

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

基于 ESP32-S2FH4 芯片的ESP32-S2 系列产品升级 Upgrade ESP32-S2 Series Products Based on ESP32-S2FH4															
PCN 编号 PCN No.	PCN20240602	提出日期 Issue Date of PCN	2024/07/02												
变更日期 Proposed Date of Change	2024/09/02	预计变更后产品首次出货日期 Proposed Date of First Shipment After Change	2024/10/02												
PCN 类型 / PCN Category	☒ 客户需要批准/ Customer Approval Required ☐ 客户通知/ Customer Notification														
1. 影响产品名称/ Affected Product Names															
1) ESP32-S2 v0.0 芯片版本升级为 v1.0 + flash 更新/ ESP32-S2 chip revision v0.0 upgraded to v1.0 + flash upgrade															
a. 芯片产品/ Chip Products:															
ESP32-S2FH4 (Change Item: Chip revision from v0.0 to v1.0+flash integrated upgrade)															
b. 模组产品/ Module Products:															
<table><tr><th>Product Name</th><th>Product MPN</th><th>Change Item</th></tr><tr><td>ESP32-S2-MINI-1</td><td>ESP32-S2-MINI-1-N4</td><td rowspan="4">Chip revision from v0.0 to v1.0 + flash upgrade (chip integrated)</td></tr><tr><td>ESP32-S2-MINI-1</td><td>ESP32-S2-MINI-1-H4</td></tr><tr><td>ESP32-S2-MINI-1U</td><td>ESP32-S2-MINI-1U-N4</td></tr><tr><td>ESP32-S2-MINI-1U</td><td>ESP32-S2-MINI-1U-H4</td></tr></table>				Product Name	Product MPN	Change Item	ESP32-S2-MINI-1	ESP32-S2-MINI-1-N4	Chip revision from v0.0 to v1.0 + flash upgrade (chip integrated)	ESP32-S2-MINI-1	ESP32-S2-MINI-1-H4	ESP32-S2-MINI-1U	ESP32-S2-MINI-1U-N4	ESP32-S2-MINI-1U	ESP32-S2-MINI-1U-H4
Product Name	Product MPN	Change Item													
ESP32-S2-MINI-1	ESP32-S2-MINI-1-N4	Chip revision from v0.0 to v1.0 + flash upgrade (chip integrated)													
ESP32-S2-MINI-1	ESP32-S2-MINI-1-H4														
ESP32-S2-MINI-1U	ESP32-S2-MINI-1U-N4														
ESP32-S2-MINI-1U	ESP32-S2-MINI-1U-H4														
2) ESP32-S2 v1.0 芯片版本产品 flash 更新 / ESP32-S2 series products of chip revision v1.0 with flash upgrade															
模组产品/ Module Products:															
<table><tr><th>Product Name</th><th>Product MPN</th><th>Change Item</th></tr><tr><td>ESP32-S2-MINI-2</td><td>ESP32-S2-MINI-2-N4</td><td rowspan="4">flash upgrade (chip integrated)</td></tr><tr><td>ESP32-S2-MINI-2</td><td>ESP32-S2-MINI-2-H4</td></tr><tr><td>ESP32-S2-MINI-2U</td><td>ESP32-S2-MINI-2U-N4</td></tr><tr><td>ESP32-S2-MINI-2U</td><td>ESP32-S2-MINI-2U-H4</td></tr></table>				Product Name	Product MPN	Change Item	ESP32-S2-MINI-2	ESP32-S2-MINI-2-N4	flash upgrade (chip integrated)	ESP32-S2-MINI-2	ESP32-S2-MINI-2-H4	ESP32-S2-MINI-2U	ESP32-S2-MINI-2U-N4	ESP32-S2-MINI-2U	ESP32-S2-MINI-2U-H4
Product Name	Product MPN	Change Item													
ESP32-S2-MINI-2	ESP32-S2-MINI-2-N4	flash upgrade (chip integrated)													
ESP32-S2-MINI-2	ESP32-S2-MINI-2-H4														
ESP32-S2-MINI-2U	ESP32-S2-MINI-2U-N4														
ESP32-S2-MINI-2U	ESP32-S2-MINI-2U-H4														

2. 变更原因/ Reason for Change

- 1) 段落 1-1) 小节中的乐鑫产品持续升级优化, 进一步提升 ESP32-S2 系列芯片性能。
 - 2) XM25QH32C 系列 flash 产品计划停产, 升级为 XM25UH32D 系列。为提高供应稳定性, 乐鑫完成了 XM25UH32D 系列 flash 在 ESP32-S2 芯片平台的物料验证测试, 测试通过。因此决定导入 XM25UH32D 作为段落 1 列出产品的备选 flash 物料。
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- 1) Upgrade ESP32-S2 series of chips to further improve the performance for the products listed in Para 1-1).
 - 2) The XM25QH32C series flash will be replaced by the XM25UH32D series since the XM25QH32C series will reach the end of its life. To ensure a robust and diversified module supply, Espressif has qualified XM25UH32D series flash as the new alternative source for products listed in Para 1.

3. 变更描述/ Description of Change

- 1) 段落 1-1) 中 ESP32-S2 系列产品的芯片版本将由 v0.0 升级为 v1.0。结合使用乐鑫推荐版本的软件, 芯片版本为 v1.0 的 ESP32-S2 系列产品提升了 11g, 11n 中高速率发射功率。同时, 芯片版本为 v1.0 的 ESP32-S2 系列产品的其他性能较变更前版本的产品有提升。具体信息参见附录 I-1 中勘误表信息。段落 1 中列出的 1-1) 中模组产品中使用的主芯片为 ESP32-S2FH4 芯片, 因此也进行相应变更。
 - 2) 段落 1 中的所有芯片产品内置 flash 由 XM25UH32C 系列升级为 XM25UH32D 系列 flash, 因此段落 1 对应模组产品也进行相应变更。
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- 1) Upgrade ESP32-S2 series of chips from chip revision v0.0 to chip revision v1.0 for products listed in Para 1-1). With the recommended ESP-IDF versions, the ESP32-S2 series products based on chip revision v1.0 have improved transmit power in high rates for 11g and 11n. The ESP32-S2 series products based on chip revision v1.0 have other performance improvements. For details, please refer to Appendix I-1 for Errata Information. Related module products listed in Para 1-1) are based on ESP32-S2FH4, and thus will change accordingly.
 - 2) Flash integrated in all chip products listed in Para 1 will be upgraded from the XM25QH32C series flash to XM25UH32D series flash. Related module products listed 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 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:

结合使用乐鑫推荐版本的软件，芯片版本为 v1.0 的 ESP32-S2 系列产品相比于芯片版本为 v0.0 的产品提升了 11g, 11n 中高速率发射功率，低速率及 11b 的发射功率未做调整，对认证无直接影响。具体射频功率参见附录 I-1 中 射频功率信息。结合使用需求版本的乐鑫软件，芯片版本为 v1.0 的 ESP32-S2 系列产品射频功率无变化。芯片版本为 v1.0 的 ESP32-S2 系列产品的其他性能较变更前版本的产品有提升。具体信息参见附录 I-1 中勘误表信息。

XM25UH32D 系列 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。With the recommended ESP-IDF versions, the ESP32-S2 series products based on chip version v1.0 have improved transmit power in high rates for 11g and 11n. The transmit power in low rates and for 11b remains unchanged, which does not have a direct impact on certification. For details about RF transmit power, please refer to Appendix I-1 for RF Power Information. The RF transmit power of the ESP32-S2 series products based on chip version v1.0 remains unchanged as before. The ESP32-S2 series products based on chip revision v1.0 have other performance improvements. For details, please refer to Appendix I-1 for Errata Information.

Flash Part Number XM25UH32D series flash has completed the qualification test. Espressif confirms it fully meets the Espressif's requirements for quality and performance.

2) 交期/ Delivery: 无影响/No impact.

3) 生产料号/ Material Part Numbers (MPN):

段落 1 中列出芯片的产品名称不变更，客户可以继续使用原有的芯片产品名称下单；

段落 1 中列出的模组的 MPN 不变更，客户可以继续使用原有的产品 MPN 进行下单。For affected Espressif chip products listed in Para 1, there is no change to the product name. You can still use the current chip name to place orders;

For affected Espressif module products listed in Para 1, there is no change to the MPN. You can still use the current MPN to place orders.

4) 认证/ Certification:

因产品芯片版本升级，段落 1-1) 列出的芯片产品变更后对认证无直接影响。由于客户的匹配电路存在差异，建议客户对发射功率进行对比测试，如需要，可联系乐鑫提供相应的支持。段落 1 中涉及的模组的认证有效性无变化，客户可正常使用变更后的模组产品。

Changes to the chip products listed in para 1-1) have no direct impact on certification because of chip revision update. Given the differences between matching circuits, it is recommended to conduct comparative tests on transmit power. Please contact Espressif for support if needed.

Certifications for the modules listed in Para 1 are still valid, and you can use the upgraded module products directly.

5) 软件/ ESP-IDF

- a) 使用段落 1-1) 列出的芯片版本变更后的产品时，如需表现更优的射频功率，请识别确认所使用的 ESP-IDF 版本为推荐版本的 ESP-IDF 版本，ESP-IDF 各分支支持信息参见表 1。同时强烈建议您升级到 ESP-IDF release 分支的[最新稳定版本](#)，更多软件信息参见 [ESP-IDF 版本简介](#)。如有问题，请联系[乐鑫](#)。

(注：使用需求版本和推荐版本都可支持变更后的产品运行。使用需求版本的 ESP-IDF 版本，搭载变更后的产品的射频功率维持不变。)

For the chip revision upgraded products listed in Para 1-1) with better RF performance, please be sure that you use the recommended ESP-IDF versions for your branch. Please refer to Table 1 for details about the required and recommended ESP-IDF versions. Moreover, it is highly recommended to upgrade to the [latest stable version](#) for your branch. For more software information, please refer to [ESP-IDF Versions](#). If you have any questions, please contact [Espressif](#).

(Note: The upgraded products can run on all required and recommended ESP-IDF versions. The RF transmit power of the upgraded products remains unchanged as long as the required version of ESP-IDF is used.)

表 1 ESP-IDF 各分支支持信息/ Table 1 Required and recommended ESP-IDF versions corresponding to the upgraded products

ESP-IDF Branch	Required IDF Ver. From	RF Improved Commit ID	Recommended IDF Ver. From
release/v4.2	v4.2	7482ad51	v4.2.3
release/v4.3	v4.3	87c2352a	v4.3.3
release/v4.4	v4.4	71b81e4a	v4.4.1
release/v5.0	v5.0	9909c4a3	v5.0
release/v5.1	v5.1	cbce221e	v5.1
release/v5.2	v5.2	11eaf41b	v5.2

注意/ Note:

ESP-IDF v4.2 , ESP-IDF v4.3, ESP-IDF v4.4 已正式停止维护，乐鑫将不再对该版本提供增加新功能、修复 bug、修复安全问题等支持。

ESP-IDF v4.2, ESP-IDF v4.3, ESP-IDF v4.4 has reached End-of-Life. New features, bug fixes, and security fixes will no longer be supported on this branch.

- b) 使用段落 1-2) 列出的模组产品时，软件无需更新也能正常运行。但我们仍然建议您使新版本 ESP-IDF 版本以获得芯片更新所带来的性能升级，参见 [ESP-IDF 版本与乐鑫芯片版本兼容性](#)。

For modules listed in Para 1-2), there is no need to update ESP-IDF version for the software to run normally. However, we still recommend using the newer versions of ESP-IDF to benefit from the performance improvements brought by the chip updates. For details, please refer to [Compatibility Between ESP-IDF Releases and Revisions of Espressif SoCs](#).

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

FIFO

7. 相关报告/ Related Report(s):

☒ Other Reports (Pls specify) 其他项目信息参见 [ESP32-S2 系列芯片勘误表](#)
For information about other items, refers to [ESP32-S2 Series SoC Errata](#)

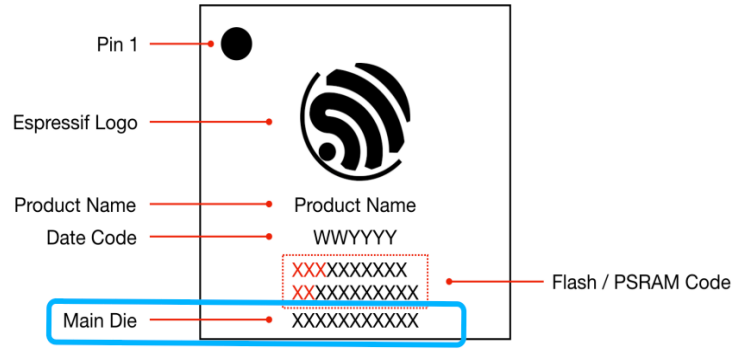
8. 给使用者的验证建议/ Verification Suggestion To Users

建议客户识别确认所使用的 ESP-IDF 版本为推荐版本的 ESP-IDF 版本，结合实际应用场景进行验证。

Suggest to check if you use the recommended ESP-IDF versions and do the verification with practical application scenarios.

Appendix I 变更对比/ Change Comparison

一. 段落 1-1) 产品的变更对比/ Change Comparison for Products Listed in Para 1-1)

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	v0.0	v1.0
1.2	eFuse 标识位/ eFuse identification bit		
	EFUSE_RD_MAC_SPI_SYS_3_REG[19]	0	0
	EFUSE_RD_MAC_SPI_SYS_3_REG[18]	0	1
	EFUSE_RD_MAC_SPI_SYS_3_REG[20]	0	0
	EFUSE_RD_MAC_SPI_SYS_4_REG[6]	0	0
	EFUSE_RD_MAC_SPI_SYS_4_REG[5]	0	0
	EFUSE_RD_MAC_SPI_SYS_4_REG[4]	0	0
1.3	Chip Marking (Main Die Line)		
		xAXXXXXXXXX	xBXXXXXXXXX
1.4	Module MPN	No change	
1.5	Module Marking (Specification Marking Line)		
		XXXXXX	MBXXXX

2 射频功率信息/ RF Power Information 射频功率信息				
No.	Tx_Rate	Before Change	After Change	
		(Chip Revision v0.0)	(Chip Revision v1.0 with Recommended ESP-IDF Version)	Chip Revision v1.0 with Required ESP-IDF Version)
2.1	1m	19.5	19.5	19.5
2.2	2m	19.5	19.5	19.5
2.3	5.5m	19.5	19.5	19.5
2.4	11m	19.5	19.5	19.5
2.5	6m	18	18	18
2.6	9m	18	18	18
2.7	12m	18	18	18
2.8	18m	18	18	18
2.9	24m	17	18	17
2.10	36m	17	18	17
2.11	48m	16	18	16
2.12	54m	15	18	15
2.13	mcs0	18	18	18
2.14	mcs1	18	18	18
2.15	mcs2	18	18	18
2.16	mcs3	17	18	17
2.17	mcs4	17	17	17
2.18	mcs5	16	17	16
2.19	mcs6	15	17	15
2.20	mcs7	13.5	17	13.5
2.21	mcs0_40	18	18	18
2.22	mcs1_40	18	18	18
2.23	mcs2_40	18	18	18
2.24	mcs3_40	17	18	17
2.25	mcs4_40	17	17	17
2.26	mcs5_40	16	17	16
2.27	mcs6_40	15	16.5	15
2.28	mcs7_40	13.5	16.5	13.5
3 勘误表信息/ Errata Information				
No.	Item	Before Change	After Change	
3.1	系统 System	NA	1) 修复 VDDA 和 VDD3P3_RTC 管脚在芯片关闭时漏电问题。	

			Fixed leakage current at the VDDA and VDD3P3_RTC pin during shutdown 2) 修复 flash 下载随机失败问题。 Fixed random flash download failure	
3.2	RTC I2C	NA	修复低温条件下 RTC_I2C_RESET 下降沿触发复位问题 Fixed reset triggered by the falling edge of RTC_I2C_RESET at low temperature	
3.3	SPI	NA	修复 SPI 自动暂停后软件重启卡住问题 Fixed SPI stuck after soft restart from auto suspension	
3.4	USB OTG	NA	修复 USB OTG 使用 AHB 总线仲裁时出现异常数据 Fixed abnormal data during AHB bus arbitration by USB OTG	
3.5	SAR ADC	NA	修复 SAR ADC 的位 1 不反转问题。 Fixed the non-flip of Bit 1 in SAR ADC	
4	软件信息/ ESP-IDF Information			
No.	ESP-IDF Branch	Required IDF Ver. From	RF Improved Commit ID	Recommended IDF Ver. From
4.1	release/v4.2	v4.2	7482ad51	v4.2.3
4.2	release/v4.3	v4.3	87c2352a	v4.3.3
4.3	release/v4.4	v4.4	71b81e4a	v4.4.1
4.4	release/v5.0	v5.0	9909c4a3	v5.0
4.5	release/v5.1	v5.1	cbce221e	v5.1
4.6	release/v5.2	v5.2	11eaf41b	v5.2
5	技术规格书信息/ Datasheet Information			
No.	Item	Before Change	After Change	
5.1	ESP32-S2 Datasheet	v1.6	v1.7	
5.2	ESP32-S2-MINI-1 & ESP32-S2-MINI-1U Datasheet	v1.4	v1.5	

二. 段落 1 产品变更对比 (flash)/ Change Comparison for Products Listed in Para 1 (flash)

项目/ Item	变更前/ Before Change	变更后/ After Change
Integrated flash	XM25QH32C series	XM25UH32D series

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: