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| 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-H2 系列产品升级 Upgrade of ESP32-H2 Series Products | | | | | |
|---|--|---|---------------------------------|-----------------------------|----------------------------|
| PCN 编号 PCN No. | PCN20250104 | 提出日期 Issue Date of PCN | 2025/03/07 | | |
| 变更日期 Proposed Date of Change | 2025/05/07 | 预计变更后产品首次出货日期 Proposed Date of First Shipment After Change | 2025/06/30 | | |
| 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/ Affected Products 受影响产品包括 ESP32-H2 系列芯片、模组、开发板，具体型号清单如下： The affected products include the ESP32-H2 series chips, modules, and development boards. The specific model list is as follows: | | | | | |
| 1) 芯片产品/ Chip Products | | | | | |
| | 变更前订购代码 Ordering Code Before Change | 变更后订购代码 Ordering Code After Change | 变更项目 Change Item | | |
| | ESP32-H2FH2 | ESP32-H2FH2S | Chip revision from v0.1 to v1.2 | | |
| | ESP32-H2FH4 | ESP32-H2FH4S | Chip revision from v0.1 to v1.2 | | |
| 2) 模组产品/ Module Products | | | | | |
| | Module Product Name | Ordering Code Before Change | Ordering Code After Change | Chip on Board Before Change | Chip on Board After Change |
| | ESP32-H2-MINI-1 | ESP32-H2-MINI-1-H2 | ESP32-H2-MINI-1-H2S | ESP32-H2FH2 | ESP32-H2FH2S |
| | ESP32-H2-MINI-1 | ESP32-H2-MINI-1-H4 | ESP32-H2-MINI-1-H4S | ESP32-H2FH4 | ESP32-H2FH4S |
| | ESP32-H2-MINI-1 | ESP32-H2-MINI-1-N2 | ESP32-H2-MINI-1-H2S | ESP32-H2FH2 | ESP32-H2FH2S |
| | ESP32-H2-MINI-1 | ESP32-H2-MINI-1-N4 | ESP32-H2-MINI-1-H4S | ESP32-H2FH4 | ESP32-H2FH4S |
| | ESP32-H2-MINI-1U | ESP32-H2-MINI-1U-H2 | ESP32-H2-MINI-1U-H2S | ESP32-H2FH2 | ESP32-H2FH2S |
| | ESP32-H2-MINI-1U | ESP32-H2-MINI-1U-H4 | ESP32-H2-MINI-1U-H4S | ESP32-H2FH4 | ESP32-H2FH4S |
| | ESP32-H2-MINI-1U | ESP32-H2-MINI-1U-N2 | ESP32-H2-MINI-1U-H2S | ESP32-H2FH2 | ESP32-H2FH2S |
| | ESP32-H2-MINI-1U | ESP32-H2-MINI-1U-N4 | ESP32-H2-MINI-1U-H4S | ESP32-H2FH4 | ESP32-H2FH4S |

| | | | | |
|--------------------|-----------------------|------------------------|-------------|--------------|
| ESP32-H2-WROOM-02C | ESP32-H2-WROOM-02C-H2 | ESP32-H2-WROOM-02C-H2S | ESP32-H2FH2 | ESP32-H2FH2S |
| ESP32-H2-WROOM-02C | ESP32-H2-WROOM-02C-H4 | ESP32-H2-WROOM-02C-H4S | ESP32-H2FH4 | ESP32-H2FH4S |
| ESP32-H2-WROOM-03 | ESP32-H2-WROOM-03-H2 | NA | ESP32-H2FH2 | NA |
| ESP32-H2-WROOM-03 | ESP32-H2-WROOM-03-H4 | NA | ESP32-H2FH4 | NA |
| ESP32-H2-WROOM-07 | ESP32-H2-WROOM-07-H2 | NA | ESP32-H2FH2 | NA |
| ESP32-H2-WROOM-07 | ESP32-H2-WROOM-07-H4 | NA | ESP32-H2FH4 | NA |

3) 开发板产品/ Development Board Products

| Development Board Product Name | Ordering Code Before Change | Ordering Code After Change |
|--------------------------------|-----------------------------|----------------------------|
| ESP32-H2-DevKitM-1 | ESP32-H2-DevKitM-1-N4 | ESP32-H2-DevKitM-1-N4S |

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-H2 系列芯片性能。
 - 2) 由于升级前后的产品在软件方面不兼容，为区分变更前后的产品，公司更新了订购代码。
- 1) Upgrade ESP32-H2 series of chips to further improve the performance for the products listed in Para 1.
 - 2) Chip revision v1.2 and previous chip revisions are not software compatible. Espressif has updated the ordering codes to distinguish between them.

3. 变更描述/ Description of Change

段落 1 中 ESP32-H2 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 v1.2，最新的 ESP32-H2 版本 v1.2 与需求版本的 ESP-IDF 搭配使用，可优化产品安全等性能。ESP32-H2 v1.2 新功能及功能优化信息可参见附录 I。段落 1 中列出的模组和开发板产品中使用的主芯片为 ESP32-H2 芯片，因此也进行相应变更。

The ESP32-H2 chip revision v1.2 involves a metal layer change to the chip revision v0.1, providing enhanced security performance when used with the required ESP-IDF version. For the new features and improvements in chip revision v1.2, please refer to [Appendix I](#). Modules and development boards listed in Para 1 are based on ESP32-H2 series of chips and thus 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：通过产品型号，eFuse 及产品丝印。

模组和开发板产品：通过产品型号，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 part number, eFuse bits and chip marking.

Module and Development Board products: Identified by the part number, chip eFuse, specification identifier on the 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-H2 芯片版本 v1.2 必须搭配指定版本的 ESP-IDF 使用,具体 ESP-IDF 版本请参见下面段落 5-5) 中的表格“ESP32-H2 v1.2 所需 ESP-IDF 版本”。使用需求版本的 ESP-IDF 可正常使用 ESP32-H2 v1.2 系列产品并可应用 ESP32-H2 v1.2 所提供的新的功能及获得功能优化, ESP32-H2 v1.2 新功能及功能优化信息可参见[附录 I](#)。

The ESP32-H2 chip revision v1.2 must be used with a specified version of ESP-IDF. For details, refer to Table *Required ESP-IDF Version for ESP32-H2 v1.2* in Para 5-5) below. With the required ESP-IDF version, you can use the new features and the improved existing features in chip revision v1.2, see [Appendix I > New Features and Improvements](#).

2) 交期/Delivery:

对于变更后的新版本,乐鑫将保持产品标准交货周期 (Standard Lead Time) 不变。

对于变更前的旧版本,乐鑫未来无供应计划;若您有订单需求,请务必尽快联系乐鑫商务人员。

为保障供应,请您及时确认版本变更并完成软件升级。

The upgraded products will maintain the standard lead time.

For products with ESP32-H2 chips prior to revision v1.2, Espressif has no future supply plans. If you have order requirements, please contact Espressif's sales team as soon as possible.

To ensure the smooth delivery of future orders, customers are advised to promptly complete software upgrades and verify the updated product.

3) 订购代码/ Ordering Code:

芯片,模组和开发板产品:请使用新的订购代码下单,变更后订购代码参见段落 1。

Chips, modules, and development boards: Please place orders using the new ordering code. Refer to Para 1 for the updated ordering code.

4) 认证/ Certification: 不影响/ No impact

5) 软件/ Software:

随着 ESP32-H2 系列升级为 v1.2 版本芯片，如果您当前使用的是早于 v1.2 的芯片版本，则现有的 ESP-IDF 版本可能无法兼容 v1.2 芯片。为确保兼容性，请将 ESP-IDF 升级至需求版本或更高版本（参见下表“ESP32-H2 v1.2 所需 ESP-IDF 版本”）。将 ESP-IDF 升级至需求版本或更高版本后，请保持 Kconfig 中 `ESP32H2_REV_MIN` 的配置不变，然后重新编译二进制文件。编译后的二进制文件可在之前的芯片版本以及 v1.2 上运行。如已使用上述 ESP-IDF 需求版本或更高版本编译了二进制文件，则无需再更新软件。

As the ESP32-H2 chip series upgrades to the v1.2 chip revision, if you are using a pre-v1.2 chip version, your existing ESP-IDF version may not be compatible with the v1.2 chip. To ensure compatibility and to have the same binary supporting ESP32-H2 v1.2 and the older version of the chip you are using, please make sure the binary is built with ESP-IDF version equal to or higher than the required version (see Table *Required ESP-IDF Version for ESP32-H2 v1.2*). If not, please upgrade ESP-IDF to the required version or higher and rebuild your binary with Kconfig option `ESP32H2_REV_MIN` unchanged. The built binary is able to run on all existing chips and on ESP32-H2 v1.2 as well. If your binary is already built with these versions, there is no need to upgrade your software.

ESP32-H2 v1.2 所需 ESP-IDF 版本/ Required ESP-IDF Version for ESP32-H2 v1.2:

| 发布版本 Release Branch | 推荐版本 Recommended | 使用 ESP32-H2 v1.2 版本产品的需求 ESP-IDF 版本 Required ESP-IDF version with ESP32-H2 v1.2 |
|------------------------|--------------------------------|--|
| release/v5.5 | 5.5 及其以上版本 5.5 or above | 5.5 (预计 2025/8 月发布) 5.5 (Release scheduled for August 2025) |
| release/v5.4 | 5.4.1 及其以上版本 5.4.1 or above | 5.4.1 (预计 2025/4 月发布) 5.4.1 (Release scheduled for April 2025) |
| release/v5.3 | 5.3.3 及其以上版本 5.3.3 or above | 5.3.3 (预计 2025/3/27 发布) 5.3.3 (Release scheduled for March 27, 2025) |
| release/v5.2 | 5.2.5 及其以上版本 5.2.5 or above | 5.2.5 (已发布) 5.2.5 (Released) |
| release/v5.1 | 5.1.6 及其以上版本 5.1.6 or above | 5.1.6 (已发布) 5.1.6 (Released) |

6) 技术规格书/ Datasheet:

[ESP32-H2 系列芯片技术规格书](#): 添加芯片版本 v1.2 新增的功能并更新芯片订购代码。

[ESP32-H2 所有模组技术规格书](#): 更新模组的内置芯片以及模组订购代码。

[ESP32-H2 Series Datasheet](#): Add the new features introduced in chip revision v1.2 and update the chip ordering code.

[All ESP32-H2 Module Datasheet](#): Update the embedded chip in the module and module ordering code.

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

7. 相关报告/ Related Report(s):

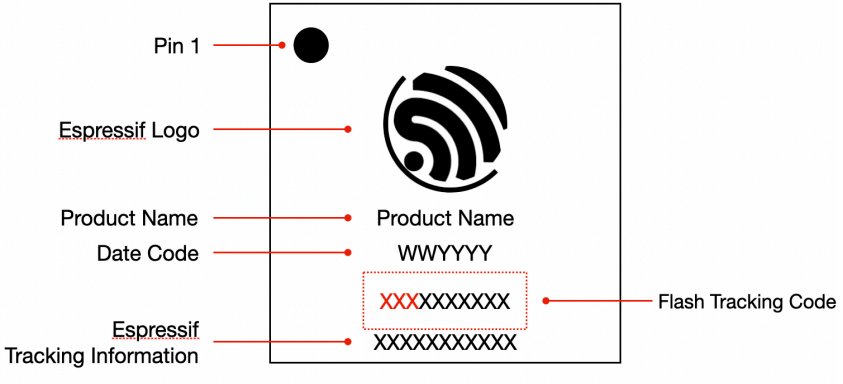

RF Performance Test Report Pass

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

在使用变更后产品前，请确保您的软件已升级至符合要求版本或更高版本的 ESP-IDF。

Before using the updated product, ensure that your software has been updated to the required version or above of ESP-IDF.

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 | v1.2 |
| 1.2 | eFuse 标识位/ eFuse identification bit | | |
| | EFUSE_RD_MAC_SYS_3_REG[22] | 0 | 0 |
| | EFUSE_RD_MAC_SYS_3_REG[21] | 0 | 1 |
| | EFUSE_RD_MAC_SYS_3_REG[20] | 0 | 0 |
| | EFUSE_RD_MAC_SYS_3_REG[19] | 0 | 1 |
| | EFUSE_RD_MAC_SYS_3_REG[18] | 1 | 0 |
| 1.3 | Product Ordering Code | 有变更，请参见段落 1。 Changed and can refer to Para 1. | |
| 1.4 | Chip Marking (Espressif Tracking Information) |  | |
| | | xBXXXXXXXX | xFXXXXXXXX |
| 1.5 | Module Marking (Specification Marking Line) |  | |
| | | MBXXXX | MFXXXX |
| 2 ESP32-H2 新功能及功能优化信息/ New Features and Improvements | | | |
| No. | 项目/ Item | 变更前/ Before Change | 变更后/ After Change |

| | | | |
|-----|---|--|---|
| 2.1 | 电源毛刺检测器 Power Glitch Detector | 无电源毛刺检测器 No Power Glitch Detector | 新增电源毛刺检测器，请参考 ESP32-H2 系列芯片技术规格书 >章节电源毛刺检测器 Add Power Glitch Detector. See ESP32-H2 Series Datasheet > Section Power Glitch Detector |
| 2.2 | AES/XTS-AES | 无抗攻击伪轮功能 No anti-attack pseudo-round function | 新增抗攻击伪轮功能，可增强抗 DPA/CPA 性能 Add anti-attack pseudo-round function, to enhance the chip' s anti-DPA/CPA performance |
| 2.3 | ECC/ECDSA | 无常数时间/功耗模式 No constant-time/power mode | 新增常数时间/功耗模式，提供强抗攻击性能 Add constant-time/power mode, providing high anti-attack performance |
| 2.4 | 其他功能优化信息可参照 ESP32-H2 系列芯片勘误表 For more details on feature improvements, refer to the ESP32-H2 Series SoC Errata . | | |

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: | <input type="checkbox"/> 批准/确认 Accepted/Acknowledged |
| | <input type="checkbox"/> 不批准/ Rejected |
| | <input type="checkbox"/> 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: