



ESPRESSIF
乐鑫科技

SHARE :: CONNECT :: INNOVATE



Q2

**Half-Year
Report**

2023



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About Espressif

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 around 600 members of staff from almost 30 countries and regions, +77% 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.



global Wi-Fi MCU
market share*



products distributed
all over the world



millions of users



Our R&D Centers

China

- Shanghai
- Suzhou
- Hefei
- Wuxi

Brazil

- Campinas

India

- Pune

Czech Republic

- Brno

Singapore

* Market share data from TSR

Message from the CEO

“Espressif has consistently demonstrated its ability to thrive in the face of challenges, and we are confident that this will continue in 2023 and beyond. We remain committed to seizing every opportunity to develop even better solutions to address our customers' future needs.”

Teo Swee Ann
Espressif's Founder & CEO



First and foremost, I would like to highlight our achievement of sustained growth during the challenging macroeconomic conditions in the second quarter of 2023.

I would like to share some exciting updates regarding our flagship product, the ESP32-S3, and its remarkable growth in sales. In particular, the ESP32-S3 has experienced a significant increase in demand within the LCD-related applications and the AI-related voice control market. This achievement showcases the exceptional capabilities of our product and its versatility across diverse industries.

In addition to its existing capabilities, ESP32-S3 now supports the integration of OpenAI APIs with IoT devices. This integration opens up a world of possibilities, enabling developers to harness the power of OpenAI within their IoT applications. This achievement is a testament to our commitment to delivering cutting-edge solutions that meet the evolving needs of our IoT customers.

We have also recently released an English book about ESP32-C3, "Wireless Adventure: A Comprehensive Guide of IoT". This book has been warmly welcomed by developers' communities around the world. Its comprehensive and detailed approach to understanding the ESP32-C3 SoC and our senior engineers' knowledge of IoT has earned it praise and recognition from both seasoned professionals and aspiring enthusiasts. Over a month since June 14, 2023, the Espressif website recorded an impressive download count of 323,189 for the PDF book, excluding any downloads from third-party platforms. Our efforts have not only contributed to the knowledge sharing within our community but have also reinforced Espressif's position as a leader in providing valuable resources to our stakeholders.

Following ESP8266 and ESP32, ESP32-S3 and ESP32-C3 have now emerged as our new flagship products, contributing to our sustainable growth.

With the adoption of the Matter standard and the completion of Matter certification by many of our customers, we are excited to announce that we will witness the launch of the first wave of Matter-compliant products in Q3.

In addition to our Wi-Fi product line meeting the requirements for Matter over Wi-Fi, we are pleased to announce that our ESP32-H2 product line has entered mass production. It is expected to meet the requirements for Matter over Thread, enabling us to capture new market share starting in Q3.

Furthermore, building on our successful achievements in the Wi-Fi 4 IoT area, we are expanding into the new markets of Wi-Fi 6, Bluetooth, Thread, and SoC. we will continue to invest in research and development and technological innovation, striving to deliver superior products and solutions. We will closely collaborate with our customers and partners, keeping pace with market demands and trends, and flexibly adjusting our operations. We firmly believe that with the capabilities and dedication of our team, we will continue to achieve even greater success.

Facts About Espressif



Core Technologies

SoCs

ESP8266, ESP32, ESP32-S, ESP32-C, ESP32-H and ESP32-P Series

Espressif offers integrated, reliable, and energy-efficient SoCs for Wi-Fi, Bluetooth Low Energy, Thread and Zigbee to various segments of the IoT market.

AI

AFE (Audio Front-End) Algorithms

qualified as a “Software Audio Front-End Solution” for Amazon Alexa Built-in devices.

3A Audio Algorithms

including Acoustic Echo Cancellation (AEC), Audio Noise Suppression (ANS) and Automatic Gain Control (AGC), which significantly reduce noise and echo in calls, keeping high-quality voice intercoms stable at all times.

OS

ESP-IDF

Espressif’s official IoT Development Framework.

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 major appliances and industrial devices.

Cloud

ESP RainMaker

A comprehensive, development-free and maintenance-free AIoT solution for private Cloud deployment.

It is an all-inclusive solution that covers everything from the underlying chip to device firmware, third-party voice-assistant integrations, mobile apps and the dashboard.

Customers can build their own AIoT devices and ecosystem, with ESP RainMaker.

Software

With our open-source software, such as Espressif’s IoT Development Framework ESP-IDF, Audio Development Framework ESP-ADF, Mesh Development Framework ESP-MDF, Cloud Connectivity Platform ESP RainMaker, Facial Recognition Development Framework ESP-WHO, and Voice-Controlled Assistant ESP-Skainet, we have developed a framework for building AIoT applications, which is both complete and innovative.



Matter

One-stop Matter Solution

This is the culmination of Espressif’s ongoing contribution to the Matter platform in various areas, including protocol formulation, core stack implementation and certification test events.

Business Highlights

Key Financial Data (Unaudited)

CNY	Three Months Ended		Six Months Ended	
	Jun 30, 2023	Jun 30, 2022	Jun 30, 2023	Jun 30, 2022
Consolidated Statement of Income Data				
Revenue	348,880,535	324,870,817	666,997,977	613,818,881
Gross profit	142,936,609	128,253,838	272,454,655	246,843,778
Selling expenses	13,351,348	10,384,806	25,524,250	19,579,687
General and administrative expenses	15,031,928	13,548,558	28,946,961	26,953,099
Research and development expenses	92,701,560	77,606,270	178,184,574	152,454,559
Net income	33,482,914	35,423,132	64,570,344	63,275,224
Earnings per share:				
Basic			0.8059	0.7880
Diluted			0.8059	0.7880
			Jun 30, 2023	Dec 31, 2022
Consolidated Balance Sheet Data				
Cash, cash equivalent and investments			1,316,868,658	1,200,219,436
Working capital			1,340,350,591	1,518,383,808
Total assets			2,199,681,460	2,082,796,825
Long-term obligations			69,453,238	65,591,788
Total shareholders' equity			1,941,958,962	1,826,677,535
			June 30, 2023	June 30, 2022
Consolidated Cash Flow Data				
Net cash flow from operating activities	66,406,199	7,345,663	99,699,642	-29,524,843
Non-GAAP Adjustment				
Stock-based compensation	9,643,201	638,729	12,267,568	5,463,737
Non-GAAP net income	43,126,115	36,061,861	76,837,912	68,738,961

Financial Indicators (Unaudited)

	Three Months Ended		Six Months Ended	
	Jun 30, 2023	Jun 30, 2022	Jun 30, 2023	Jun 30, 2022
Gross margin	40.97%	39.48%	40.85%	40.21%
R&D-to-sales ratio	26.57%	23.89%	26.71%	24.84%
EBITDA margin	9.74%	12.26%	10.26%	11.98%
Weighted ROE			3.43%	3.46%

Financial Analysis

Espressif's total revenue in the first half of the current fiscal year (2023) was CNY 667.00 million, marking an increase of 8.66% from CNY 613.82 million of H1 2022. Currently, the economic environment is still filled with uncertainty, and there are no visible factors indicating a positive recovery for individual customers. The company's revenue growth relies on attracting more customers. The net income was CNY 64.57 million, which marked an increase of 2.05% year-on-year, due to our increased R&D expenditure.

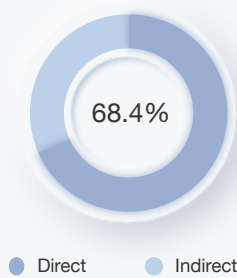
The overall gross margin is 40.85%, with the IoT chip gross margin reaching 47.51%. This overall gross margin stability aligns with our target of 40%.

The customers in China's mainland prefer purchasing chips while the customers from the rest of the world and their OEM/ODM in China's mainland prefer modules. The revenue proportion of the module business can approximately represent the income we, directly and indirectly, obtain from overseas.

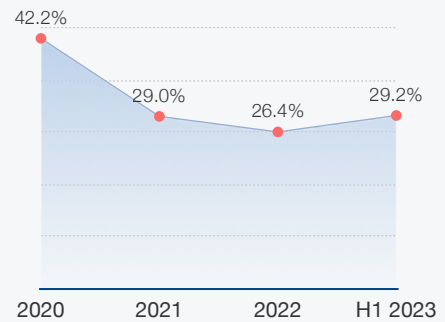
Revenue by Area of H1 2023



Revenue by Sales Mode of H1 2023



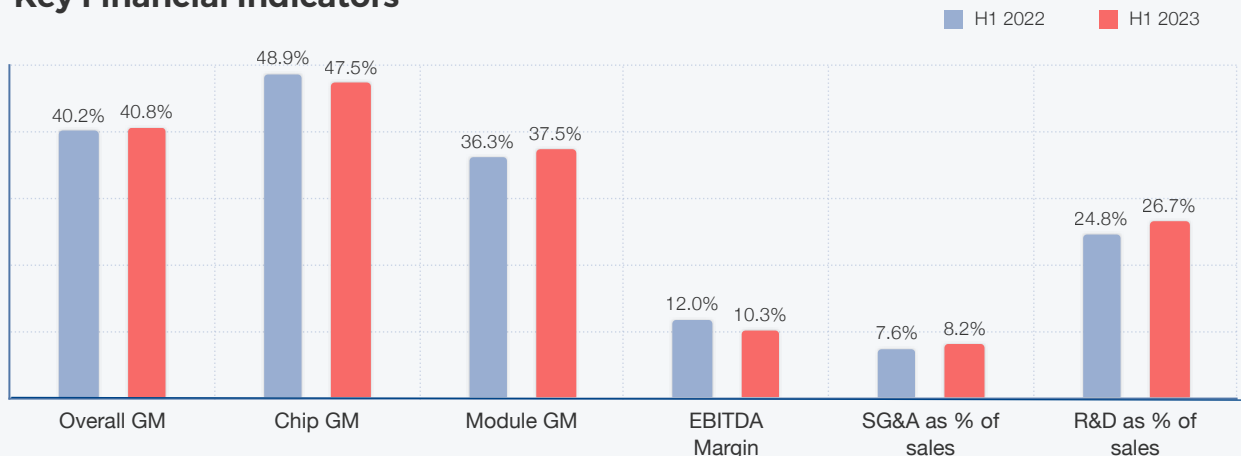
Top-5 Customer Concentration Rate



Revenue by Product Category



Key Financial Indicators

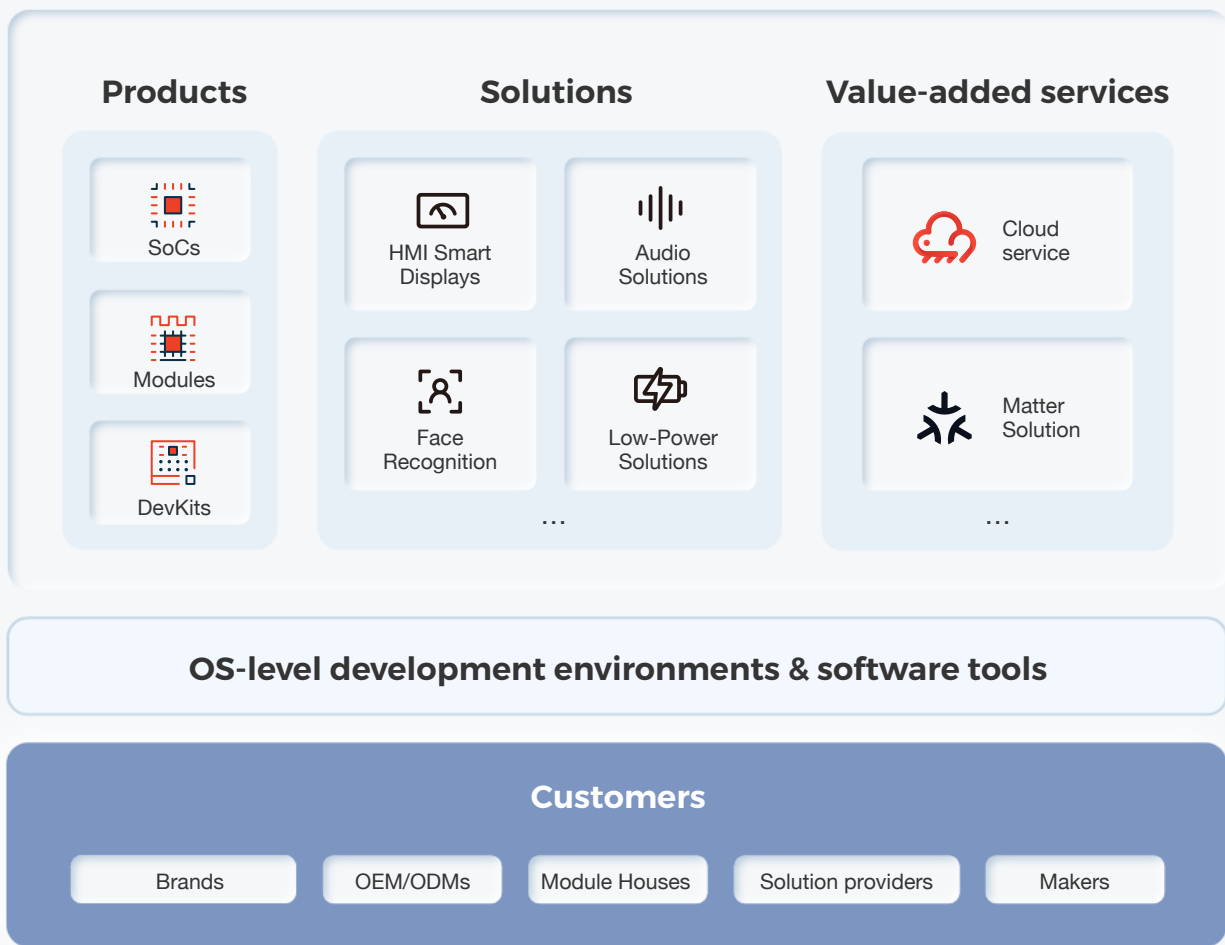


Management Report

Business Strategy

Espressif Systems' business strategy emanates from our service/product areas and our engagement with the developer ecosystem.

Our product and service areas include IoT chips, OS-level development environments, software tools, application solutions, and value-added services, such as Cloud and Matter. The above-mentioned products ensure that we are in the heart of numerous commercial AIoT applications in different markets, including smart home, consumer electronics, industrial automation, healthcare, etc.

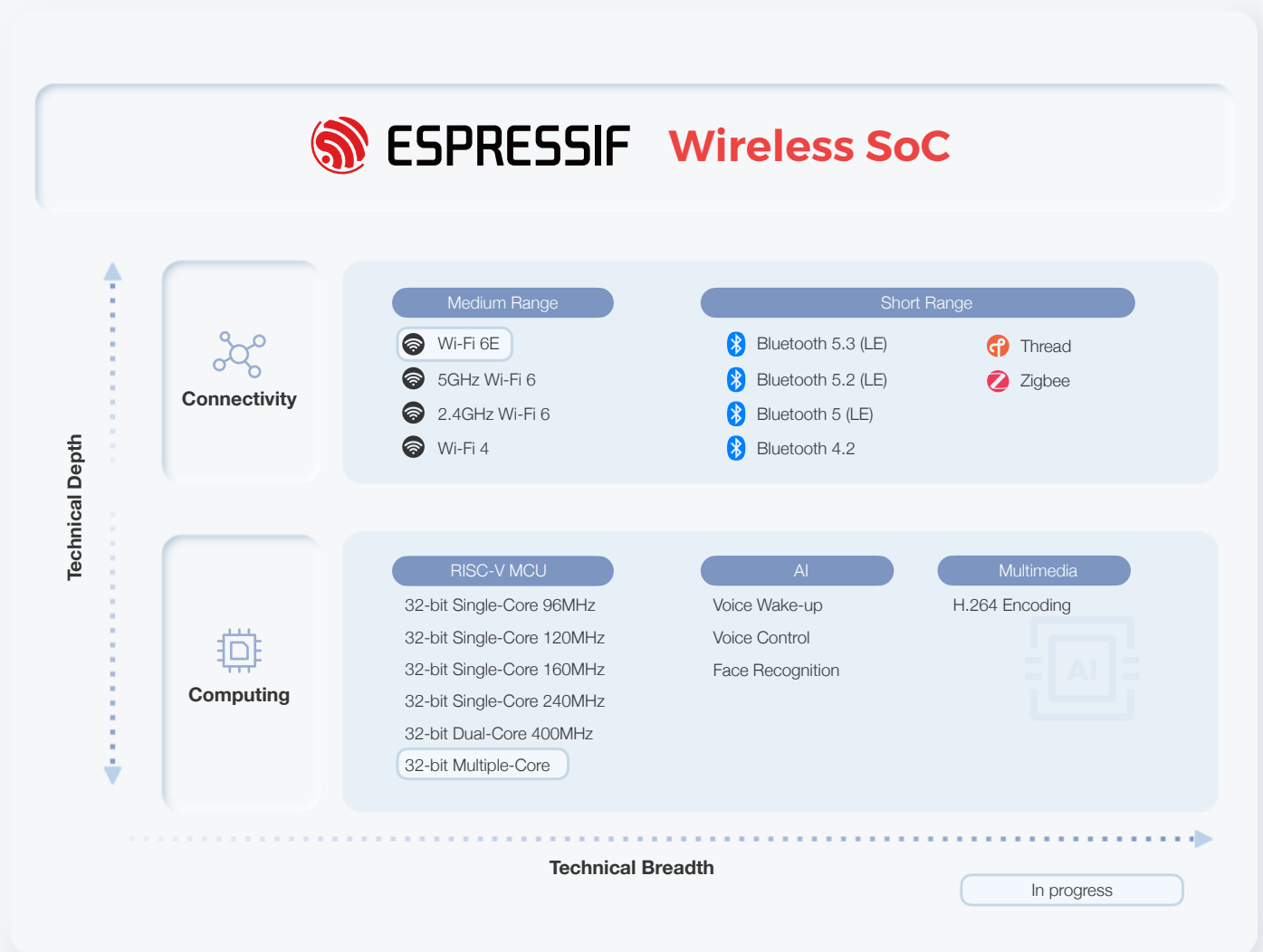


Key Products - IoT Chips

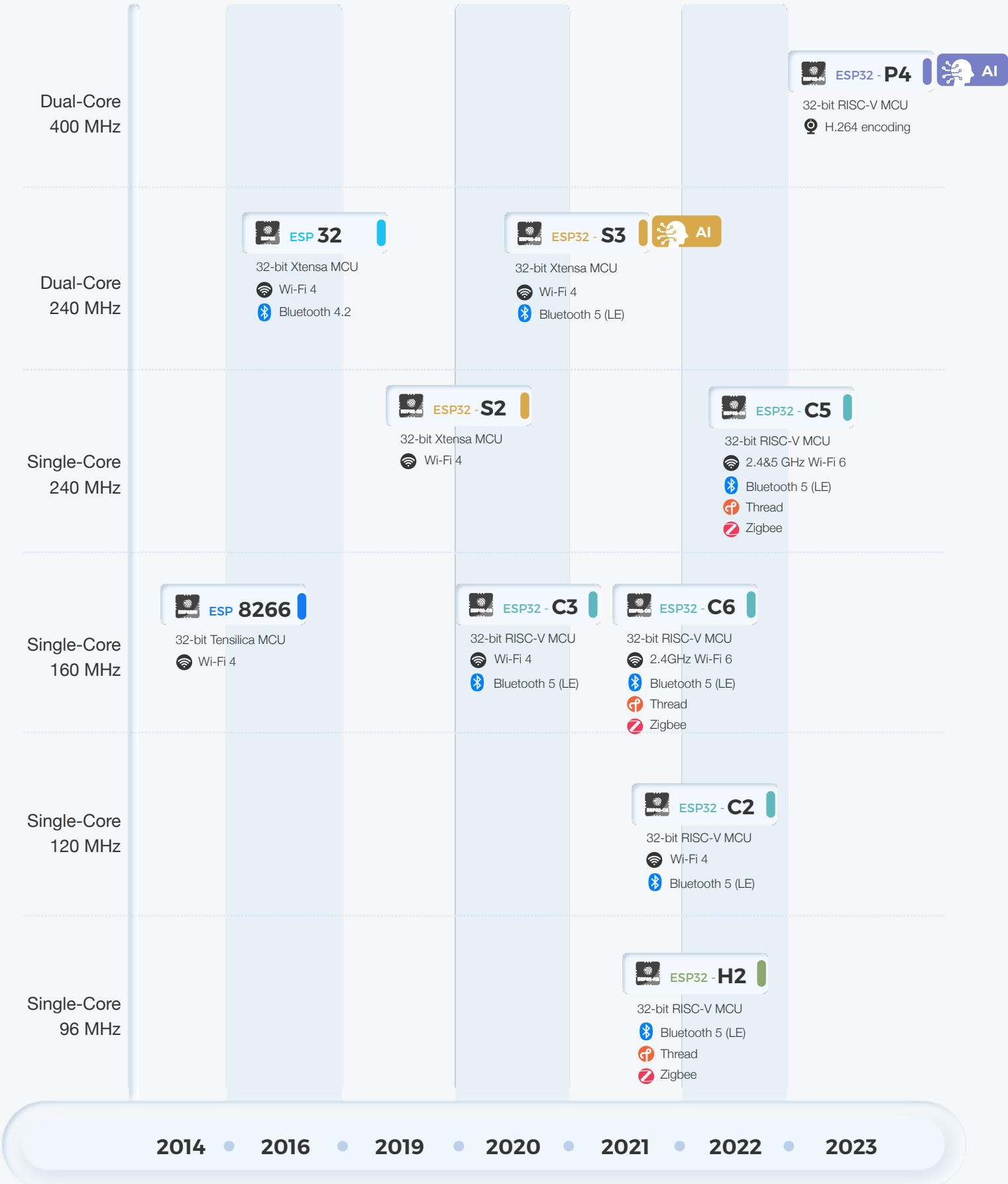
Espressif is recognized as a market leader in the field of Wi-Fi MCUs. We released our first Wi-Fi MCU in 2014, and our first Wi-Fi/Bluetooth LE combo chip in 2016. In 2020, we successfully developed our own RISC-V MCU core, adding it to our product portfolio, while in 2021 we released our first Thread/Zigbee/Bluetooth LE 5 combo chip and a 2.4GHz Wi-Fi 6 chip. In 2022, we released our first 2.4 & 5GHz Wi-Fi 6 chip and our product range has expanded to Wireless SoCs.

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 the main short- and medium-range connectivity technologies. Our core technologies are self-developed, including connectivity IPs, RF components, RISC-V IPs, software frameworks, tools, AI functions etc.

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.



Key Products - AIoT Chip Matrix



Software Solutions

HMI Smart Displays

The solution has an innovative user-interface that enables data visualization, touch or knob control, voice wake-up and recognition, multi-mode gateway, etc.

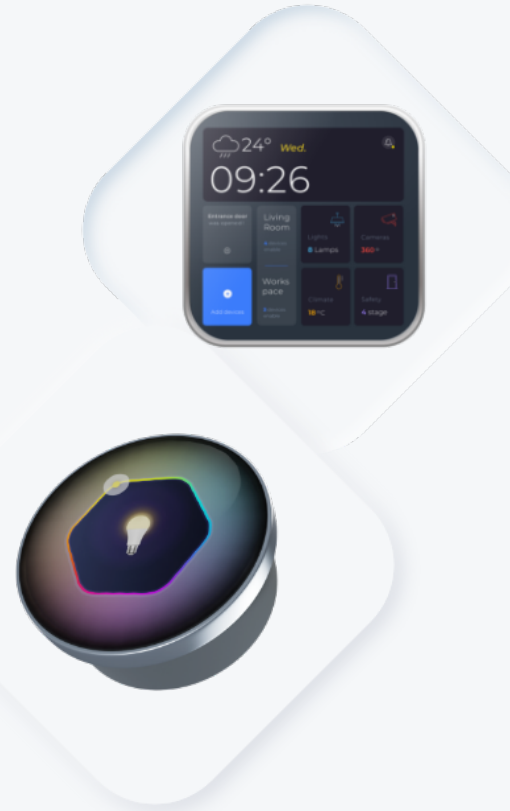
It is widely used in smart-home control, home appliance screens, healthcare, industrial control, and educational devices for children.

Espressif's HMI smart displays, based on ESP32-S3 and ESP32-C3 SoCs, are designed to support RGB and SPI interfaces, respectively.

The RGB display is a common interface for smart-home control. ESP32-S3 is an excellent choice for RGB interface LCDs. ESP32-S3 has a dual-core CPU with powerful AI features.

SPI is a common interface for small displays. The state-of-the-art technology of ESP32-C3 allows it to dynamically adjust the operating frequency and switch over to low-power modes.

The solution is supported by ESP-IDF, Espressif's mature IoT development framework, with which users can easily build new applications.



Low-Power Solution



Smart Switch

Based on ESP32-C2/ESP32-C3, the ESP Smart Switch Solution allows customers to easily build Wi-Fi switches with low power-consumption, excellent Wi-Fi performance, security, and reliability.

Ultra-Low Power, No Anti-Flicker Required

ESP-NOW protocol

ESP-NOW is a connectionless communication protocol defined by Espressif, which enables a direct, quick and low-power control of smart devices without the need of a router.

ESP-NOW can work with Wi-Fi and Bluetooth LE, and supports ESP8266, ESP32, ESP32-S and ESP32-C series of SoCs. It's widely used in smart appliances, remote controls, sensors, etc.



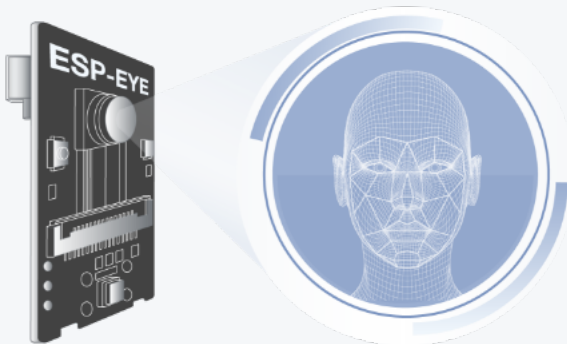
Audio Solutions

AFE (Audio Front-End) Algorithms

have a solid voice-controlled performance even in noisy environments. Customers can use these algorithms with Espressif's powerful ESP32 and ESP32-S3 SoCs, in order to build high-performance, yet low-cost, products with a voice user interface. Espressif's AFE algorithms have been qualified by Amazon as an "Audio Front End" solution for Alexa built-in devices.

Offline smart-voice assistant

supports a configurable wake-word engine (WakeNet), and an offline speech-recognition engine (MultiNet) with up to 200+ offline commands and acoustic algorithms.



Face Recognition

ESP-WHO

is a face detection and recognition development framework based on ESP32 and ESP32-S3.

You can use it with the ESP-EYE or the ESP-WROVER-KIT development board. Then, by adding only a few peripherals, such as cameras and screens, you can easily create complete AIoT applications.



Security

Local memory



High Performance

10 frames per second



Cost-Effectiveness



Expandability

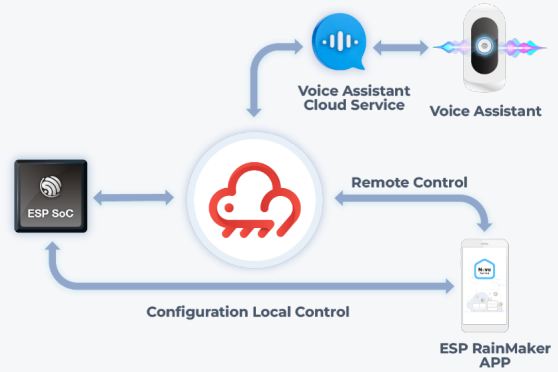
Object detection
Object tracking
Hand-gesture recognition

Value-Added Services



This is a complete, yet light-weight, AIoT solution that enables private Cloud deployment for our customers' business in a simple, cost-effective and efficient manner.

Espressif offers a turnkey solution that includes product firmware, private Cloud and a dashboard, as well as a voice assistant and mobile apps. This allows customers to build their very own brand of an IoT business in an efficient, affordable and speedy way.



Comprehensive Matter Solutions

<p>Wi-Fi End Device</p>	<p>Thread Border Router</p>
<p>Thread End Device</p>	<p>Matter Bridge</p>









Espressif is an active contributor to the development of the Matter protocol. Espressif, with its unique combination of connectivity SoCs, software, and complete solutions makes it easy for our customers to build Matter-enabled smart-home devices of various types. Espressif provides the most comprehensive solutions for Matter, including support for Wi-Fi or Thread end-point devices, Thread Border Routers, and Matter gateway reference designs.



Market

The market for wireless SoCs is truly diverse, including applications for smart homes (e.g., smart lights, air conditioners, ovens, coffee machines, etc.), consumer electronics (e.g., smart speakers, drones, etc.), industrial automation (e.g., mechanical arms), smart agriculture (e.g., soil PH detector, CO² detector, etc.), healthcare (e.g., monitoring devices for diabetes, blood pressure, etc.), energy control (solar energy devices, EV chargers, etc.), the internet of vehicles (OBD devices, dashboards, etc.), and education (talking pens, interactive whiteboards, etc.).

Although the consumer market shrunk in 2022 due to various macroeconomic factors, digitalization in the non-consumer sectors has brought us many new customers. Moreover, we are encouraged by the gradual recovery in demand observed during the first half of 2023.

<p>Smart Home</p>  <p>Smart Ovens</p>	<p>Consumer Electronics</p>  <p>Smart Speakers</p>	<p>Industrial Automation</p>  <p>Mechanical Arms</p>	<p>Smart Agriculture</p>  <p>Soil PH Detector</p>
<p>Healthcare</p>  <p>Medical Detectors</p>	<p>Energy Management</p>  <p>Smart Solar Panels</p>	<p>Internet of Vehicles</p>  <p>Intelligent instrument panel</p>	<p>Education</p>  <p>Talking Pens</p>

Core Competitiveness



Chip Competitiveness

Espressif takes pride in the invaluable experience that our R&D team leaders have in the field of wireless-communication chips. For example, Mr. Teo Swee Ann, Espressif's founder and CEO and a Fellow of the Academy of Engineering Singapore (SAEng), has over 20 years of experience in the semiconductor industry. He has 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 mechanisms. 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 with the above-mentioned SoCs, 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 established a fastidious release process, and a support policy which ensures that customers can choose a stable release, while also getting important updates. Each stable release undergoes a rigorous QA process that ensures production readiness at all times. 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, network stacks, protocol implementations, and examples of common use cases. These components help developers focus on their 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

The company provides numerous software solutions, including AI-related ones (e.g., offline/online voice recognition and smart control, AI image recognition, etc.), Wi-Fi Mesh, BLE Mesh, HMI functions, various peripheral drivers and other functions covering all the development needs of our customers. These solutions greatly reduce the cost of application development for our customers.

Espressif's AI Lab has developed Audio Front-End (AFE) algorithms that have been qualified as a "Software Audio Front-End Solution" to Amazon-Alexa Built-in devices. This is the result of Espressif's incessant focus not just on the connectivity of its own AIoT solutions, but also on high-performance Machine Learning on the edge. Furthermore, in 2022 our AI Lab launched the so-called 3A Audio Algorithms, i.e., Acoustic Echo Cancellation (AEC), Audio Noise Suppression (ANS), and Automatic Gain Control (AGC). Based on Espressif's 3A audio algorithms, Espressif-powered Real-Time Communication applications benefit from significantly reduced noise and echo in calls, and sustained stability in high-quality voice intercoms.

Our newly-launched, one-stop Matter solution, including the fully-customized ESP-Matter SDK and Cloud services, can simplify and accelerate the development process of Matter-compatible products significantly. This is the culmination of our ongoing contribution to the Matter platform in various areas, including protocol formulation, core stack implementation and certification test events.

Furthermore, ESP RainMaker® is a one-stop, development-free and maintenance-free AIoT solution for private Cloud deployment, which reduces R&D costs and accelerates time-to-market. More specifically, this is a complete system for building AIoT products with a minimal amount of code, which enables our customers to deploy and develop secure, customized AIoT solutions. It covers all of Espressif's chips and modules, device firmware, voice-assistant integrations, phone apps and Cloud backend. This helps our customers avoid expensive investments in Cloud capabilities, gain independence and focus on innovating their core-value offerings.

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's technologies. For example, on GitHub, which is the largest provider of Internet hosting for software development, there are more than 92,000 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 200 digital and physical books about Espressif's SoCs in more than ten languages.

Developer Community Content

ITEM	June 30, 2023	Dec 31, 2022	change%
GitHub (Worldwide open-source development platform)			
ESP32 Projects	50,513	41,891	21%
ESP8266 Projects	41,733	39,294	6%
Gitee (Chinese open-source development platform)			
ESP32 Projects	2,793	2,629	6%
ESP8266 Projects	1,954	1,868	5%
CSDN (Chinese Tech-blog platform)			
Search results for ESP32	104,521	93,242	12%
Search results for ESP8266	40,072	36,286	10%
Hackaday (open-source hardware platform)			
ESP32 projects	5,204	4,702	11%
ESP8266 projects	6,192	6,101	1%
Reddit			
ESP32 group members	67,361	59,619	13%
ESP8266 group members ^[1]	/	59,004	
bilibili (Chinese video-sharing platform)			
Official account followers	27,686	24,064	15%
Official account views	779,199	658,235	18%
YouTube			
Official account subscribers	16,800	14,800	14%
Official account views ^[2]	798,987	810,523	-1%
ESP32 community videos	766,901	641,926	19%
ESP8266 community videos	850,730	778,090	9%
Views of the most watched ESP32 community video	around 3.9m	around 3.4m	
Views of the most watched ESP8266 community video	around 1.7m	around 1.6m	

N.B.

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 quarter reported here, unless otherwise stated.

The search results of the keyword "ESP32" include the ESP32 series, ESP32-C series, ESP32-S series, and ESP32-H series.

[1] On May 31, 2023, Reddit announced a policy change that will kill essentially some third-party Reddit app now operating. There have been Reddit-wide blackouts in protest to this, and r/esp32 & r/esp8266 have gone private as well. So we will stop updating the member numbers of the Reddit.

[2] Due to the conversion of certain previously published videos to private, the views on the official YouTube account have decreased compared to the end of 2022.

Business Model

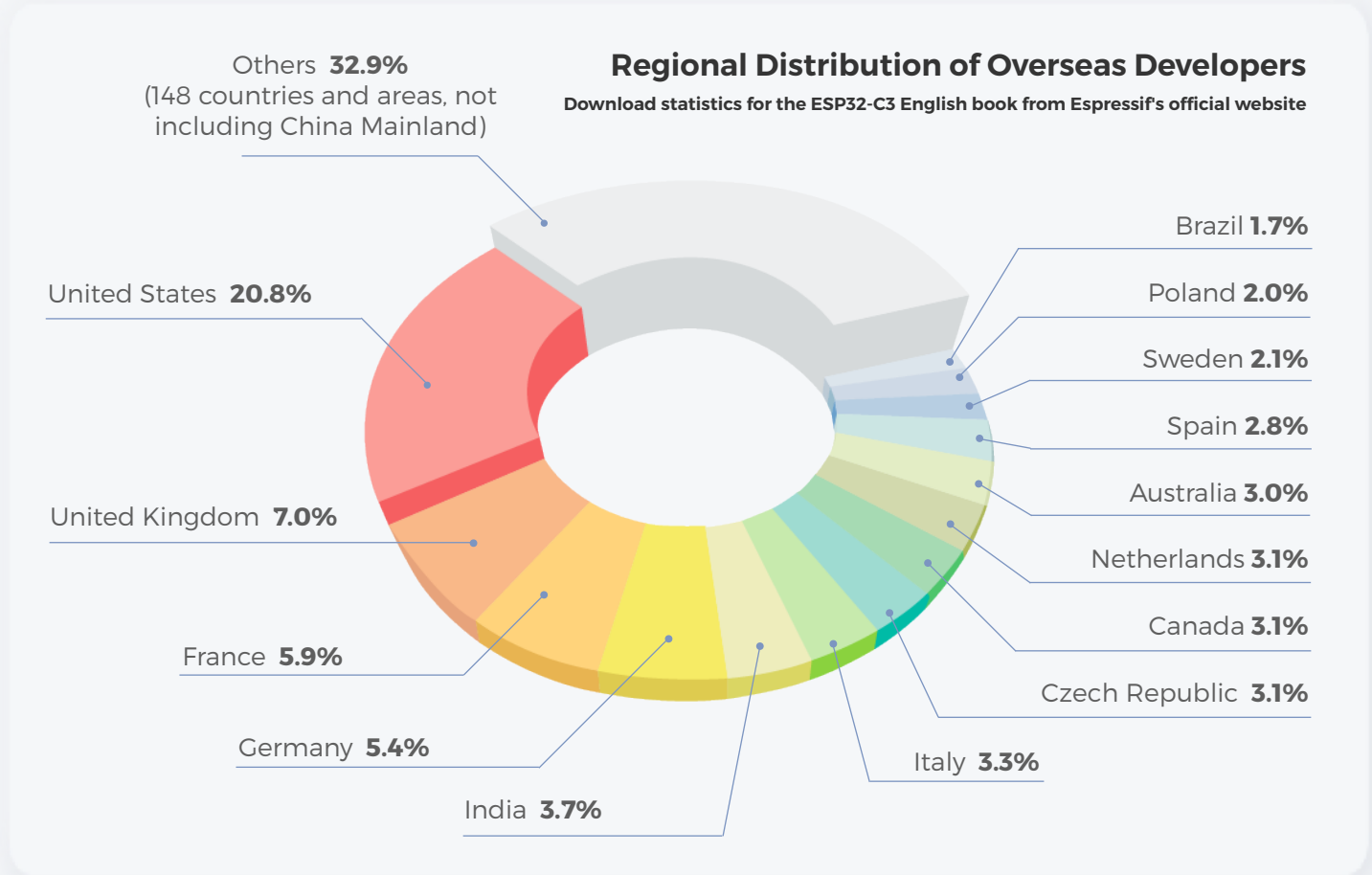
Business-to-Developer-to-Business (B2D2B)

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 effective since the influence of developers on organizations of all sizes has gained traction. In other words, most developers are R&D employees in various companies and bring forth 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 our 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 supports a large number of customers directly. In fact, most of our revenue is gained through direct sales.



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 178.18 million, which marked a 16.88% increase compared with that of 2022. At the same time, the R&D-to-sales ratio was 26.71% in the first half of this fiscal year (2023).

Espressif’s escalating R&D investment cost can be attributed to the increase in the number of R&D staff and their subsequent compensation level, which increased year-over-year.

CNY	Six Months Ended		change (%)
	June 30, 2023	June 30, 2022	
R&D Expenses	178,184,574	152,454,559	16.88
R&D-to-sales ratio	26.71%	24.84%	

Intellectual Property

We seek to protect our technologies through a combination of patents, software copyright and commercial secrets. By the end of June 2023, the Company had been granted 153 patents. We continue to submit new patent applications relating to our recent R&D innovations.



List of Intellectual Property Rights Applied and Granted

	H1 2023		Cumulative number	
	Applied for	Granted	Applied for	Granted
Invention patents	5	8	129	80
Utility model patents	0	0	26	26
Design patents	0	0	1	1
Software copyright	0	3	23	23
Others	4	2	60	23
Total	9	13	239	153

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.

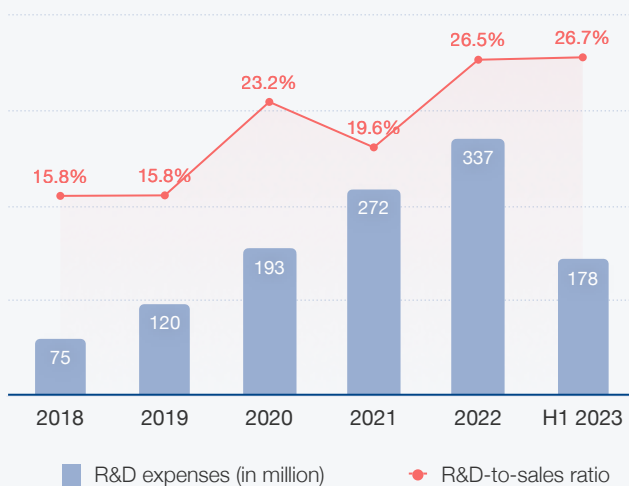
R&D Employees

We are proud of our talented, diverse and multicultural workforce. By June 30, 2023, across our eight branches worldwide, we had employed 591 people, around 77% 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.

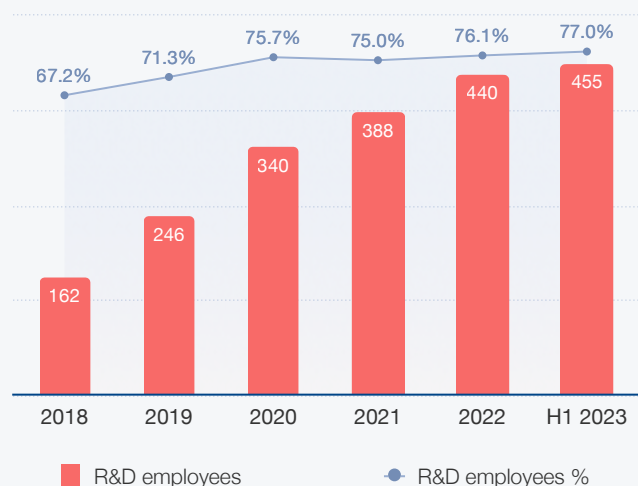
Since the research and development of software and hardware are inextricably intertwined, we constantly invest in software technology, too. Hence, we are currently focused on AIoT technologies, including toolchains, compilers, operating systems, application frameworks, AI algorithms, Cloud products,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

	Six Months Ended	
	June 30, 2023	June 30, 2022
R&D employees	455	428
R&D employees as a percentage of total employees	76.99%	76.29%
Total compensation of R&D employees (CNY in thousands)	135,244	123,837
Average compensation of R&D employees (CNY in thousands)	302	304

R&D Expenses



R&D Employees



Ownership of Securities

Basic information of securities

Share types	Ordinary share
Share capital	80,731,207 (as of June 30, 2023)
Listing	Shanghai Stock Exchange (SSE)
Ticker	688018.SH
Listing Date	2019-07-22

Shareholder Structure as of Jun 30, 2023

Shareholder	Share Numbers	Percentage (%)
Espressif (Hong Kong) Investment Ltd.	33,047,244	40.93
Shinvest Holding Ltd.	2,226,179	2.76
Dajia Life Insurance Co., Ltd. – Universal Products	1,978,918	2.45
Ningbo Meishan Free Trade Port Le Tun Investment Management Partnership (Limited Partnership)	1,046,030	1.30
BOC - Franklin Templeton Sealand Fund	983,092	1.22
Hong Kong Securities Clearing Company Limited	779,013	0.96
GTJA Allianz CSI All-share Semi-conductor Product and Equipment ETF	680,818	0.84
Changjiang Securities Company Limited	509,236	0.63
ABC - Franklin Templeton Sealand Fund	508,981	0.63
BOC - Guangfa SME selected Equity Fund	476,726	0.59
Top 10 shareholders	42,236,237	52.32
Other public shareholders	38,494,970	47.68
Total of outstanding shares	80,731,207	100.00

Stock-Based Compensation

Espressif has six 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 (%)*	Grant Price (CNY)
2019 restricted stock incentive plan	Class II restricted stock	204,400	0.2532	62.025
2020 restricted stock incentive plan	Class II restricted stock	197,872	0.2451	92.025
2021 restricted stock incentive plan	Class II restricted stock	921,592	1.1416	92.900
2022 restricted stock incentive plan	Class II restricted stock	1,022,679	1.2668	118.400
2023 restricted stock incentive plan	Class II restricted stock	62,478	0.0774	60.000
2023 II restricted stock incentive plan	Class II restricted stock	551,130	0.6827	40.000

N.B. The above-mentioned numbers were calculated on June 30, 2023.

The grant price has been adjusted due to dividend distribution.

Stock-Based Compensation

CNY	Six Months Ended	
	June 30, 2023	June 30, 2022
Selling expenses	591,697	290,063
G&A expenses	535,743	732,517
R&D expenses	11,140,129	4,441,157
Total stock-based compensation	12,267,568	5,463,737

Risks and Uncertainties



Financial Risk

The Company performs periodic credit evaluations of its customers' financial condition and generally requires of its customers no collateral. 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 and others. Intense competition from current players, as well as new entrants, such as Silicon Labs and Nordic, may reduce our product sales and market share.



Suppliers

A significant portion of the Company's products is fabricated by the Taiwan Semiconductor Manufacturing Company Limited (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 certain 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 29.2% in H1 2023. The top-five customers include solution providers and module manufacturers, who also have a large number of dispersed downstream customers, similar to the Company itself.

Consolidated Financial Statements (Unaudited)

Consolidated Balance Sheet (Unaudited)

CNY	June 30, 2023	January 1, 2023	December 31, 2022
Assets			
Current assets:			
Cash and cash equivalents	391,285,979	350,677,354	350,677,354
Held for trading financial assets	298,172,379	461,223,082	461,223,082
Notes receivable	2,297,288	789,099	789,099
Accounts receivable, net	269,968,500	198,406,116	198,406,116
Accounts receivable financing	12,084,421	1,441,520	1,441,520
Prepayments	9,251,381	9,724,045	9,724,045
Other receivables	11,351,984	9,578,753	9,578,753
Including: Interest receivable	2,877,754	838,168	838,168
Inventories	345,743,974	448,981,896	448,981,896
Other current assets	188,463,945	228,089,444	228,089,444
Total current assets	1,528,619,852	1,708,911,310	1,708,911,310
Non-current assets:			
Debt investment	482,265,600	212,484,600	212,484,600
Investment in other equity assets	35,340,648	35,340,648	35,340,648
Other non-current financial assets	19,879,347	19,879,347	19,879,347
Fixed assets	66,179,165	60,243,507	60,243,507
Construction work in progress			
Right-of-use assets	21,684,595	21,692,767	21,692,767
Intangible assets	2,022,807	2,412,317	2,412,317
Long-term deferred expenses	9,133,434	6,565,887	6,565,887
Deferred income tax assets	34,556,013	18,987,186	15,266,444
Total assets	2,199,681,460	2,086,517,567	2,082,796,825

Consolidated Balance Sheet (Unaudited)

CNY	June 30, 2023	January 1, 2023	December 31, 2022
Liabilities & Shareholders' Equity			
Current liabilities:			
Accounts payable	92,198,649	77,918,867	77,918,867
Contract liabilities	24,942,716	9,044,287	9,044,287
Payroll payable	44,777,989	85,041,335	85,041,335
Taxes payable	5,017,167	5,211,995	5,211,995
Other payable	9,801,092	2,925,552	2,925,552
Non-current liabilities due within one year	10,698,588	9,607,030	9,607,030
Other current liabilities	833,059	778,437	778,437
Total current liabilities	188,269,260	190,527,502	190,527,502
Non-current liabilities:			
Lease liabilities	11,985,150	12,839,126	12,839,126
Provisions	623,241		
Deferred income tax liabilities	56,844,847	56,473,404	52,752,662
Total liabilities	257,722,498	259,840,032	256,119,290
Owners' equity (or shareholders' equity):			
Share capital	80,731,207	80,484,430	80,484,430
Capital reserves	1,345,790,809	1,309,813,001	1,309,813,001
Less: Treasury stock	40,966,012	40,966,012	40,966,012
Other comprehensive income	31,432,873	16,946,374	16,946,374
Surplus reserves	46,570,910	46,570,910	46,570,910
Retained earnings	478,399,175	413,828,832	413,828,832
Total shareholders' equity	1,941,958,962	1,826,677,535	1,826,677,535
Total liabilities and shareholders' equity	2,199,681,460	2,086,517,567	2,082,796,825

Consolidated Cash Flow Statement (Unaudited)

CNY	Three Months Ended		Six Months Ended	
	June 30, 2023	June 30, 2022	June 30, 2023	June 30, 2022
Operating Activities				
Cash from sales of merchandise and provision of services	351,729,950	323,433,638	668,675,823	716,230,416
Tax refund	11,113,912	626,261	33,504,703	27,942,635
Other received cash related to operational activities	4,349,276	3,506,621	10,494,111	12,795,208
Subtotal of cash inflow from operational activities	367,193,138	327,566,521	712,674,636	756,968,259
Cash paid for merchandise and services	177,404,495	220,744,919	322,438,347	556,762,874
Cash paid to and for employees	74,283,588	63,047,148	208,755,881	170,766,766
Cash paid for taxes and surcharges	22,795,807	18,347,307	36,251,089	25,286,124
Other paid cash related to operational activities	26,303,049	18,081,483	45,529,677	33,677,338
Subtotal of cash outflow from operational activities	300,786,939	320,220,858	612,974,994	786,493,102
Net cash provided by operating activities	66,406,199	7,345,663	99,699,642	-29,524,843
Investing activities				
Cash arising from the disposal of investments	465,055,370	807,335,414	1,282,789,551	1,641,103,857
Cash arising from investment income	2,075,281	1,465,867	3,829,647	2,893,450
Net cash arising from the disposal of fixed assets, intangible assets and other long-term assets	1,400		19,250	
Other received cash relating to investment activities	1,342,000		1,653,000	
Subtotal of cash inflow from investment activities	468,474,051	808,801,281	1,288,291,448	1,643,997,307
Cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets	10,053,768	2,753,972	24,779,027	15,360,524
Cash paid for investments	488,000,000	783,000,000	1,351,000,000	1,538,100,000
Other paid cash relating to investment activities	300,000		600,000	
Subtotal of cash outflow from investment activities	498,353,768	785,753,972	1,376,379,027	1,553,460,524
Net cash used by investment activities	-29,879,716	23,047,309	-88,087,579	90,536,784
Financing activities				
Cash arising from the issuance of common stock	23,229,130	5,957,003	23,957,017	26,273,338
Including: Cash arising from subsidiaries absorbing investments by minority shareholders				
Subtotal of cash inflow from financing activities	23,229,130	5,957,003	23,957,017	26,273,338
Cash paid for the distribution of dividends and profits, or payment of interests		128,722,856		128,722,856
Including: dividends and profits paid to minority shareholders by subsidiaries				
Other paid cash relating to financing activities	3,732,556	767,795	7,064,234	2,004,407
Subtotal of cash outflow from financing activities	3,732,556	129,490,651	7,064,234	130,727,263
Net cash used for financing activities	19,496,574	-123,533,648	16,892,783	-104,453,925
Impact of fluctuation in exchange rates on cash and cash equivalents	10,632,571	11,083,046	12,103,780	8,856,092
Net increase in cash and cash equivalents	66,655,628	-82,057,630	40,608,625	-34,585,891
Add: Cash and cash equivalent at the commencement of the period			350,677,354	367,142,726
Cash and cash equivalents at the end of the period	66,655,628	-82,057,630	391,285,979	332,556,835

Consolidated Statement of Changes in Equity

(Unaudited)

CNY	Share capital	Capital reserves	Less: Treasury stock	Other comprehensive income	Surplus reserves	Retained earnings	Total equity
Balance as of December 31, 2021	80,158,963	1,266,771,034		-15,711,579	33,462,951	458,336,543	1,823,017,913
Comprehensive income, net of tax							
Net Income						63,275,224	63,275,224
Other comprehensive income				19,555,718			19,555,718
Transactions with owners							
Capital increase	292,822	36,133,353					36,426,175
Stock-based compensation		-4,689,100					-4,689,100
Surplus reserves							
Dividends						-128,722,856	-128,722,856
Balance as of June 30, 2022	80,451,785	1,298,215,288		3,844,139	33,462,951	392,888,912	1,808,863,075
Balance as of December 31, 2022	80,484,430	1,309,813,001	40,966,012	16,946,374	46,570,910	413,828,832	1,826,677,535
Comprehensive income, net of tax							
Net Income						64,570,344	64,570,344
Other comprehensive income				14,486,498			14,486,498
Transactions with owners							
Capital increase	246,777	31,856,474					32,103,251
Stock-based compensation		4,121,334					4,121,334
Surplus reserves							
Dividends							
Balance as of June 30, 2023	80,731,207	1,345,790,809	40,966,012	31,432,873	46,570,910	478,399,175	1,941,958,962

Further Information

Terms and Conditions of the 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, 28 July 2023
Espressif Systems

Board of Directors

Teo Swee Ann

Founder and Chairman

Ng Pei Chi

Information Technology Officer

Wang Jue

Deputy General Manager

Teo Teck Leong

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.

List of abbreviations

AI	Artificial Intelligence
AIoT	Artificial Intelligence and Internet of Things
Bluetooth LE	Bluetooth Low Energy
CEO	Chief Executive Officer
CES	Consumer Electronics Show
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
Espressif	ESPRESSIF SYSTEMS (SHANGHAI) CO., LTD.
G&A	General and Administrative
GM	Gross Margin
IC	Integrated Circuit
IoT	Internet of Things
MCU	Microcontroller Unit
OBD	On-Board Diagnostics
R&D	Research and Development
RF	Radio Frequency
RISC-V	Reduced Instruction Set Computer-V
ROE	Return on Earnings
RTOS	Real-Time Operating System
SG&A	Selling, General and Administrative
SH	Shanghai
SoCs	System on Chips
TSR	Techno Systems Research
YoY	Year-on-Year



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All amounts presented in these condensed Consolidated Financial Statements are shown in CNY unless stated otherwise. Slight discrepancies between the amounts presented may occur due to rounding. The term "overseas" mentioned in the report is in reference to regions outside of China.