

文件编号 Document No.	ESP-07-2-007-03	文件名称 Document Name	产品/工艺变更通知 Product/Process Change Notice (PCN)
文件版本 Document Version	1.4	保存期限 Retention Period	5 年 5 years

乐鑫 ESP32-C6 系列产品升级 Upgrade of ESP32-C6 Series Products									
PCN 编号 PCN No.	PCN20240701 (v2)	提出日期 Issue Date of PCN	2024/08/06						
变更日期 Proposed Date of Change	2024/10/06	预计变更后产品首次出货日期 Proposed Date of First Shipment After Change	2024/11/06						
PCN 类型 / PCN Category	<input checked="" type="checkbox"/> 客户需要批准/ Customer Approval Required <input type="checkbox"/> 客户通知/ Customer Notification								
1. 影响产品名称/ Affected Product Name									
1) 芯片产品/ Chip Products:									
		<table border="1"> <thead> <tr> <th>产品名称/ Product Name</th> <th>Change Item</th> </tr> </thead> <tbody> <tr> <td>ESP32-C6</td> <td>Chip revision from v0.1 to v0.2</td> </tr> <tr> <td>ESP32-C6FH4</td> <td>Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)</td> </tr> </tbody> </table>		产品名称/ Product Name	Change Item	ESP32-C6	Chip revision from v0.1 to v0.2	ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)
产品名称/ Product Name	Change Item								
ESP32-C6	Chip revision from v0.1 to v0.2								
ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)								
2) 模组产品/ Module Products									
产品名称/ Product Name	MPN	Chip on Board	Change Item						
ESP32-C6-WROOM-1	ESP32-C6-WROOM-1-N4	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1	ESP32-C6-WROOM-1-H4	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1	ESP32-C6-WROOM-1-N8	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1	ESP32-C6-WROOM-1-N16	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1U	ESP32-C6-WROOM-1U-N4	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1U	ESP32-C6-WROOM-1U-H4	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1U	ESP32-C6-WROOM-1U-N8	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-1U	ESP32-C6-WROOM-1U-N16	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-WROOM-ECOFLOW	ESP32-C6-WROOM-ECOFLOW-N16	ESP32-C6	Chip revision from v0.1 to v0.2						
ESP32-C6-MINI-1	ESP32-C6-MINI-1-N4	ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash						

			upgrade (chip integrated)
ESP32-C6-MINI-1	ESP32-C6-MINI-1-H4	ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)
ESP32-C6-MINI-1U	ESP32-C6-MINI-1U-N4	ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)
ESP32-C6-MINI-1U	ESP32-C6-MINI-1U-H4	ESP32-C6FH4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)

3) 开发板产品/ Development Board Products

产品名称/ Product Name	MPN	Change Item
ESP32-C6-DevKitC-1	ESP32-C6-DevKitC-1-N8	Chip revision from v0.1 to v0.2
ESP32-C6-DevKitM-1	ESP32-C6-DevKitM-1-N4	Chip revision from v0.1 to v0.2 + flash upgrade (chip integrated)

2. 变更原因/ Reason for Change

- 1) 段落 1 中的乐鑫产品持续升级优化，进一步提升 ESP32-C6 系列芯片性能。
 - 2) 原 ESP32-C6FH4 中叠封的 flash 产品计划停产。为提高供应稳定性，乐鑫完成了该供应商升级版本 flash 在 ESP32-C6 芯片平台的物料验证测试，测试通过。因此决定导入升级版本 flash 作为段落 1 列出的 ESP32-C6FH4 系列产品的备选 flash 物料。
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- 1) Upgrade ESP32-C6 series of chips to further improve the performance for the products listed in Para 1-1).
 - 2) The flash integrated in ESP32-C6FH4 will reach the end of its life. To ensure a robust and diversified module supply, Espressif has qualified the upgraded flash from the same manufacturer on ESP32-C6 series of chips. Therefore, the upgraded flash will be introduced as the new alternative source for ESP32-C6FH4 series of products listed in Para 1.

3. 变更描述/ Description of Change

- 1) 段落 1 中 ESP32-C6 系列产品的芯片硬件金属层变更，芯片版本将由 v0.1 升级为 v0.2，提升产品性能。具体信息参见附录 I-1 中[勘误表信息](#)。段落 1 中列出的模组和开发板产品中使用的主芯片为 ESP32-C6 系列芯片，因此也进行相应变更。
 - 2) 段落 1 中的 ESP32-C6FH4 芯片产品内置 flash 更新，因此段落 1 中对应的模组和开发板产品也进行相应变更。
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- 1) The ESP32-C6 chip revision v0.2 is a metal layer change to the ESP32-C6 chip revision v0.1 with enhanced performance. The new revision fixes the bugs described in Appendix I > [Errata](#)

[Information](#). Modules and development boards listed in Para 1 are based on ESP32-C6 series of chips, and thus will change accordingly.

- 2) The integrated flash in the ESP32-C6FH4 chip's package will be upgraded. Modules and development boards based on ESP32-C6FH4 in Para 1 will change accordingly.

4. 变更对比/ Change Comparison

请见附录 I: 变更对比。

Please refer to Appendix I: Change comparison.

识别方式/ Identification Method:

芯片产品: 通过 eFuse 及产品丝印。

模组和开发板产品: 通过主芯片的 eFuse, 模组屏蔽盖丝印的产品规格标识位, 或产品外箱标签中的 PW 号。

Chip products: Identified by eFuse bits and chip marking.

Module and Development Board products: Identified by the chip eFuse, module shield marking, or PW No. on carton box.

5. 变更影响/ Impact of Change

- 1) 品质和性能/ Quality & Performance:

ESP32-C6 芯片升级, 具体信息参见附录 I 中[勘误表信息](#)。

新 flash 已经通过了物料验证测试, 乐鑫确认该 flash 的品质和性能满足乐鑫的要求。

Chip revision upgrade of ESP32-C6, for details about ESP32-C6 series chip upgrade, see Appendix I > [Errata Information](#).

New flash has passed the material verification test, and Espressif has confirmed that the quality and performance of this flash meets Espressif's requirements.

- 2) 交期/ Delivery: 不影响/ No impact

- 3) 生产料号/ Material Part Numbers (MPN): 不影响/ No impact

- 4) 认证/ Certification: 不影响/ No impact

- 5) 软件/ Software:

a) 首个支持 ESP32-C6 的 ESP-IDF 版本 v5.1 能正常运行在芯片版本 v0.2 上, 对客户的现有产品无影响。ESP32-C6 芯片版本 v0.2 修复了 FTM 的功能, ESP-IDF 支持 [FTM 功能](#) 的所有版本均支持在芯片版本 v0.2 芯片上使用此功能。详情参见 [IDF 与芯片版本兼容性说明](#)。

The first ESP-IDF version to support ESP32-C6, namely v5.1, can run normally on chip revision v0.2, so the upgrade has no impact on customers' existing products. The [FTM functionality](#) fixed in ESP32-C6 chip revision v0.2 can be used on v0.2 with any ESP-IDF version that supports FTM. For details, see [Compatibility Between ESP-IDF Releases and Revisions of Espressif SoCs](#).

b) 默认情况下，ESP32-C6FH4 系列产品内置 SPI flash 的最大时钟频率为 80 MHz，且不支持自动暂停功能。如需要使用 120 MHz 的 flash 时钟频率或自动暂停功能，请联系乐鑫。

By default, the SPI flash on the ESP32-C6FH4 series products operates at a maximum clock frequency of 80 MHz and does not support the auto suspend feature. If you have a requirement for a higher flash clock frequency of 120 MHz or if you need the flash auto suspend feature, please contact us.

6. 变更前后产品处理/ How to Deal with Products
FIFO

7. 相关报告/ Related Report(s):

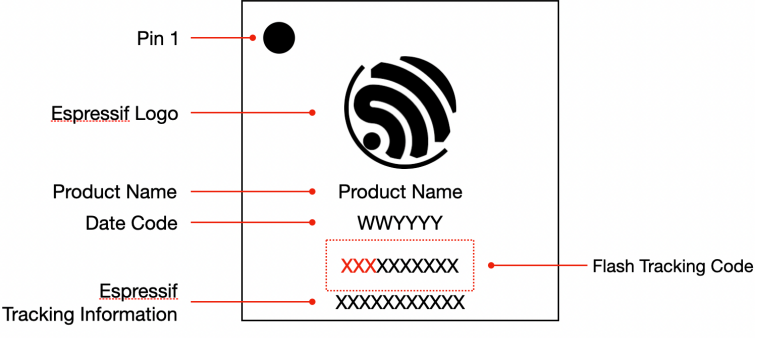

- | | |
|---|--|
| <input checked="" type="checkbox"/> RF Performance Test Report | Pass |
| <input checked="" type="checkbox"/> Other Reports (Pls specify) | ESP32-C6 系列芯片勘误表 |
| | ESP32-C6 Series SoC Errata |

8. 给使用者的验证建议/ Verification Suggestion To Users

请确认您是否使用 flash 自动暂停功能，如有，请务必联系乐鑫。

Please confirm whether you are using the flash auto suspend feature. If so, please contact Espressif.

Appendix I 变更对比/ Change Comparison

1 产品基本信息/ Product Basic Information			
No.	项目/ Item	变更前/ Before Change	变更后/ After Change
1.1	Chip Revision	v0.1	v0.2
1.2	eFuse 标识位/ eFuse identification bit		
	EFUSE_RD_MAC_SPI_SYS_3_REG[23]	0	0
	EFUSE_RD_MAC_SPI_SYS_3_REG[22]	0	0
	EFUSE_RD_MAC_SPI_SYS_3_REG[21]	0	0
	EFUSE_RD_MAC_SPI_SYS_3_REG[20]	0	0
	EFUSE_RD_MAC_SPI_SYS_3_REG[19]	0	1
	EFUSE_RD_MAC_SPI_SYS_3_REG[18]	1	0
1.3	Chip Marking (Espressif Tracking Information Line)		
		xBXXXXXXXX	xCXXXXXXXX
1.4	Module MPN	No Change	
1.5	Module Marking (Specification Marking Line)		
		MBXXXX	MCXXXX
2	勘误表信息/ Errata Information		

2.1	RISC-V CPU	写 LP SRAM 时指令执行乱序导致死锁 Possible Deadlock due to Out-of-Order Execution of Instructions When Writing to LP SRAM is Involved	已在芯片版本 v0.2 中修复。 Fixed in chip revision v0.2.
2.2	SPI	flash 自动暂停功能启用时, 可能导致读出数据异常 Enabling Flash Auto Suspend May Cause Abnormalities in Data Read	已在芯片版本 v0.2 中修复。 Fixed in chip revision v0.2.
2.3	SAR ADC	SAR ADC 访问 GDMA 时可能出现数据重复 Data Duplication May Occur When SAR ADC Accessing GDMA	已在芯片版本 v0.2 中修复。 Fixed in chip revision v0.2.
2.4	SAR ADC	SAR ADC 低四位精度缺失 Loss of Precision in Lower Four Bits of SAR ADC	已在芯片版本 v0.2 中修复。 Fixed in chip revision v0.2.
2.5	Wi-Fi	ESP32-C6 无法作为 802.11mc 精确时间测量 (FTM) 的发起方 ESP32-C6 Cannot be 802.11mc FTM Initiator	已在芯片版本 v0.2 中修复。 Fixed in chip revision v0.2.
3	内置 flash 信息/ flash upgrade (chip integrated)	变更前/ Before Change	变更后/ After Change
	Integrated flash	flash A	flash B

邮件订阅**Espressif Email Notifications**

乐鑫为注册用户提供电子邮件通知服务，用户可通过[乐鑫订阅系统](#)接收技术文档更新、新闻通讯、PCN 等邮件通知。

Espressif sends email notifications of technical documentation changes, along with newsletters, PCNs and other valuable information, to subscribed customers only. If you wish to stay updated on our products and services, please subscribe [here](#).

客户响应要求**Customer Response Requirements****需客户批准的变更/ Change Requiring Customer Approval:**

- a) 客户须在乐鑫发出 PCN 后的 30 天内告知乐鑫已收到 PCN。如客户未在接收到 PCN 后的 30 天内告知已收到，则视为客户收到变更。

Customers are requested to acknowledge receipt of the PCN within 30 calendar days from the date of issue of the PCN. Customers would be considered as notified 30 calendar days after issue of the PCN if no acknowledgement is received.

- b) 自发布 PCN 之日起 90 天内，客户没有任何其他反馈，则表示客户接受该 PCN。

The lack of any additional responses from customers within 90 calendar days from the date of issue of the PCN constitutes acceptance of the proposed changes.

客户通知/ Customer Notification:

- a) 客户需在乐鑫发出 PCN 后 14 天内通知乐鑫收到该 PCN。如客户未在接收到 PCN 14 日反馈乐鑫，则视为客户确认该 PCN。

Customers are requested to acknowledge receipt of the PCN within 14 calendar days from the date of issue of the PCN. Customers would be considered as having acknowledged the PCN if no response is received after 14 calendar days.

请反馈至 pcn@espressif.com。

Please send feedback to pcn@espressif.com.

客户批准/确认信息**Customer Approval/Acknowledgement and Remarks**

客户公司全称:

Customer' s Company Name:

PCN 评审结果/ PCN Review Result:

- 批准/确认 Accepted/Acknowledged
 不批准/ Rejected
 需要分析/ Further Analysis Required

客户意见/Comment:

公司代表人姓名
Representative' s Name:

公司代表人职责
Representative' s Job
Title:

公司代表人签名
Representative' s
Signature:

日期
Date: