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Announcing ESP32-C2 and Explaining Its Significance

If you need a small, simple and cheap SoC with robust connectivity, you must try ESP32-C2!

Shanghai, China, Apr 29, 2022

Today, Espressif (688018. SH) announces the release of ESP32-C2, which is a combo Wi-Fi 4 + Bluetooth 5 (LE) chip that was conceived during last year's semiconductor supply shortages which -to a certain extent- persist even today. Hence, one of the most important goals for Espressif in creating this chip was to reduce its silicon area and the flash-size requirement. This is why ESP32-C2 has been designed to target simple, high-volume, low-data-rate, IoT applications, such as smart plugs and light bulbs.

ESP32-C2 is a chip in a 4mm x 4mm package, with 272 kB of memory. It runs frameworks, such as ESP-Jumpstart and ESP RainMaker®, while it also runs ESP-IDF. ESP-IDF is Espressif's open-source, real-time operating system for embedded IoT devices, which has been trusted by users across the whole wide world. It is supported by Espressif and the community for all ESP32 chips. The ROM code of ESP32-C2 is optimized, as it reduces the need for flash.

Thus, if you need a small, simple and cheap SoC that is able to provide your application with robust connectivity, ESP32-C2 is the way to go. Besides, ESP32-C2 also continues the tradition of Espressif's excellent security, having such features as secure boot and flash encryption, while also providing hardware root-of-trust for any applications.

One of the unintended, yet positive, side effects of this design is that the fairly small package and chip enhance the RF performance, due to reduced parasitics. ESP32-C2 can transmit 802.11N MC7 packets (72.2 Mbps) with 18 dBm of output power. ESP32-C2

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transmits at the full 20 dBm FCC limit for low data-rates. The typical receiver sensitivity is between -97 to -100 dBm for 1 Mbps 802.11B packets. The receive current is 58 mA.

Routers usually have better transmitters than client devices (here meaning devices connected to a router). However, client devices connected to ESP32-C2 can transmit as much output power as the router itself. (N.B.: We are not talking about multi-antenna routers here.) For most client devices, the output power of 20 dBm is supported for low-data-rate modes only. However, in the case of ESP32-C2, the output power of 20 dBm is also supported for some of the high data-rates, which therefore reduces transmission time and improves the overall connection quality, especially when many devices are being used.

The maximum distance is determined by the maximum power that the device can, or is allowed to, transmit at the lowest data-rate, i.e., 20 dBm at 802.11B 1 Mbps (or 19.5 dBm - and sometimes even lower- as per the FCC certification criteria). If your application needs to maximize the physical distance, as it happens with most applications, you should check out the receive sensitivity and transmit power (at 802.11B 1 Mbps) of the parts that you are using. ESP32-C2 takes full advantage of the allowed limits. Besides physical distance, larger bandwidths are helpful if you want to target audio applications. Incidentally, the improvements in the RF performance will also be applied to ESP32-C6, which is a WiFi-6-and-Bluetooth-LE 5.2 IoT chip that is to be commercially available in late Q3/early Q4 2022.

The Matter Standard

The Matter standard is designed to run on any network stacks that support IP. In its forthcoming first release, Matter will support Wi-Fi, Thread, and Ethernet protocols.

The following are the pros and cons of using Matter Wi-Fi vs Matter Thread:

Wi-Fi Pros

- Low latency, high throughput
- Most applications can be supported due to the high availability of Wi-Fi routers.

Wi-Fi Cons

- High power consumption, hard to support battery power

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- Without an additional mesh protocol, the network is limited in scale with only one hop.

Thread Pros

- Low power, support for battery power
- Support for mesh network (up to 250 devices)

Thread Cons

- We need a Thread border router for everything to function. And we still need Wi-Fi connectivity (or some other form of network connectivity).
- Low throughput, high latency

Since Wi-Fi is widely available in most places, the migration of existing Wi-Fi-based devices to the Matter Wi-Fi standard will most likely drive a large part of the early adoption of the Matter standard. For this reason, ESP32-C2, which is a low-cost, Wi-Fi chip supporting the Matter standard, is bound to be considered particularly valuable.

Getting Started

The ESP32-C2 series of chips currently includes the three different variants shown in the table below:

SoC	Variants	SiP flash (MB)	Ambient Temperature (°C)	Package (mm)
ESP32-C2	ESP8684H1	1	-40 ~ 105	QFN (4*4)
	ESP8684H2	2	-40 ~ 105	QFN (4*4)
	ESP8684H4	4	-40 ~ 105	QFN (4*4)

Figure 1: Variants in the ESP32-C2 Series of Chips

Availability and Pricing

Please contact Espressif's customer support team to request samples and build the most cost-effective IoT solution! If you also want to learn more about Espressif's other products, please visit our official website to get all the details about our chips and modules. Alternatively, you can use our selection tool and choose with it the product



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that suits your project best. For more information availability and pricing please visit email: sales.europe@macnica.com.

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About Espressif Systems

Espressif Systems (Shanghai) Pte. Ltd. is a fabless semiconductor company, with headquarters in Shanghai Zhangjiang High-Tech Park, providing low power Wi-Fi and Bluetooth SoCs and wireless solutions for the Internet of Things (IoT). The company build the widely popular ESP8266 and ESP32 chips with an innovative team of chip-design specialists, software and firmware developers and marketers. Espressif is committed to providing the best IoT devices and software platforms in industry.

The company also helps their customers build their own solutions and connect with other partners in the IoT ecosystem. Their passion lies in creating state-of-the-art chip-sets and enabling partners to deliver great products. Espressif's products are widely deployed in the tablet, OTT boxes, cameras, and Internet of Things markets.

For more information, please visit <https://www.espressif.com>.

About Macnica ATD Europe GmbH, (former Macnica GmbH)

Macnica's ATD Europe GmbH, (former Macnica GmbH), was originally established in the UK in 2006, and moved to Germany in July 2008, to increase efficacy of its service for European customers.

By it's acquisition of the Munich based company Scantec Mikroelektronik in 2014 Macnica Europe formed a powerful semiconductor distribution with headquarter in Ingolstadt and offices in Munich, Regensburg, Milton Keynes (UK) and Warsaw offering an attractive and competitive portfolio of highly sophisticated devices.

Macnica provides end to end support from design-in to production through its global service network to its customers, regardless of the final destination of the product shipment to customers' manufacturing locations.

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About Macnica ATD Europe S.A.S.

Founded in 1990 as ATD Electronique, Macnica ATD Europe headquarter offers innovative components dedicated to imaging applications for the European market. Its product portfolio includes: image sensors (CCD, CMOS, InGaAs, Thermal etc.), optics, interface circuits, FPGA & IPs, imaging processors, cables and OLED microdisplays.

It also covers development tools and design services enabling fast and efficient realization of new high-performance camera systems for markets such as machine vision, medical, life sciences, surveillance, automotive and others. After the acquisition of the company by Macnica Inc. as of October 1, 2020 the company operates under the name Macnica ATD Europe.

About Macnica, Inc.

Macnica was established in 1972 as a semiconductor distribution company headquartered in Yokohama, Japan, and has over 85 sales offices worldwide in eastern Asia, Europe and the USA. Total number of employees is over 3,000 and its consolidated revenue for fiscal 2020 was approximately US\$ 5.5 B.

Macnica is famous for having an excellent engineering team of more than 900 application support engineers, IC designers and software developers with strong focus on providing technical support for its customers including custom design services. Macnica is continuing to extend its presence globally by having successful partners in strategic areas in the electronics market.

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