



ANNUAL REPORT 2021



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About Espressif



ESPRESSIF

SHARE :: CONNECT :: INNOVATE

A Leading AIoT Solution Provider

Espressif Systems is a public, multinational, fabless, semiconductor company focused on developing cutting-edge, wireless-communication, low-power chipsets. By leveraging wireless computing, we provide green, versatile and cost-effective AIoT solutions. We have accomplished a hardware-and-software, closed-loop development cycle for a series of core technologies, including RF, Wi-Fi & Bluetooth LE network protocol stacks, RISC-V MCUs, AI instruction sets and algorithms, operating systems, toolchains, compilers, IoT software application frameworks, Cloud, etc.

We have a diverse team of engineers from around the world. All company branches employ more than 500 members of staff from almost 30 countries and regions, +75% of whom are based in our Research & Development Department. We have eight R&D centers in five countries, including China (4 out of 8), India, the Czech Republic, Brazil and Singapore. The company's increasing reputation in recent years has been instrumental in attracting talented engineers from across the world. Being united by our passion for technology, our diversity is our strength, as it allows the creative blending of different kinds of knowledge, perspectives and ways of thinking.



* Market share data from TSR

Message from the CEO

“We strive to make our chips, operating systems, frameworks, solutions, Cloud, business practices, tools, documentation, writings, ideas, etc., ever more relevant to the answers people need in contemporary life’s most pressing problems. This is Espressif’s highest ambition and moral compass.”

Teo Swee Ann,
Espressif’s Founder and Chief Executive Officer



In 2021 Espressif managed to successfully overcome the challenges which made many in the AIoT industry be fraught with worry: global chip shortages and supply chain disruptions, geopolitical and trade issues, climate crisis and the ongoing COVID19 pandemic, to name but a few. Despite all these challenges, Espressif had a truly productive year in 2021.

We started the year with [ESP32-S3](#), our AI-enabled series of SoCs supporting 200 offline commands, with 2.4 GHz Wi-Fi and Bluetooth 5 (LE), powerful AI acceleration, and strong security features. Then, having successfully launched [ESP32-C3](#) with Wi-Fi 4 and Bluetooth 5 (LE), we took our SoC offering to the next level with [ESP32-C6](#), which has a 32-bit RISC-V core with Wi-Fi 6 and Bluetooth 5 (LE) capabilities for securely connected devices. ESP32-C6, which was swiftly certified by the Wi-Fi Alliance, is unique in that not only does it pack a 2.4 GHz Wi-Fi 6 (802.11ax) radio, but it also supports the 802.11b/g/n standard for backward compatibility.

Next came [ESP32-S2-HMI-DevKit-1](#), which is specifically designed for human-machine interaction. Furthermore, we are particularly proud of Espressif's [Audio Front-End Algorithms](#) that have been qualified as a “Software Audio Front-End Solution” for Amazon Alexa built-in devices. Later in 2021, we announced [ESP32-H2](#) with IEEE 802.15.4 and Bluetooth 5 (LE) connectivity, which was soon recognized officially as a “Thread-certified component” and a “Zigbee-compliant platform”.

All of the above-mentioned MCUs were complemented with firmware, operating system support, certification, documentation, modules, and customer sampling. The same strategy will be implemented in the upcoming SoCs that we have in the pipeline. I should also mention the considerable development of [ESP RainMaker®](#), Espressif's turnkey solution to building AIoT products, which has now reached the commercial stage. This, along with the many ESP-IDF improvements in 2021, Espressif's Eclipse IDE, audio DSP, AI voice-recognition suite, ESP-Insight, and tool chain improvements, have established Espressif as a unique, one-stop, AIoT solution-provider of not just powerful hardware, but also of innovative SDKs, Firmware, Cloud backend, phone apps, and voice integrations.

In summary, not only did we increase our competitiveness in the AIoT arena, but we actually made inroads in the domains of Artificial Intelligence and Cloud computing. Thus, our products today power more than 700 million devices across the whole wide world. They are being used by independent developers and big companies alike, while Espressif is recognized as a leading force in the AIoT chip industry. Hence, we are now in a better position than ever before to further expand into new markets.

In fact, our revenue in 2021 increased by more than 60% compared to 2020, and our customer base expanded accordingly. This was -in no small part- due to our exceptional customer support, based on the huge effort of our operations team to secure adequate supplies during periods of serious disruptions in the global semiconductor supply chain, our reasonably-priced products and services, and the considerable amount of time that our account managers spent coordinating deliveries to our customers.

Our diverse, hard-working, dedicated staff is what makes us feel optimistic about the future. So, in 2022, we expect Espressif's supply chain to be further strengthened, which will enable us to launch several new products. In terms of R&D, we plan to build more chips, and continue making incremental changes to our current structures, in order to accommodate a larger variety of products that we can capitalize on.

Most importantly, though, the purpose of our R&D is not just to generate more revenue. Our primary goal, both as a company and as individuals, is to make Espressif contribute to the world something useful. We strive to make our chips, operating systems, frameworks, solutions, Cloud, business practices, tools, documentation, writings, ideas, etc., ever more relevant to the answers people need in contemporary life's most pressing problems. This is Espressif's highest ambition and moral compass.

Facts About Espressif

517

employees



75%

R&D employees



30

employee nationalities

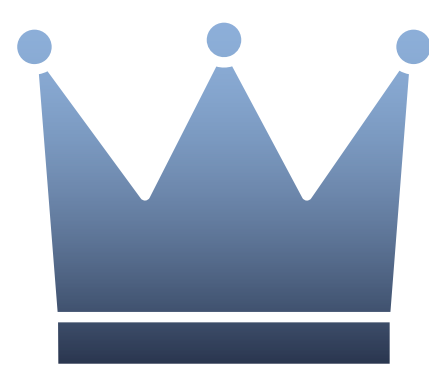


200+

millions of users in 200+ countries and regions

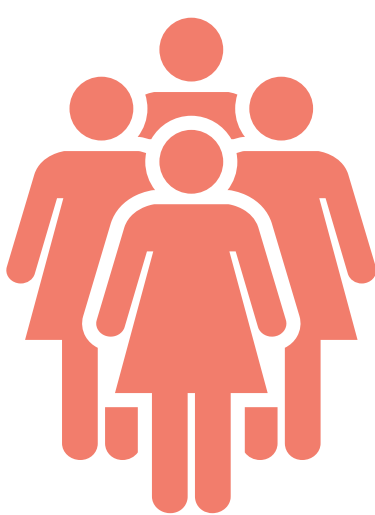
8

R&D centers



34%

female employees



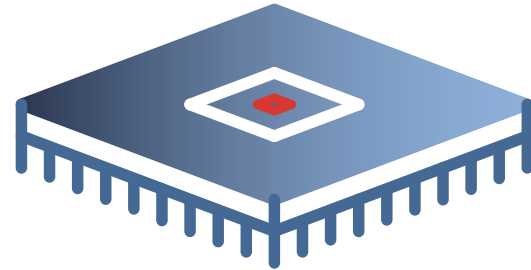
Forbes China

Espressif included in the most innovative IoT companies



>600,000

Espressif SoCs sold daily



65K+

65 K+ open-source, Espressif-powered projects on GitHub



1.5M+

1.5 M+ views for the most popular videos of Espressif-powered projects on YouTube



Book

100+ books written about Espressif's SoCs in 10+ languages



Google

31 M+ search results for ESP8266 and ESP32 on Google

Business Highlights

Key Financial Data

CNY	Fiscal Year		
	2021	2020	2019
Consolidated Statement of Income Data			
Revenue	1,386,371,541	831,286,490	757,428,577
Gross profit	549,025,732	343,235,573	356,185,901
Selling expenses	41,815,693	31,485,447	27,131,940
General and administrative expenses	55,485,146	46,595,295	54,771,687
Research and development expenses	271,689,981	192,792,044	119,748,689
Net income	198,427,708	104,051,961	158,505,350
Earnings per share:			
Basic	2.4775	1.3006	2.3196
Diluted	2.4566	1.3006	2.3196
Consolidated Balance Sheet Data			
Cash, cash equivalent and investments	1,114,558,363	1,357,770,452	1,406,188,938
Working capital	1,749,605,271	1,634,809,451	1,603,555,663
Total assets	2,129,056,143	1,829,631,150	1,725,047,426
Long-term obligations	68,244,392	50,822,540	38,017,703
Total shareholders' equity	1,823,017,913	1,641,130,356	1,609,822,892
Consolidated Cash Flow Data			
Net cash flow from operating activities	31,460,857	36,055,511	102,315,848
Non-GAAP Adjustment			
Stock-based compensation	21,787,964	18,757,990	2,102,821
Non-GAAP net income	220,215,672	122,809,951	160,608,171

Key Financial Indicators

	Fiscal Year		
	2021	2020	2019
Gross margin	39.60%	41.29%	47.03%
Chip gross margin	48.94%	45.71%	50.33%
Module gross margin	33.48%	36.00%	39.35%
R&D-to-sales ratio	19.60%	23.19%	15.81%
EBITDA margin	16.78%	14.90%	24.01%
Weighted ROE	11.52%	6.47%	18.32%
Number of Espressif employees as of December 31	517	449	345

Key Announcements



New SoCs

ESP32-H2

officially certified as a “Thread-Certified Component” and a “Zigbee-Compliant Platform”

ESP32-C6

a 2.4 GHz Wi-Fi 6 + Bluetooth 5 (LE) SoC, with a single-core, 32-bit 160MHz RISC-V microcontroller



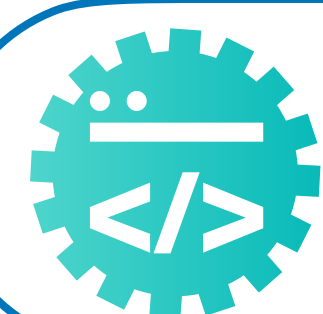
AI

AFE (Audio Front-End)

Espressif’s audio front-end algorithms have been qualified for Amazon Alexa devices

ESP-DL

a library for high-performance deep-learning resources dedicated to Espressif SoCs



OS

ESP-IDF

Espressif’s own IoT development framework, including RTOS, has been upgraded to v4.4 and has won 8.2K stars on GitHub

NuttX / Zephyr

new operating systems supported by Espressif SoCs



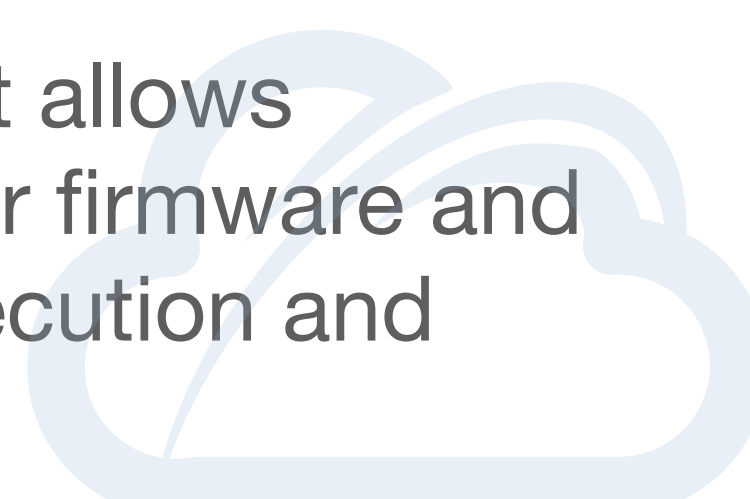
Cloud

ESP RainMaker

an AIoT cloud platform that enables customers to quickly build their own solutions based on enterprise-grade Cloud computing, with a single-click deployment

ESP Insights

a device observability framework that allows developers to remotely peek into their firmware and get detailed information about its execution and debug errors



matter

Matter Standard

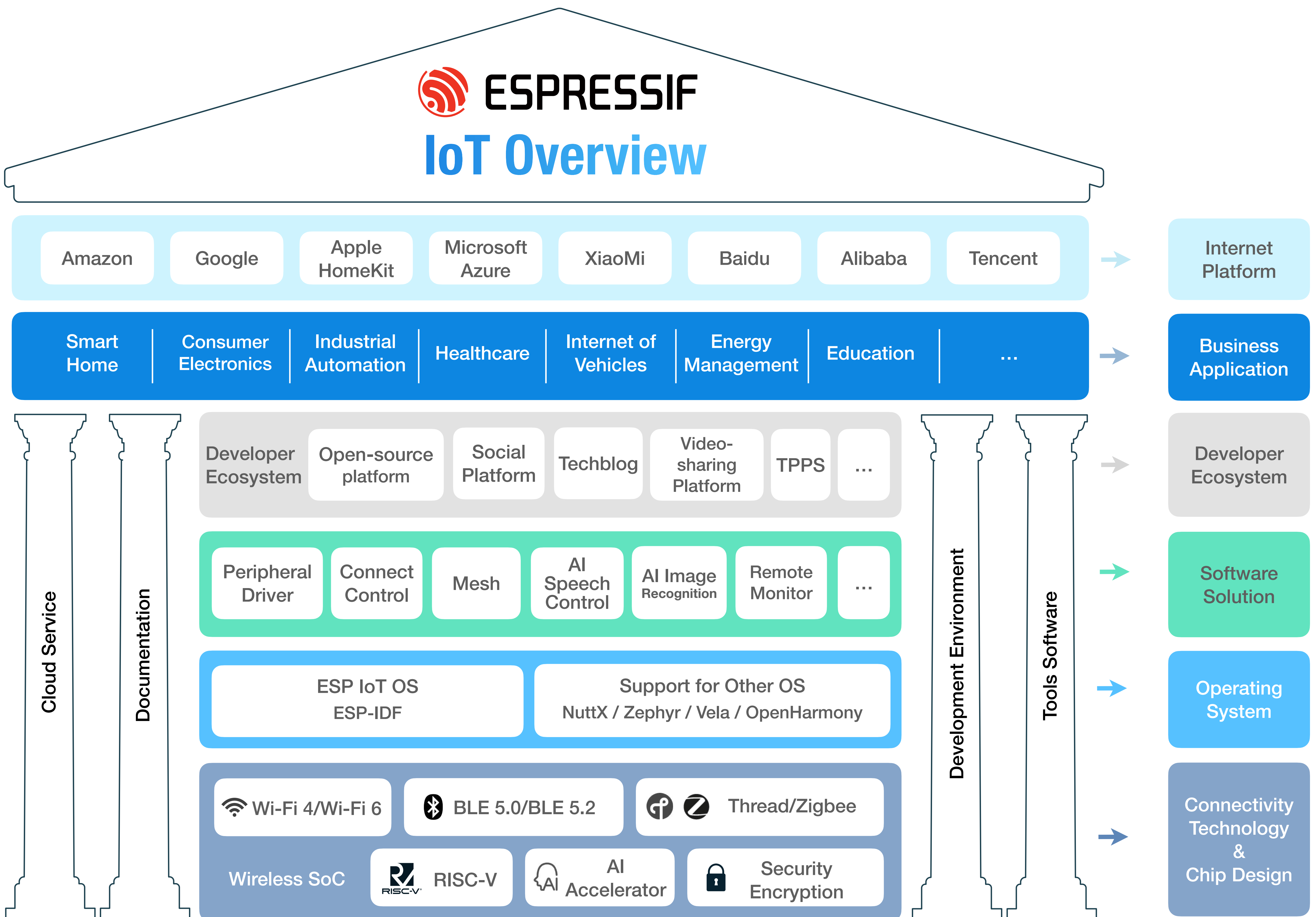
all Espressif chips, apart from ESP8266, support Matter, the latest industry-unifying, IP-based connectivity protocol.



Management Report

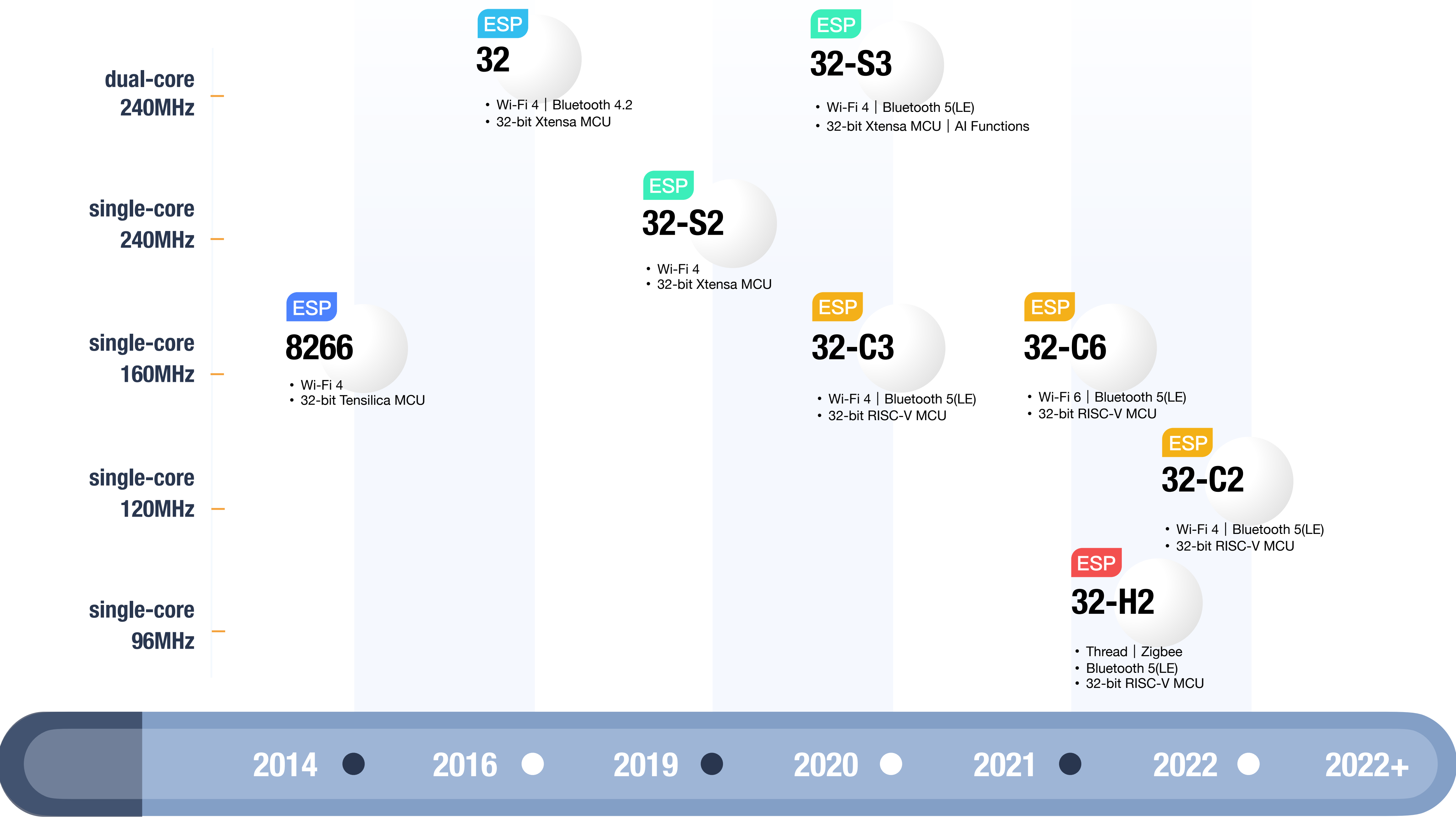
Business Strategy

Espressif Systems' business strategy emanates from our four key capabilities and our four key services/products. More specifically, the four key capabilities include Espressif's connectivity and chip design, OS-level development, software solutions, and our engagement with our ecosystem. Our four key services and products include our development environment, software tools, cloud services, and detailed documentation support. The above-mentioned structure ensures that our products are the heart of numerous commercial AIoT applications in different markets, including smart home, consumer electronics, industrial automation, healthcare, etc.



Key Products - IoT Chips

Espressif is recognized as a market leader in the field of Wi-Fi MCUs. We released our first Wi-Fi MCU in 2014, and our first Wi-Fi/Bluetooth LE combo chip in 2016. In 2020, we successfully developed our own RISC-V MCU core, adding it to our products, while in 2021, we released our first Thread/Zigbee/Bluetooth LE 5 combo chip and a 2.4GHz Wi-Fi 6 chip. In fact, we have been constantly diversifying our product portfolio, introducing new solutions through our numerous investments. Thus, we now have various product lines in all the main short-range connectivity technologies.



We also provide IoT modules based on our chips. The benefit for customers is that they can get direct support from us, shortening and optimizing their supply chain, even in case of chip shortages.

Applications

We sell our own IoT chips and modules, enabling the connectivity between various products, ranging from simple devices -such as smart light bulbs- to complicated ones, such as robots. Our core connectivity chips are Wi-Fi MCUs and Wi-Fi /Bluetooth LE (BLE) combo MCUs, which account for 98% of our revenue.

The market for Wi-Fi MCUs or Wi-Fi/BLE combo MCUs is truly diverse, including applications for smart homes (smart lights, air conditioners, ovens, coffee machines, etc.), consumer electronics (e.g., smart speakers), industrial automation (e.g., mechanical arms), healthcare (e.g., monitoring devices for diabetes, blood pressure, COVID-19, etc.), energy control (solar energy devices, EV chargers, etc.), the internet of vehicles (OBD devices, dash boards, etc.), education (talking pens, interactive white boards, etc.) and others, such as drones, robots, wireless POS, and asset trackers.

Smart Homes



Smart oven

Consumer Electronics

Smart speaker



Industrial Automation



Mechanical arm

Healthcare

Medical detector



Energy Management

Solar energy device



Internet of Vehicles



OBD devices

Education

Talking pen



Others



.....

Core Competitiveness

Espressif's competitiveness stems from our previously-referred to “four key capabilities and four key services/products” —our business philosophy, which helps us make a difference on the market in terms of the chips, operating systems and software that we offer, within our vibrant ecosystem.

Chip Competitiveness

Espressif takes pride in the invaluable experience that our R&D team leaders have in the field of wireless-communication chips. Additionally, Espressif's founder and CEO, Mr Teo Swee-Ann, has over 20 years of experience in the semiconductor industry, having also registered over 40 IC and IoT-related patents under his name.

After the huge success of our initial series of Wi-Fi MCUs, our company expanded to other wireless-connectivity technologies, including Bluetooth LE and Thread/Zigbee. This development has further enhanced our Company's high-tech offerings, thus increasing our market opportunities, while also keeping our customers spoiled for choice.

Our products are renowned for their high level of integration, small size, low power consumption, great computing power, large memory space and strong security mechanism. Our products power over 700 million devices across the whole wide world. They are being used by independent developers and big companies alike, while Espressif is recognized as a leading force in the AIoT chip industry.

System Competitiveness

ESP-IDF is Espressif's official IoT Development Framework for the ESP32, ESP32-S, ESP32-C and ESP32-H series of SoCs. It provides a self-sufficient SDK for any generic application development on these platforms, using programming languages such as C and C++. ESP-IDF currently powers millions of devices in the field, and enables building a variety of network-connected products, ranging from simple light bulbs and toys to big appliances and industrial devices.

ESP-IDF has a well-defined release process and a support policy which ensures that customers can choose a stable release and that they continue getting important fixes for their application. Each stable release undergoes a rigorous QA process that ensures production readiness. Also, ESP-IDF comes with an extensive documentation for its software components not only at the usage level but also at the design level. This helps developers to fully understand what ESP-IDF offers, and select whatever suits their applications best.

Furthermore, ESP-IDF supports a large number of software components, including RTOS, peripheral drivers, networking stack, various protocol implementations, and helpers for common application use-cases. These components help developers to focus on the business logic, while the SDK provides most of the building blocks

required for typical applications. Open-source and freely-available developer tools, as well as officially supported Eclipse and VSCode IDEs ensure ease-of-use for developers.

Software Competitiveness

ESP-WIFI-MESH is a wireless communication network with nodes organized in a mesh topology using the simultaneous AP-STA feature on Espressif SoCs. It provides a self-forming and self-healing network, with ease of deployment. The network topology of ESP-WIFI-MESH can scale up to 1,000 nodes in large areas, without requiring any support for specific Wi-Fi infrastructure. ESP-WIFI-MESH can also be used to cover Wi-Fi blind spots in home-deployment scenarios where the Wi-Fi signal cannot be reached. We also provide ready-to-use, yet customizable, phone apps that facilitate the auto-discovery of new nodes which allow their easy configuration with the Bluetooth LE method. Finally, ESP-WIFI-MESH is based on standard Wi-Fi connectivity and it can use standard WPA2 network security among the mesh nodes to ensure communication security.

Additionally, ESP-BLE-MESH is an open-source protocol stack based on Bluetooth® mesh. It is fully certified by the Bluetooth® Special Interest Group and supports all the functions and application models of the Bluetooth® Mesh Specification v1.0.1. By using the ESP-BLE-MESH technology, different types of standard Bluetooth® mesh devices from different manufacturers can achieve interoperability, communicating with one another reliably and securely. In fact, the big advantage of using the ESP-BLE-MESH technology is that, with an OTA upgrade on existing Bluetooth LE devices, users can implement a mesh network. This is why Bluetooth® mesh has become so popular.

Furthermore, ESP RainMaker® is a complete system for building AIoT products with a minimal amount of code, empowering our customers to develop and deploy secure, customized AIoT solutions. It covers all Espressif chips and modules, device firmware, voice-assistant integrations, phone apps and Cloud backend. This helps our customers save a large investment in Cloud capabilities, gain independence and focus on innovating their core-value offering.

Ecosystem Competitiveness

Our company has brought together professionals and companies from across the AIoT industry, e.g., hardware and software developers, business applications, and Cloud platforms, as well as maker communities. Espressif's own software development platforms and the accompanying documentation are entirely open-source, thus making our innovative products available to people from all walks of life.

As a result, thousands of third-party projects have been based on Espressif technologies. For example, on GitHub, which is the largest provider of Internet hosting for software development, there are more than 65,000 open-source projects based on Espressif's IoT chips. Furthermore, the popularity of our products has stimulated an increasing number of authors who have produced teaching resources based on Espressif chipsets in several languages including English, Chinese, German, Portuguese, Japanese, and Serbo-Croatian. At present, there are more than 100 digital and physical books about Espressif's SoCs.



Ecosystem Competitiveness (continued)

DEVELOPER COMMUNITY CONTENTS

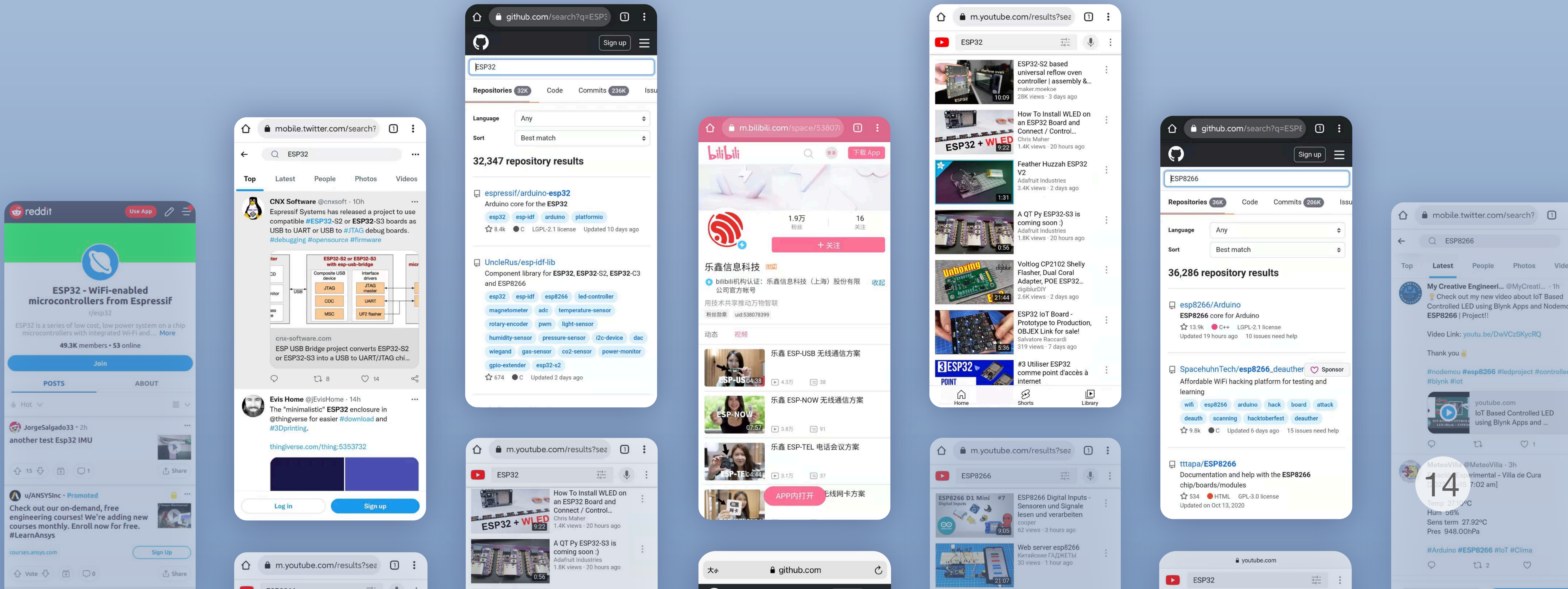
ITEM	Dec 31, 2021	Dec 31, 2020	change%
GitHub (Worldwide open-source development platform)			
ESP32 Projects	29,007	19,091	52%
ESP8266 Projects	35,055	30,161	16%
Gitee (Chinese open-source development platform)			
ESP32 Projects	2,592		*
ESP8266 Projects	1,867		*
CSDN (Chinese Tech-blog platform)			
Search results for ESP32	79,188	65,144	22%
Search results for ESP8266	30,033	23,563	27%
Hackaday (open-source hardware platform)			
ESP32 projects	3,816		*
ESP8266 projects	5,789		*
Reddit			
ESP32 group members	46,540		*
ESP8266 group members	53,523		*
bilibili (Chinese video-sharing platform)			
Official account followers	17,502	3,352	422%
Official account views	390,000	62,000	529%
YouTube			
Official account subscribers	11,600		**
Official account views	556,846		**
ESP32 community videos	466,459	284,505	64%
ESP8266 community videos	687,155	544,174	26%
Views of most watched ESP32 community video	around 1.5m	around 1.2m	
Views of most watched ESP8266 community video	around 1.5m	around 1.4m	

N.B.:

*The search results mentioned above were retrieved on Jan. 29, 2022.

**The search results mentioned above were retrieved on Apr. 10, 2022.

Statistical data derived from different platforms may be based on different collecting methods. It is possible for certain platforms to modify their algorithms from time to time and, therefore, impact the resulting statistical data. The above-mentioned data resulted from the Company’s research at the end of each fiscal year reported here, unless otherwise stated.



Business Model

B2D2B

Business-to-Developer-to-Business

Espressif has deployed the Business-to-Developer type of marketing, not only because it has gained prominence in recent years, but also because it has proven to be more viable with the increased influence of developers on organizations of all sizes. In other words, most developers are R&D employees in various companies and bring about business opportunities from the companies they work for.

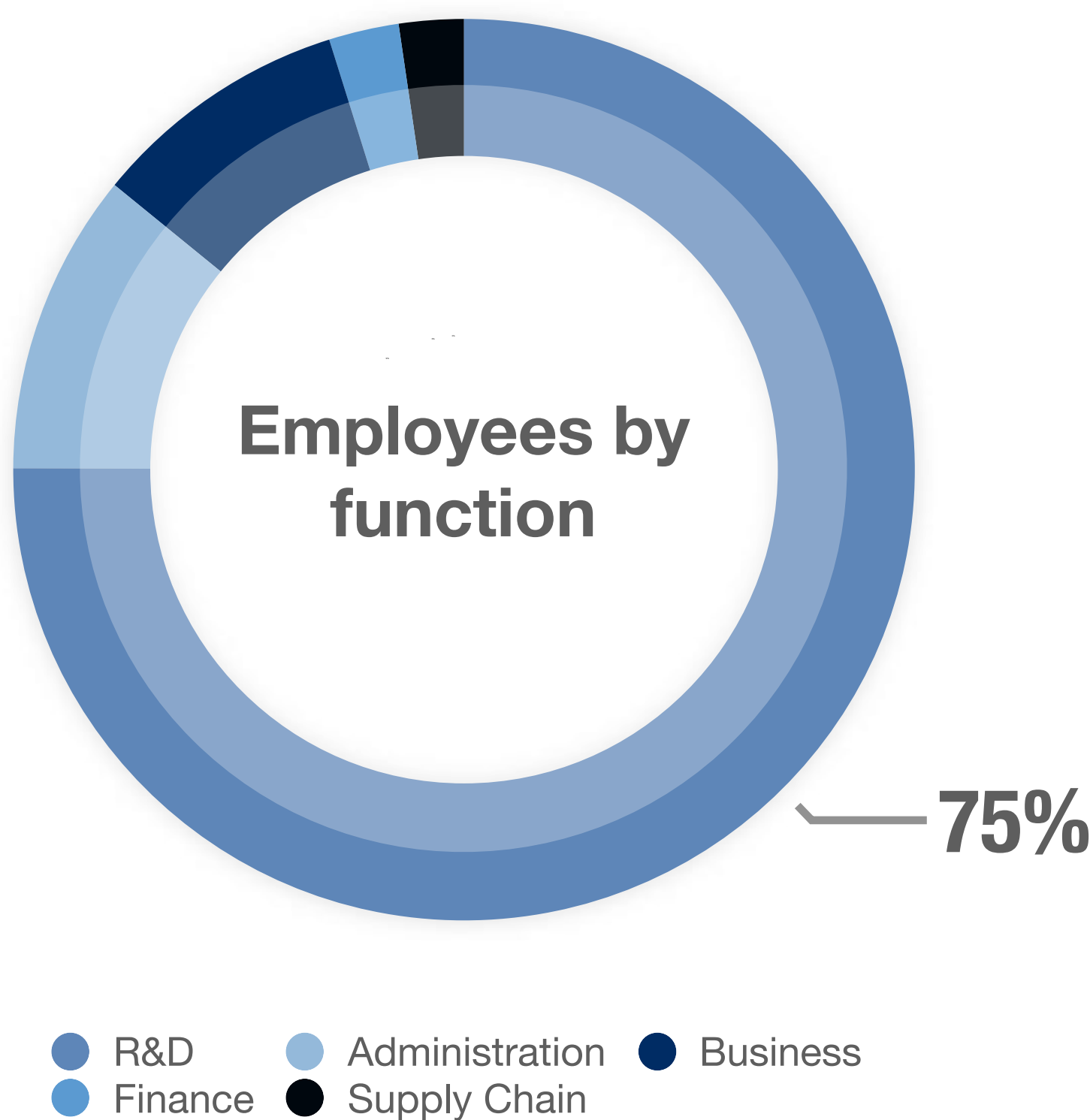
This way, the developer ecosystem we have created at Espressif demonstrates how the value of networks can grow exponentially:

- The more developers we attract as customers, the more hardware and software solutions we generate.
- The more successful hardware and software solutions we create, the more our reputation spreads with positive feedback from happy customers/developers.
- The above-mentioned interaction between people in our network prompts the creation of more content, which -in turn- attracts more users/developers searching for new content.
- Likewise, other third-party development platforms join the ecosystem and bring in new developers, as our influence continues to grow.

Having successfully applied the B2D2B model, Espressif can now focus on R&D investments, while maintaining a small business team that directly supports a large number of customers. In fact, most of our revenue is gained through direct sales.

Number of Employees

	December 31, 2021
R&D	388
Administration	56
Business	48
Finance	13
Supply Chain	12
Total	517



Financial Performance

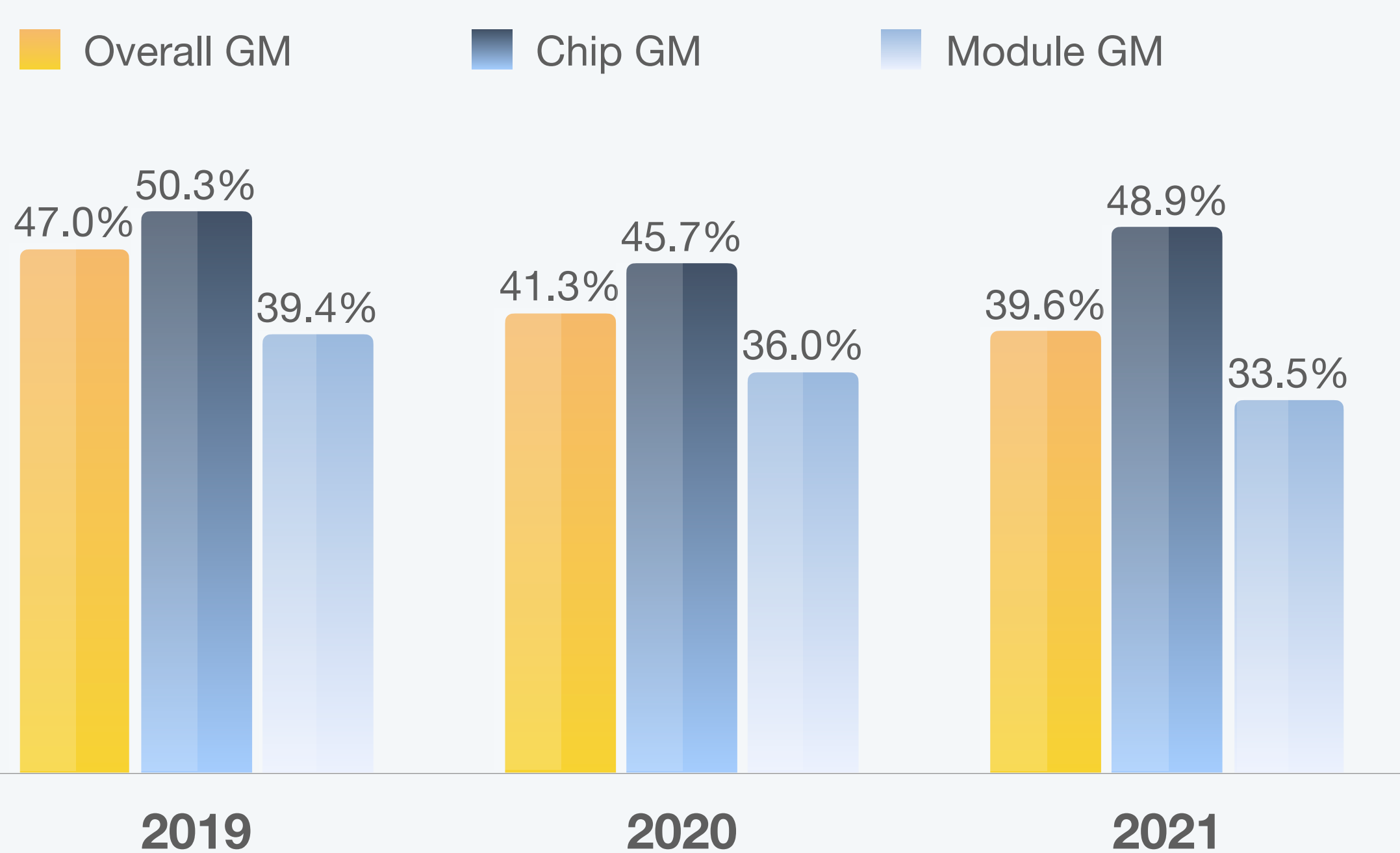
The big picture

Espressif's total revenue in 2021 was CNY 1,386 million, marking an increase of 66.77% from CNY 831million in 2020, due to the company's IoT sales growth. The ensuing net income was CNY 198 million, which marked an increase of 90.70% year-on-year.

Given the chip shortages across the semiconductor industry, the upstream cost of chips and modules rose in 2021, passing this through to retail prices. The overall gross margin was 39.6%, in which the IoT chip gross margin was 48.94%. The overall gross margin decreased due to the increased module shipment.

Customers tend to select larger memory capacity for their applications, which correspondingly comes with higher cost, thus resulting in a decrease in the gross margin of the module. However, we keep the chip margin to a reasonable level, in order to support our future R&D expenditure. The module margin fluctuates depending on its memory capacity. Overall, the gross profit of a module is higher than that of a chip.

Gross Margin by Product Category



Shipment by Product Category

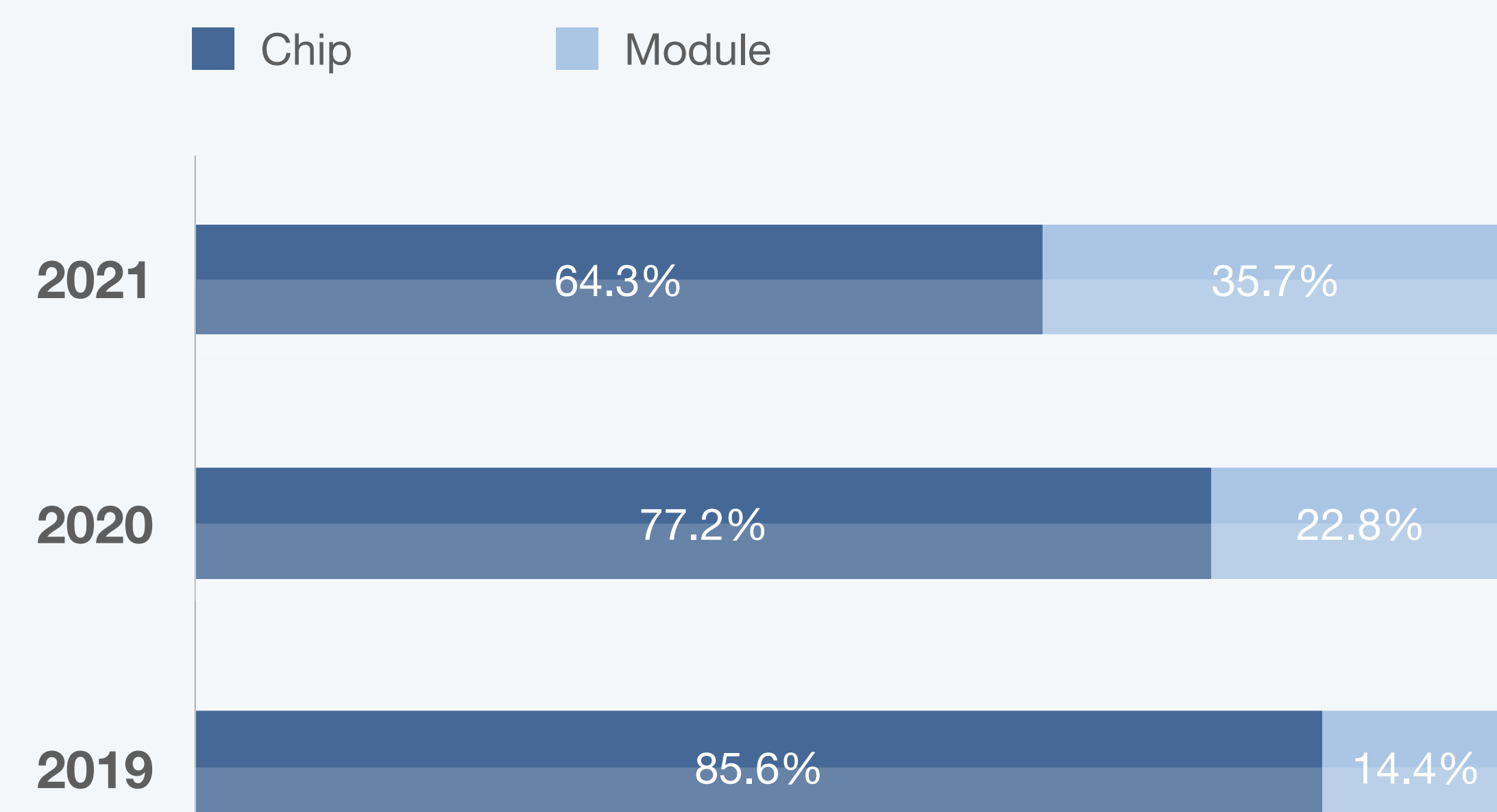


Table of Production and Shipment

pcs in million	Production	Shipment	End-of-Year Inventory	Increase of production YoY	Increase of shipment YoY	Increase of inventory YoY
Chip	170.53	145.71	41.50	27.55%	12.70%	148.89%
Module	85.35	80.79	7.60	116.88%	111.68%	150.16%
Total	255.88	226.50	49.10	47.87%	35.26%	149.09%

N.B.: Each module includes one Espressif chip. Therefore, we have excluded the number of chips used in modules in the statistics of chips. We delivered 226.50m chips in 2021, which marked an increase of 35.26% from 2020.

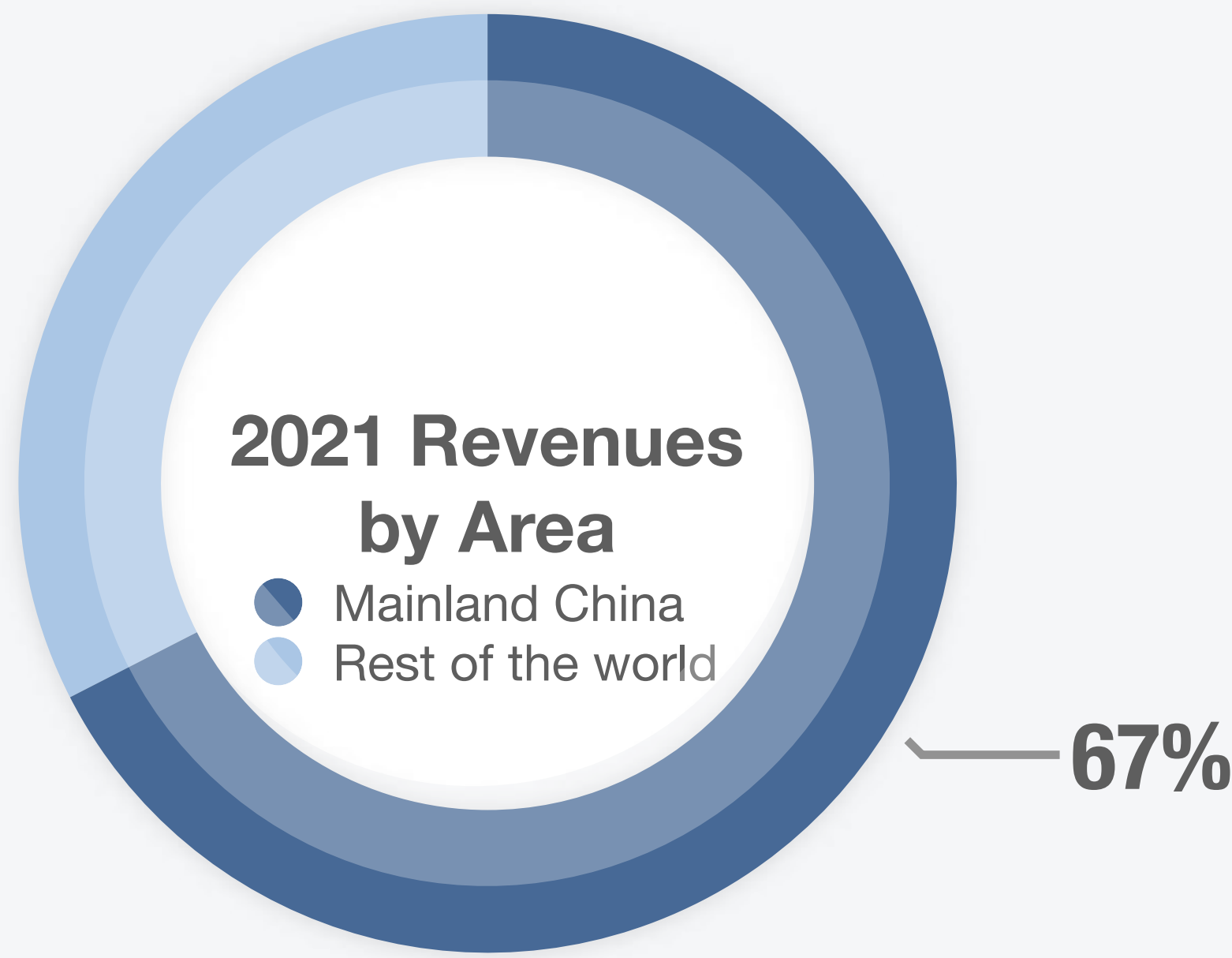
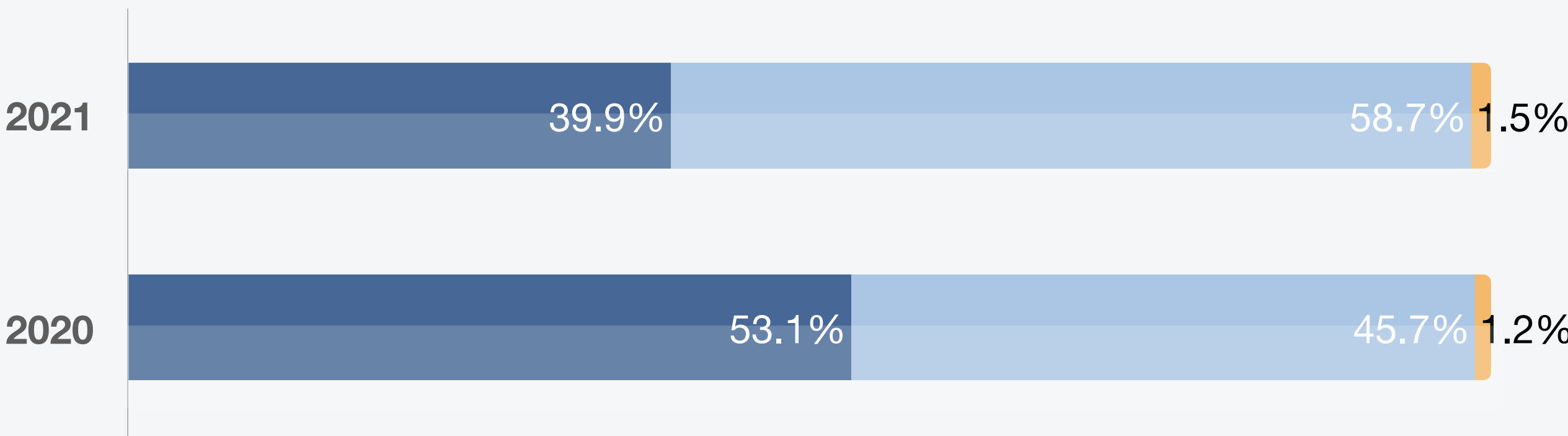
Main Business Operations

Changes in Key Aspects of Income and Cash Flow

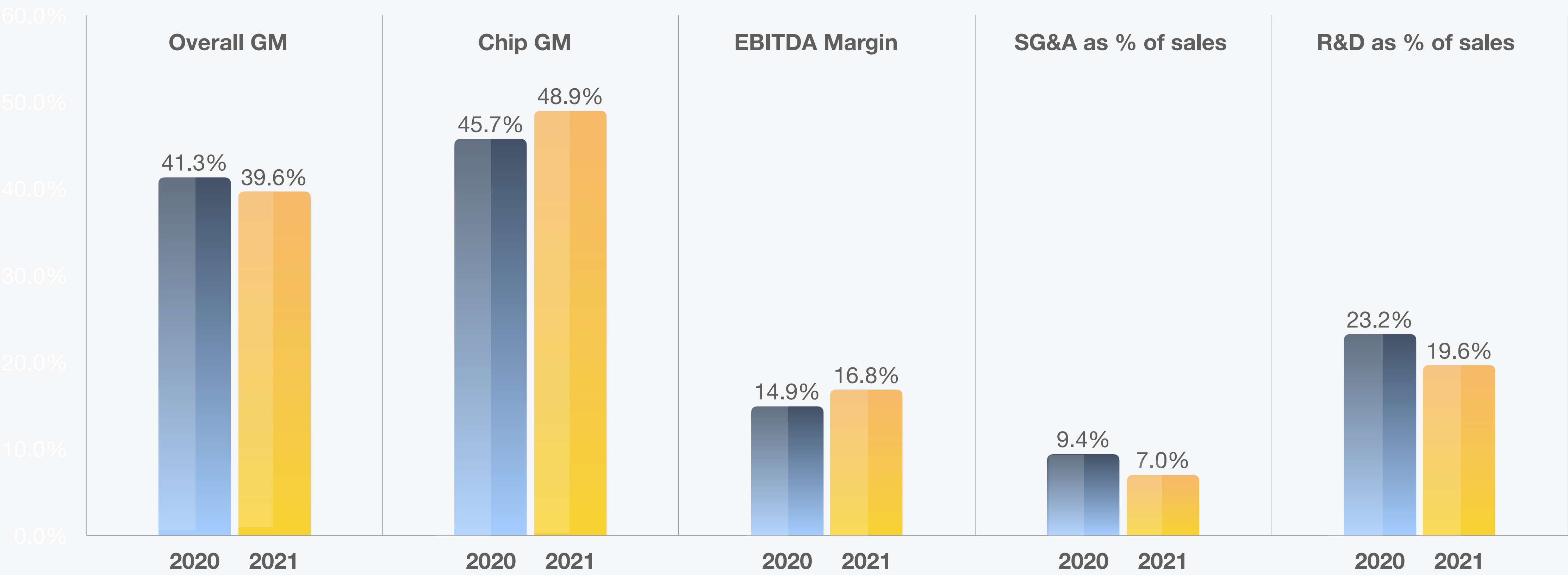
CNY	Fiscal Year		Change (%)
	2021	2020	
Revenue	1,386,371,541	831,286,490	66.77
Cost of revenue	837,345,809	488,050,917	71.57
Selling expenses	41,815,693	31,485,447	32.81
General and administrative expenses	55,485,146	46,595,295	19.08
Research and development expenses	271,689,981	192,792,044	40.92
Financial expenses	-2,312,067	-3,060,677	-24.46
Net income	198,427,708	104,051,961	90.70
Non-GAAP net income	220,215,672	122,809,951	79.31
Net cash flow from operating activities	31,460,857	36,055,511	-12.74
Net cash flow from investing activities	-119,672,349	423,821,658	-128.24
Net cash flow from financing activities	-38,832,903	-68,042,287	-42.93

Revenues by Product Category

Chip Module Others



Key Financial Indicators



Research and Development

R&D Investment

R&D investment is at the heart of Espressif Systems' development. During the reporting period, R&D cost CNY 271.69 million, which marked a 40.92% increase compared to 2020. At the same time, the R&D-to-sales ratio was 19.60% in 2021.

Espressif's escalating R&D investment cost can be attributed to the increase in R&D staff, the implementation of the company's stock incentive plans, as well as software and licensing fees, which increased significantly year-over-year.

CNY	Fiscal Year		change
	2021	2020	
R&D Expenses	271,689,981	192,792,044	40.92%
R&D-to-sales ratio	19.60%	23.19%	

Intellectual Property

We seek to protect our technology through a combination of patents, software copyright and trade secrets. By the end of December 2021, the Company had been granted 119 patents. We continue to submit new patent applications relating to our recent R&D innovations.



List of Intellectual Property Rights Applied and Granted

	2021		Cumulative number	
	Applied for	Granted	Applied for	Granted
Invention patents	13	18	114	62
Utility model patents	0	1	26	26
Design patents	0	0	1	1
Software copyright	1	2	19	19
Others	14	5	50	11
Total	28	26	210	119

N.B.: The number of patents that have been “applied for” does not include the rejected applications in China, or the PCT patent applications not submitted to any particular country, or any patent applications beyond the reporting period. The number of “granted” patents includes those with expired IP rights. The category of “others” includes overseas (non-Chinese) patent applications, i.e. the PCT patent applications, U.S. patent applications through the PCT route or the Paris Convention route, as well as patent applications in India.

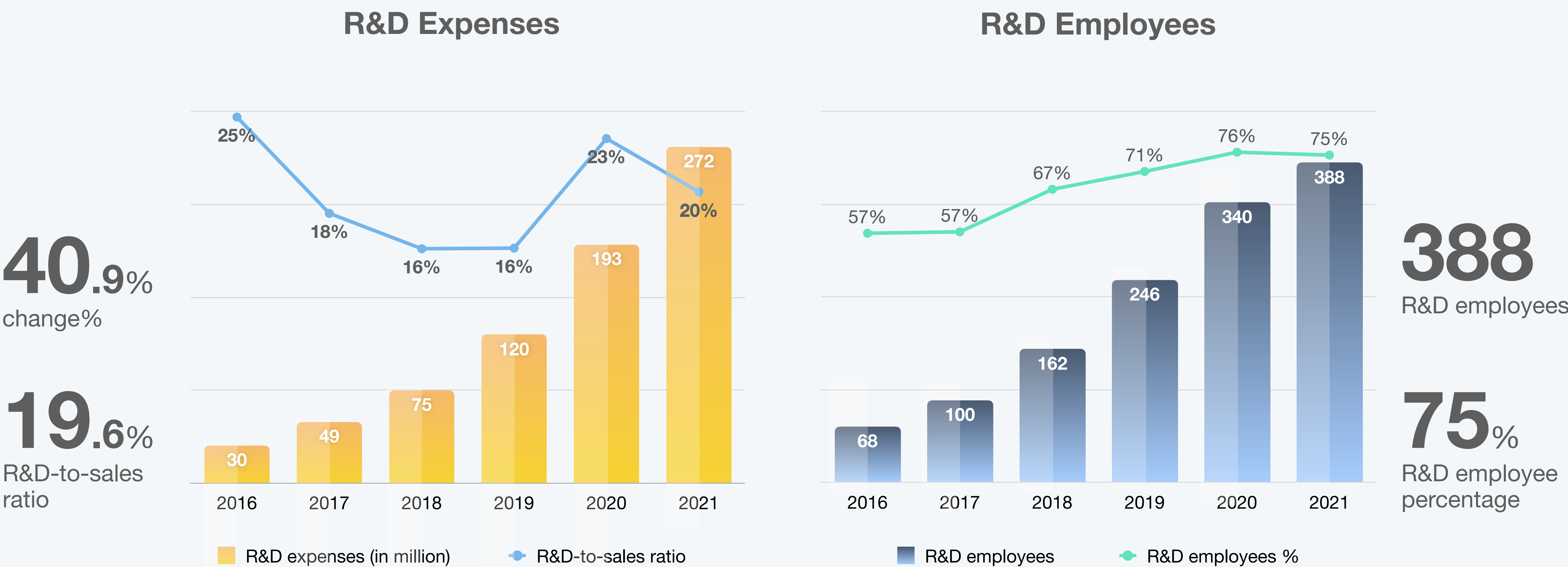
R&D Employees

We are proud of our talented, diverse and multicultural workforce. As of Dec 31, 2021, across our eight branches worldwide, we have employed 517 people, more than 75% of whom are in engineering roles. Meanwhile, we have expanded our business beyond Wi-Fi MCUs, thus offering innovative solutions to wireless connectivity and processing, including AI, RISC-V MCU, Wi-Fi 6, Bluetooth LE, Thread, Zigbee and other IoT-related technologies.

Since the research and development of software and hardware are inextricably intertwined, we constantly invest in software technology, too. Hence, we are currently focused on AIoT technologies, including toolchains, compilers, operating systems, application frameworks, AI algorithms, Cloud products, apps, etc. Our aim is to make Espressif a one-stop solution-provider offering anything relating to hardware, software and the Cloud.

	Fiscal Year	
	2021	2020
R&D employees	388	340
R&D employees as a percentage of total employees	75.05%	75.72%
Total compensation of R&D employees (CNY in thousands)	200,254	143,563
Average compensation of R&D employees (CNY in thousands)	550	490

272 million in R&D expenses



Ownership of Securities

Basic information of securities

Share types	Ordinary share
Share capital	80,158,963 (as of December 31, 2021)
Listing	Shanghai Stock Exchange (SSE)
Ticker	688018.SH
Listing Date	2019-07-22

Shareholder Structure as of Dec 31, 2021

Shareholder	Share Numbers	Percentage (%)
Espressif (Hong Kong) Investment Ltd.	34,860,000	43.49
Yadong Beichen Investment Management Co., Ltd.	3,370,061	4.20
Shinvest Holding Ltd.	2,804,446	3.50
BOC - Franklin Templeton Sealand Fund	1,344,085	1.68
ABC - Franklin Templeton Sealand Fund	1,047,539	1.31
Ningbo Meishan Free Trade Port Le Tun Investment Management Partnership (Limited Partnership)	1,046,030	1.30
BOC - Taixin Medium and Small Cap Selected Stock Securities Investment Fund	940,000	1.17
Jingyang Wang	937,210	1.17
New China Life Insurance Company Ltd. – Group Annuity Insurance – 018L – FH001 SH	818,651	1.02
BOC - Cathay Pacific CES Semiconductor Chip ETF	689,695	0.86
Top ten shareholders	47,857,717	59.70
Other public shareholders	32,301,246	40.30
Total of outstanding shares	80,158,963	100.00

Stock-Based Compensation

Espressif has three ongoing restricted stock incentive plans. The fair value of the restricted stock incentive plans is estimated using the Black-Scholes model. The following table presents details of stock-based compensation costs acknowledged in the Consolidated Statements of Income.

Restricted Stock Incentive Plans

Plan	Award Type	Number of Underlying Shares	Ratio of Underlying Shares (%)	Number of Employees in the Plan	Proportion of Awarded Employees to Total (%)	Grant Price (CNY)
2019 restricted stock incentive plan	Class II restricted stocks	288,300	0.3597	21	4.06	63.625
2020 restricted stock incentive plan	Class II restricted stock	240,787	0.3004	169	32.69	93.625
2021 restricted stock incentive plan	Class II restricted stock	1,093,164	1.3637	246	47.58	94.500

Stock-Based Compensation

CNY	Fiscal Year		
	2021	2020	2019
Selling expenses	897,990	588,065	
G&A expenses	1,722,458	1,235,804	164,228
R&D expenses	19,167,516	16,934,121	1,938,593
Total stock-based compensation	21,787,964	18,757,990	2,102,821

Risks and Uncertainties



Financial Risk

The Company performs periodic credit evaluations of its customers' financial condition and generally requires no collateral from its customers. The Company provides an allowance for expected credit losses based on the net amount expected to be collected on such receivables. Losses have not been significant for any of the periods presented.



R&D Risk

Espressif's research and development strategy is focused on leveraging new technologies for the creation of innovative AIoT products. Any delays or changes in the development of these technologies by our industry partners, or a failure of our products to achieve market acceptance could compromise our competitive position.



Competitors

As the market for AIoT products grows, we face an increasing antagonism from relatively large competitors, such as Realtek, MediaTek, Infineon, NXP, Qualcomm and others. Intense competition from current players as well as new entrants may reduce our product sales and market share.



Suppliers

A significant portion of the Company's products is fabricated by Taiwan Semiconductor Manufacturing Co. (TSMC). The inability of TSMC to deliver wafers to the Company in a timely manner could impact the production of the Company's products for a substantial period of time, which could have an adverse effect on the Company's business, financial condition, results of operations and cash flow.



Customers

The Company sells directly to end customers, distributors, solution providers and contract manufacturers. Our customers are a mix of several big customers and numerous small customers. The concentration ratio for our top-five customers was 29.05%, 42.18% and 50.96% during the fiscal years of 2021, 2020 and 2019, respectively. None of the customers accounted for greater than 10% of our revenue during the fiscal year of 2021.

Consolidated Financial Statements

Consolidated Balance Sheet

CNY	December 31, 2021	December 31, 2020
Assets		
Current assets:		
Cash and bank balances	367,149,078	503,239,989
Transactions of monetary assets	747,409,285	854,530,463
Notes receivable	11,600,177	3,710,773
Accounts receivable, net	306,823,758	182,138,716
Prepayments	8,172,703	6,312,319
Other receivables	9,519,869	13,884,859
Including: Interest receivable	298,796	
Inventories	326,168,928	196,155,326
Other current assets	210,555,311	12,515,259
Total current assets	1,987,399,110	1,772,487,705
Non-current assets:		
Investment in other equity assets	56,600,700	6,646,876
Fixed assets	46,176,368	24,991,572
Construction work in progress		4,868,345
Right-of-use assets	21,731,123	
Intangible assets	3,191,335	4,036,053
Long-term deferred expenses	7,582,637	6,714,956
Deferred income tax assets	6,374,870	9,885,643
Total assets	2,129,056,143	1,829,631,150

Consolidated Balance Sheet

CNY	December 31, 2021	December 31, 2020
Liabilities & Shareholders' Equity		
Current liabilities:		
Accounts payable	138,572,198	83,093,192
Contract liabilities	17,184,196	3,569,826
Payroll payable	66,168,763	49,476,684
Taxes payable	6,472,494	489,933
Other payable	754,261	1,048,619
Non-current liabilities due within one year	8,641,928	
Total current liabilities	237,793,839	137,678,254
Non-current liabilities:		
Lease liabilities	12,116,036	
Deferred income tax liabilities	56,128,356	50,822,540
Total liabilities	306,038,230	188,500,794
Owners' equity (or shareholders' equity):		
Share capital	80,158,963	80,030,500
Capital reserves	1,266,771,034	1,235,113,896
Other comprehensive income	-15,711,579	-7,401,076
Surplus reserves	33,462,951	15,428,165
Retained earnings	458,336,543	317,958,872
Total shareholders' equity	1,823,017,913	1,641,130,356
Total liabilities and shareholders' equity	2,129,056,143	1,829,631,150

Consolidated Income Statement

CNY	End of Year	
	December 31, 2021	December 31, 2020
Revenue	1,386,371,541	831,286,490
Cost of Revenue	837,345,809	488,050,917
Gross Profit	549,025,732	343,235,573
Taxes and surcharges	3,556,395	849,935
Selling expenses	41,815,693	31,485,447
General and administrative expenses	55,485,146	46,595,295
Research and development expenses	271,689,981	192,792,044
Financial expenses	-2,312,067	-3,060,677
Including: Interest expenses	608,767	
Interest income	4,379,324	5,535,051
Add: Other income	4,251,502	5,619,810
Investment income (mark "-" for loss)	20,794,725	28,328,313
Incomes from changes in fair value (mark "-" for loss)	4,509,285	1,530,463
Credit impairment losses (mark "-" for loss)	-13,830	83,916
Assets impairment losses (mark "-" for loss)	34,567	322,345
Assets disposal income (mark "-" for loss)	-2,124	
Operating Income	208,364,710	110,458,376
Add: Non-operating revenues	66,231	38,227
Less: Non-operating expenses	100,817	37,409
Income before income taxes	208,330,124	110,459,194
Provision (benefit) for income taxes	9,902,416	6,407,233
Net Income	198,427,708	104,051,961
Earnings per share		
Basic	2.4775	1.3006
Diluted	2.4566	1.3006

CNY	End of Year	
	December 31, 2021	December 31, 2020
Net Income	198,427,708	104,051,961
Other comprehensive income (loss), after tax		
Changes to the fair value of investment in other equity instruments	11,929	-15,150
Currency translation reserves	-8,322,431	-23,445,049
Other comprehensive income (loss)	-8,310,502	-23,460,199
Comprehensive income	190,117,205	80,591,761

Consolidated Cash Flow Statement

CNY	End of Year	
	December 31, 2021	December 31, 2020
Operating Activities		
Cash from sales of merchandise and provision of services	1,453,744,622	869,774,621
Tax refund	37,691,770	20,697,886
Other received cash related to operational activities	8,720,037	12,107,089
Subtotal of cash inflow from operational activities	1,500,156,429	902,579,596
Cash paid for merchandise and services	1,105,365,342	615,349,137
Cash paid to and for employees	232,723,048	164,201,039
Cash paid for taxes and surcharges	41,903,120	16,548,700
Other paid cash related to operational activities	88,704,063	70,425,209
Subtotal of cash outflow from operational activities	1,468,695,573	866,524,086
Net cash flow provided by operating activities	31,460,857	36,055,511
Investment activities		
Cash arising from disposal of investments	3,096,596,236	4,337,234,513
Cash arising from investment income	3,266,350	
Net cash arising from disposal of fixed assets, intangible assets and other	12,510	
Other received cash related to investment activities	1,535,102	
Subtotal of cash inflow from investment activities	3,101,410,198	4,337,234,513
Cash paid for purchase and construction of fixed assets, intangible assets and other long-term assets	31,912,546	21,702,855
Cash paid for investments	3,187,670,000	3,891,710,000
Other paid cash related to investment activities	1,500,000	
Subtotal of cash outflow from investment activities	3,221,082,546	3,913,412,855
Net amount of cash flow provided by investment activities	-119,672,349	423,821,658
Financing activities		
Cash arising from the issuance of common stock	9,997,637	1,957,713
Including: Cash arising from subsidiaries absorbing investments by		
Subtotal of cash inflow from financing activities	9,997,637	1,957,713
Cash paid for distribution of dividends and profits or payment of interests	40,015,250	70,000,000
Including: dividends and profits paid to minority shareholders by		
Other paid cash related to financing activities	8,815,291	
Subtotal of cash outflow from financing activities	48,830,541	70,000,000
Net cash flow provided by financing activities	-38,832,903	-68,042,287
Impact of fluctuation in exchange rate on cash and cash equivalents	-9,052,722	-24,587,777
Net increase in cash and cash equivalents	-136,097,117	367,247,104
Add: Cash and cash equivalent at the commencement of the period	503,239,843	135,992,739
Cash and cash equivalents at the end of the period	367,142,726	503,239,843

Additional Information on Cash Flow Statement

CNY	End of Year	
	December 31, 2021	December 31, 2020
Additional information		
Net income	198,427,708	104,051,961
Adjustments to reconcile net income to cash provided by operating activities:		
Add: provision for impairment of assets	-34,567	-322,345
Credit impairment provision	13,830	-83,916
Depreciation of fixed assets	11,167,228	9,566,370
Depreciation of right-of-use assets	7,547,081	
Amortization	844,718	761,769
Amortization of long-term prepaid expenses	4,129,969	3,080,182
Losses on disposal of fixed assets, intangible assets and other long-term assets (mark "-" for income)	2,124	
Losses on scrapping of fixed assets (mark "-" for income)	162	129
Losses on fair value changes (mark "-" for income)	-4,509,285	-1,530,463
Financial expenses (mark "-" for income)	1,700,139	2,185,811
Losses on investment (mark "-" for income)	-20,794,725	-28,328,313
Decrease on deferred income tax assets (mark "-" for increase)	3,568,877	-7,382,277
Increase on deferred income tax liabilities (mark "-" for decrease)	5,305,815	12,787,379
Changes in operating assets and liabilities:		
Decrease in inventories (mark "-" for increase)	-129,902,049	-97,761,746
Decrease in operational receivables (mark "-" for increase)	-159,345,382	-50,969,810
Increase in operational payables (mark "-" for decrease)	91,379,998	71,242,790
Others	21,959,215	18,757,990
Net cash flow provided by operating activities	31,460,856	36,055,511

Consolidated Statement of Changes in Equity

CNY	Share capital	Capital reserves	Other comprehensive income	Surplus reserves	Retained earnings	Total equity
Balance as of December 31, 2019	80,000,000	1,214,428,693	16,059,123	11,122,473	288,212,604	1,609,822,892
Comprehensive income, net of tax						
Net Income					104,051,961	104,051,961
Other comprehensive income			-23,460,199			-23,460,199
Transactions with owners						
Capital increase	30,500	4,399,238				4,429,738
Stock-based compensation		16,285,965				16,285,965
Surplus reserves				4,305,692	-4,305,692	
Dividends					-70,000,000	-70,000,000
Balance as of December 31, 2020	80,030,500	1,235,113,896	-7,401,076	15,428,165	317,958,872	1,641,130,356
Comprehensive income, net of tax						
Net Income					198,427,708	198,427,708
Other comprehensive income			-8,310,502			-8,310,502
Transactions with owners						
Capital increase	128,463	20,963,006				21,091,469
Stock-based compensation		10,694,132				10,694,132
Surplus reserves				18,034,786	-18,034,786	
Dividends					-40,015,250	-40,015,250
Balance as of December 31, 2021	80,158,963	1,266,771,034	-15,711,578	33,462,951	458,336,543	1,823,017,913

Further Information

Terms and Conditions of the Annual Report

Responsibility Statement

The Board of Directors, the Board of Supervisors and executive management of the Company warrant that the contents of this annual report are true, accurate and complete, and do not contain any false information, misleading statements or material omissions, severally and jointly accepting any legal responsibility thereof.

Shanghai, 10 March 2022
Espressif Systems

Board of Directors

Teo Swee Ann

Founder and Chairman

Ng Pei Chi

Information Technology Officer

Teo Teck Leong

Shareholder elected

Xu Xin

Shareholder elected

Lan Yuzhe

Independent Director

Koh Chuan Koon

Independent Director

Lee Sze Chin

Independent Director

Board of Supervisors

Lv Zhihua

Employee elected

Fu Hanyu

Shareholder elected

Wang Yiwen

Shareholder elected

Executive Management

Teo Swee Ann

Founder and CEO

Wang Jue

Deputy General Manager

Shao Jingbo

Financial Director

Forward-looking Statements

This report contains forward-looking statements and/or assessments about the business, financial condition, performance and strategy of the Espressif Group. These statements and/or assessments are based on assumptions and management expectations resting upon currently available information and current estimates. These are subject to a multitude of uncertainties and risks, many of which are partially or entirely beyond Espressif's control. Espressif's actual business development, financial condition, performance and strategy may, therefore, differ from what is discussed in this report.



Independent Auditor's Report

To the Shareholders of
Espressif Systems (shanghai) Co., Ltd.

Opinion

We have audited the financial statements of Espressif Systems (Shanghai) Co., Ltd. (“the Company”), which comprise the consolidated balance sheet and balance sheet as of December 31, 2021, the consolidated income statement, income statement, consolidated cash flow statement, cash flow statement, the consolidated statement of changes in equity, and statement of changes in equity for the year then ended, and the notes to the financial statements.

In our opinion, the enclosed financial statements were prepared in accordance with the Accounting Standards for Business Enterprises (the “ASBE”) in all material aspects, and present fairly the consolidated and the company's financial positions as of December 31, 2021, the consolidated and the company's results of operations, and the consolidated and the company's cash flows for the year then ended.

Basis For the Opinion

We conducted our audit in accordance with China's Standards on Auditing (the “CSA”). Our responsibilities under those standards are further described in the section of our report detailing the “Auditor's responsibilities for the audit of the financial statements”. We are independent of the Company, in accordance with the CSA's Code of Ethics for Professional Accountants (the “Code”), and we have fulfilled our other ethical responsibilities, again, in accordance with the Code. We believe that the audit evidence we have obtained is sufficient and appropriate for providing the basis of our opinion.

Key Audit Matters

Key audit matters are those matters that, in our professional judgement, were of the greatest significance in our auditing of the financial statements for the financial year from January 1, 2021 to December 31, 2021. These matters were addressed in the context of our audit of the financial statements as a whole, and in forming our opinion thereon, we do not provide a separate opinion on these matters.

AUDIT



Key Audit Matter	How our audit addressed the Key Audit Matter
<p>Revenue Recognition</p> <p>Espressif's main business includes the sales of chips and modules, which created a revenue of CNY 1,386,371,500 in 2021.</p> <p>Since the operating revenue is a key performance indicator, there is an inherent management risk when adjusting the time point of revenue recognition, in order for it to coincide with certain goals or expectations. Therefore, we identify revenue recognition, too, as a key auditing matter.</p>	<p>Our main auditing procedures for revenue recognition are as follows:</p> <ul style="list-style-type: none"> > Understanding and evaluating the effectiveness of the internal control design relating to the revenue recognition of product sales, and testing the effectiveness of the critical control point. > Evaluating the appropriateness of the sales revenue recognition policy by interviewing the management, reviewing the main terms of the sales contracts and the time point of major control transfers relating to the revenue recognition. > Checking the origin of revenue by performing analytical procedures for the operating revenue, including monthly sales analysis, as well as gross profit analysis categorized by customers and products. > Checking the authenticity of revenue by sampling supporting documents related to revenue recognition, such as sales contracts, shipping records and customer receipts. > Performing a confirmation procedure on the current amount of sales by using the sampling method. > Checking commercial information and the transaction prices paid by important customers, in order to determine whether any abnormal transactions were made by the company. > Performing a cut-off test to check whether the revenue recognition is recorded within the correct accounting period.
<p>Inventory</p> <p>As of December 31, 2021, the inventory balance amounts to CNY 332,217,135 with provision for inventory impairment CNY 6,048,207, and the net book value amounts to CNY 326,168,928.</p> <p>Since most inventories are stored in warehouses entrusted by external processors and third parties, and the determination of provision for inventory impairment involves significant management judgment and estimation, we identify the existence of inventories and the provision for inventory impairments as key matters.</p>	<p>Our main auditing procedures for the inventory are as follows:</p> <ul style="list-style-type: none"> > Evaluating the effectiveness of the internal control design of the inventory management, and testing the effectiveness of the critical control point. > Analyzing the rationality of the inventory balance fluctuation at the end of the reporting period by investigating its production cycle and stock policy. > Performing a confirmation procedure on the third party warehouse. > Implementing a supervision on the inventory check at the end of the reporting period. > Evaluating whether the provision for inventory impairment at the end of the reporting period is fully accrued by conducting storage age analysis and by reviewing the calculation model and the results of provision for inventory impairment. > Calculating the inventory turnover and making a comparison to other similar companies.

Other Information

The management of Espressif Systems (Shanghai) Co., Ltd. (“the management”) is responsible for any other information comprising all components of the 2021 company report, apart from the financial statements and the auditor’s report about them.

Our opinions on the financial statements and the group management report do not cover the other information, and consequently we do not express an opinion or any other form of assurance conclusion thereof.

In connection with our audit, our responsibility is to read the other information and, in so doing, consider whether the other information:

> is materially inconsistent with the consolidated financial statements, with the group management report information audited for content or our knowledge obtained in the audit, or

> otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. However, we have nothing to report in this regard.

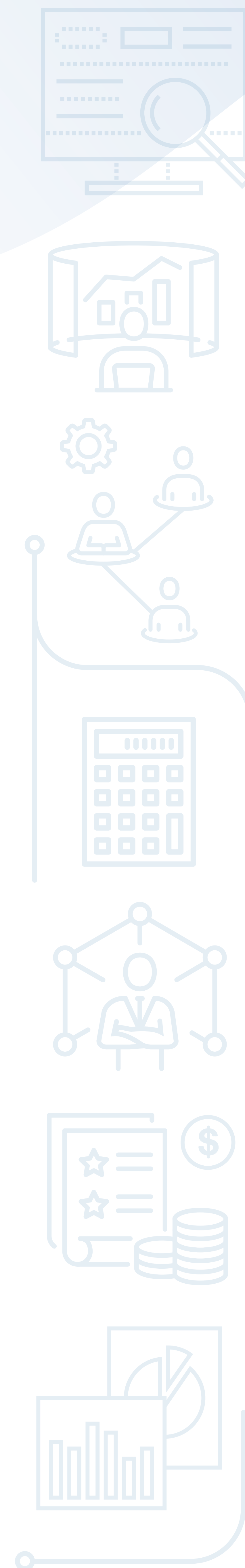
Responsibilities of Management for the Financial Statements

The management is responsible for the preparation of financial statements that give a true and fair view, in accordance with the ASBE, and for the design, implementation and maintenance of such internal controls as the management deems necessary, to enable the preparation of financial statements that are free from material misstatements, whether due to fraud or error.

In preparing the financial statements, the management is responsible for assessing the Company’s ability to continue its operation, disclosing, as applicable, any matters related to ongoing concerns and using them as a basis of accounting, unless the management either intends to liquidate the Company or cease its operations, having no realistic alternative but to do so.

Auditors’ Responsibilities for the Auditing of the Financial Statements

Our objectives are to obtain reasonable assurances about whether the financial statements as a whole are free from material misstatements, either due to fraud or errors, and to issue an auditor’s report that includes our true opinion. Reasonable assurances provide a high level of confidence, but are not a guarantee that an audit conducted in accordance with CSAs will always detect a material misstatement when and where it exists.



Misstatements can arise from fraud or errors and are considered substantial if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users, taken on the basis of these financial statements.

As part of an audit in accordance with CSAs, we exercise our professional judgment and maintain professional skepticism throughout the audit. We also:

- > Identify and assess the risks of substantial financial misstatements, either due to fraud or errors; design and perform auditing procedures in response to those risks, and obtain auditing evidence that is sufficient and appropriate for providing a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.
- > Obtain an understanding of internal controls relevant to the audit, in order to design auditing procedures that are appropriate to the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal controls.
- > Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the management.
- > Conclude on the appropriateness of the management's use of a going concern as the basis of accounting and, according to the auditing evidence obtained, determine whether a substantial uncertainty exists about events or conditions that may cast a significant doubt on the Company's ability to continue its operation. If we conclude that there is substantial uncertainty, we are required to draw users' attention to our auditor's report on the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the auditing evidence obtained up until the date of our auditor's report. However, future events or conditions may force the Company to cease its operation altogether.
- > Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and determine whether the financial statements represent the underlying transactions and events in a manner that achieves a fair presentation.
- > Obtain sufficient and appropriate auditing evidence about the financial information of entities or business activities of the Company, in order to express our auditing opinion on the Company's consolidated financial statements. We are responsible for directing, supervising and executing group audits and assume full responsibility for auditing opinions.

We communicate with those charged with governance, among other matters, on the planned auditing scope, timing and significant audit findings, including any significant deficiencies in internal controls that we may identify during our audit.

We also provide those charged with governance with a statement that we have complied with all relevant ethical requirements regarding our independence, and we also communicate with them all relationships and other matters that may reasonably be thought to bear on our independence and, where applicable, any other related protections.

From the matters communicated to those charged with governance, we determine which matters are of the highest significance in the auditing of the financial statements of the current period and are, therefore, the key auditing findings. We describe these findings in our auditor’s report, unless a law or regulation prohibits such public disclosure about those findings, or when -in extremely rare circumstances- we determine that a finding should not be communicated in our report, because the adverse consequences of its disclosure would reasonably be expected to outweigh the benefits of such communication for the public interest.

Beijing, 10 March 2022
Baker Tilly China

Ma Gang
Chinese Certified Public Accountant

Li Xiaomin
Chinese Certified Public Accountant



List of abbreviations

AI	Artificial Intelligence
AIoT	Artificial Intelligence and Internet of Things
B2D2B	Business-to-Developer-to-Business
Bluetooth LE	Bluetooth Low Energy
CEO	Chief Executive Officer
CES	Consumer Electronics Show
COVID-19	Coronavirus Disease-2019
CSA	China Standards on Auditing
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
Espressif	ESPRESSIF SYSTEMS (SHANGHAI) CO., LTD.
ETF	Exchange Traded Fund
EV	Electric Vehicle
G&A	General and Administrative
GM	Gross Margin
IC	Integrated Circuit
IoT	Internet of Things
OBD	On-Board Diagnostics
PCS	Piece of Chips
POS	Point of Sale
R&D	Research & Development
RF	Radio Frequency
RISC-V MCU	Reduced Instruction Set Computer-V Microcontroller Unit
ROE	Return on Earnings
RTOS	Real-Time Operating System
SG&A	Selling, General and Administrative
SH	Shanghai
SoCs	System on Chips
TPPS	Third-Party Plugins
TSR	Techno Systems Research
YoY	Year-on-Year



ESPRESSIF

SHARE :: CONNECT :: INNOVATE

Investor Relations

ir@espressif.com

Official Platforms

www.espressif.com

blog.espressif.com

github.com/espressif

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