

AN13860

使用空中编程工具为 KW45B41Z/K32W148 创建固件更新映像

第 1 版 — 2023 年 3 月 21 日

应用笔记

文档信息

信息	内容
关键词	AN13860, OTAP, KW45B41Z, 固件更新映像
摘要	本应用笔记介绍了在 KW45/K32W1 评估套件板上创建和升级映像的步骤



1 介绍

本文档介绍了在 KW45/K32W1 评估套件 (EVK) 板上创建和升级映像的步骤。

该示例可以使用两个应用运行：

- OTAP 客户端-嵌入式应用
- 空中编程 PC 端应用

OTAP 客户端-嵌入式应用有两个版本：ATT 版本和 L2CAP 版本。每个版本使用不同的传输方法。

OTAP 客户端是一个 GAP 外设，它发布低功耗蓝牙 (Bluetooth LE) OTAP 服务，并等待来自 OTAP 服务器的连接。在与 OTAP 服务器连接后，OTAP 客户端等待其写入 OTAP 控制点 CCCD，然后开始通过 ATT 指示发送命令。

该示例应用默认使用外部存储。只有当内部闪存中有足够的空间用于升级映像时，内部存储才可用。在这种情况下，闪存的大小必须至少是最大应用程序的两倍。

2 前提条件

要创建一个映像进行升级，需要以下前提条件：

- MCUXpresso IDE v11.6.0 或更新的版本，或面向 Arm 的 IAR EW，其可以从 [MCUXpresso-IDE](#) 下载
- 空中编程工具 1.0.4.1 或更新的版本，其可以从[空中编程](#)下载
- KW45B41Z/K32W148 电路板
- 一部安装了恩智浦物联网工具箱应用 (IoT toolbox NXP app) 的智能手机，支持安卓和 iOS 系统

3 使用 IAR 进行软件设置

请按照以下步骤来配置软件：

1. 要使用外部存储，必须做一些更改。需要在源文件和工具链的链接器选项中设置几个配置选项：
 - a. 在 `app_preinclude.h` 中，确保 `gAppOtaExternalStorage_c` 设置为 "1" 。
 - b. IAR EW IDE 的 OTAP 演示应用在链接器选项中的设置如[图 1](#) 所示。

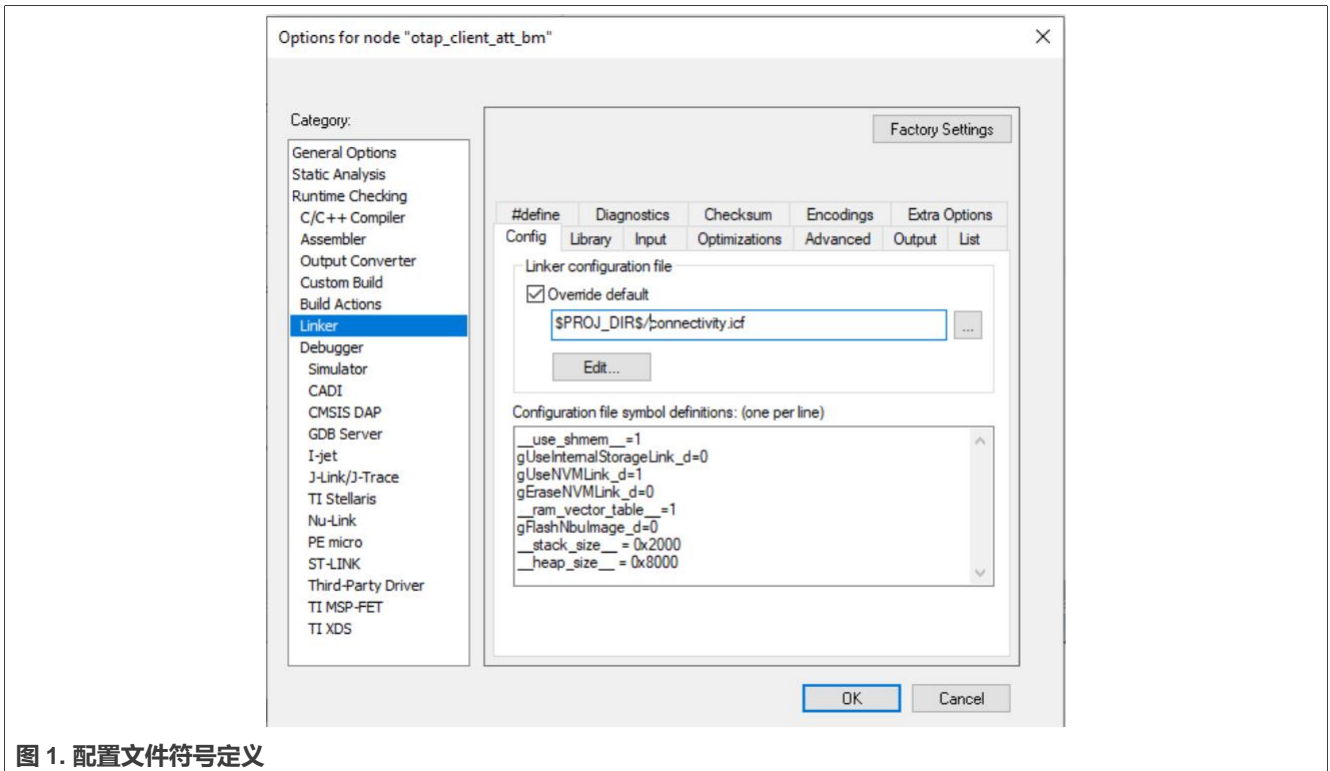


图 1. 配置文件符号定义

2. 要使用内部存储，需要在链接器配置中设置 `gUseInternalStorageLink_d=1` 符号，并将 `gAppOtaExternalStorage_` 的值设置为 “0”。

注意：

`gEraseNVMLink_d=1` 链接器标志位将一些虚拟字节放置在 NVM 区域，以使数据无效，并强制应用擦除整个 NVM 区域。当生成 OTA 升级的映像时，这个标志位以及 `gUseNvmLink_d` 标志位都应该设置为 “0”。这样，可以减少传输映像的大小并降低功耗。如果升级完成后需要擦除 NVM 区域，则必须使用擦除扇区位图将 NVM 扇区标记为可擦除。

3.1 OTAP 映像格式文件

Bluetooth LE OTAP 映像文件采用二进制文件格式。它由一个文件头和若干个子元素组成。文件头描述了文件的一般信息。文件中有一些预定义的子元素，而终端制造商可以添加制造商特定的子元素。文件头中不包含子元素的详细信息，但每个部分的类型都有描述。

要使 IAR Embedded Workbench 能够为嵌入式应用创建一个 SREC 和 BIN 文件，步骤如下：

1. 打开目标属性。
2. 转到**输出转换器 (Output Converter)** 选项卡。
3. 激活**生成额外输出 (Generate additional output)** 复选框。
4. 从**输出格式 (Output format)** 下拉菜单中选择**摩托罗拉或原始二进制 (Motorola or Raw Binary)** 选项。

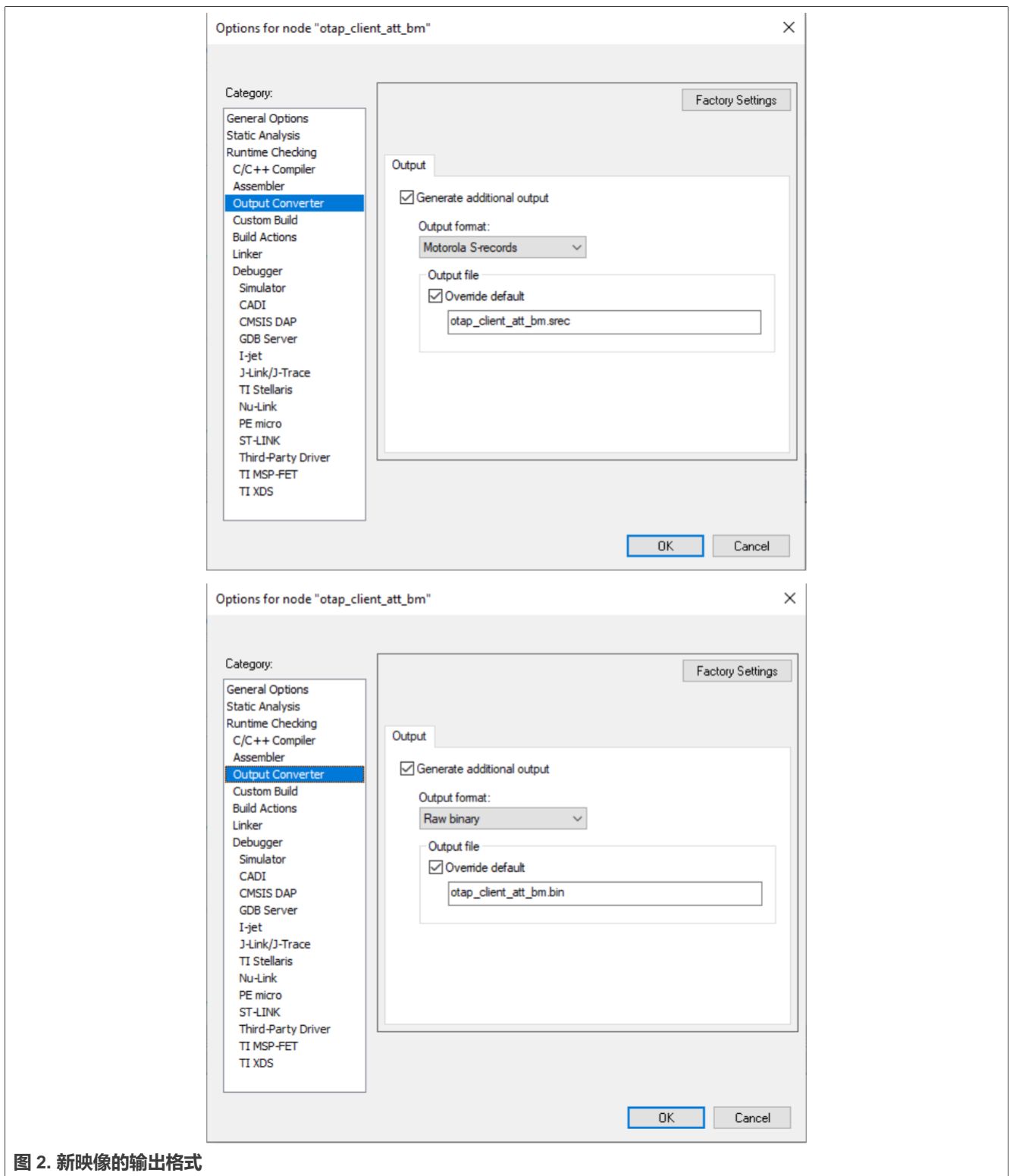


图 2. 新映像的输出格式

4 使用 MCUXpresso 进行软件设置

要为应用程序创建映像，必须在工作区中部署**二进制 (Binaries)** 图标。在 .axf 文件上单击鼠标右键，然后选择**二进制工具 (Binary Utilities) > 创建 S-记录 (Create S-Record)**。该 S-Record 文件将保存在工作区中的 Debug 文件夹中，扩展名为 .srec。

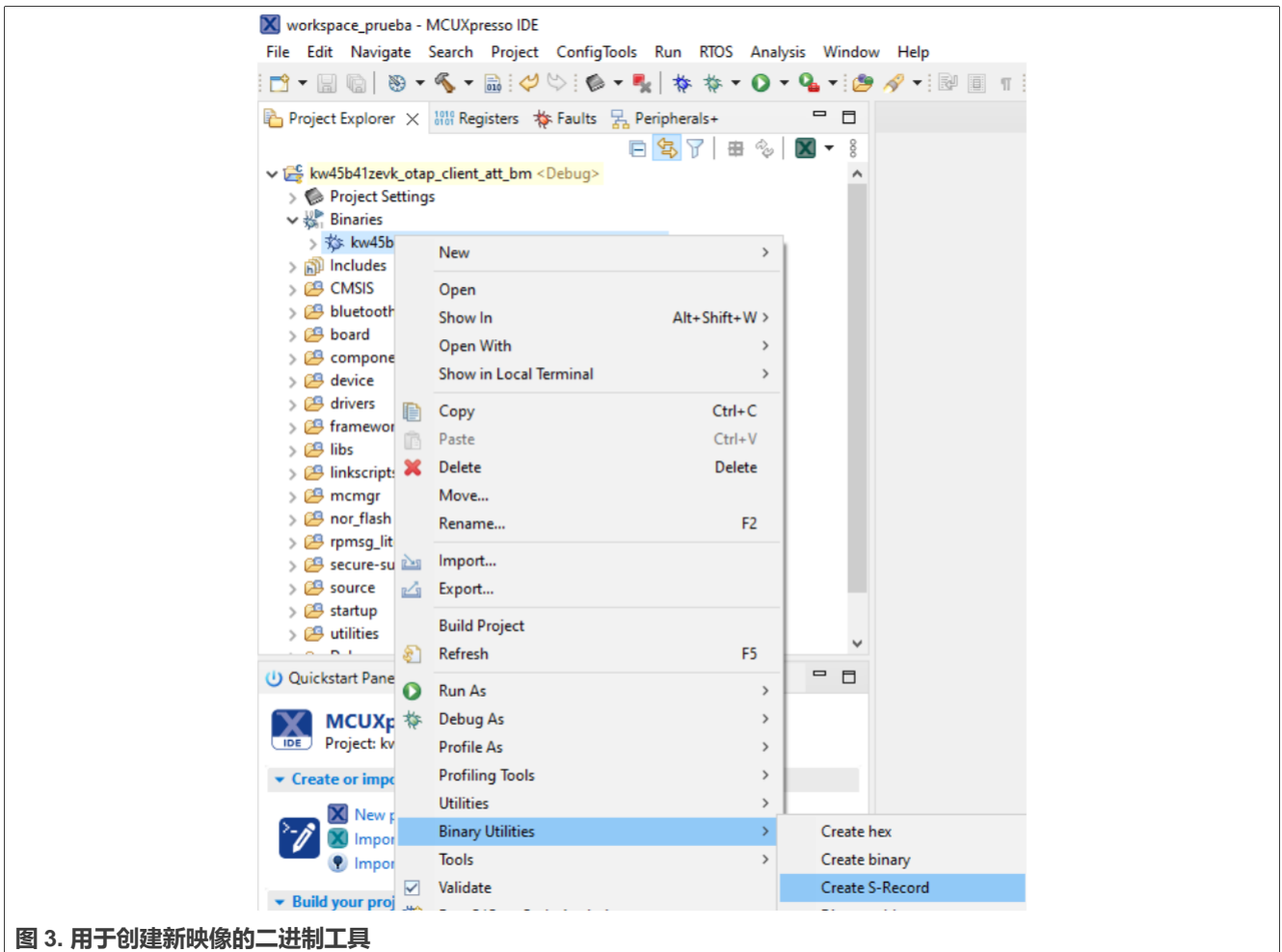
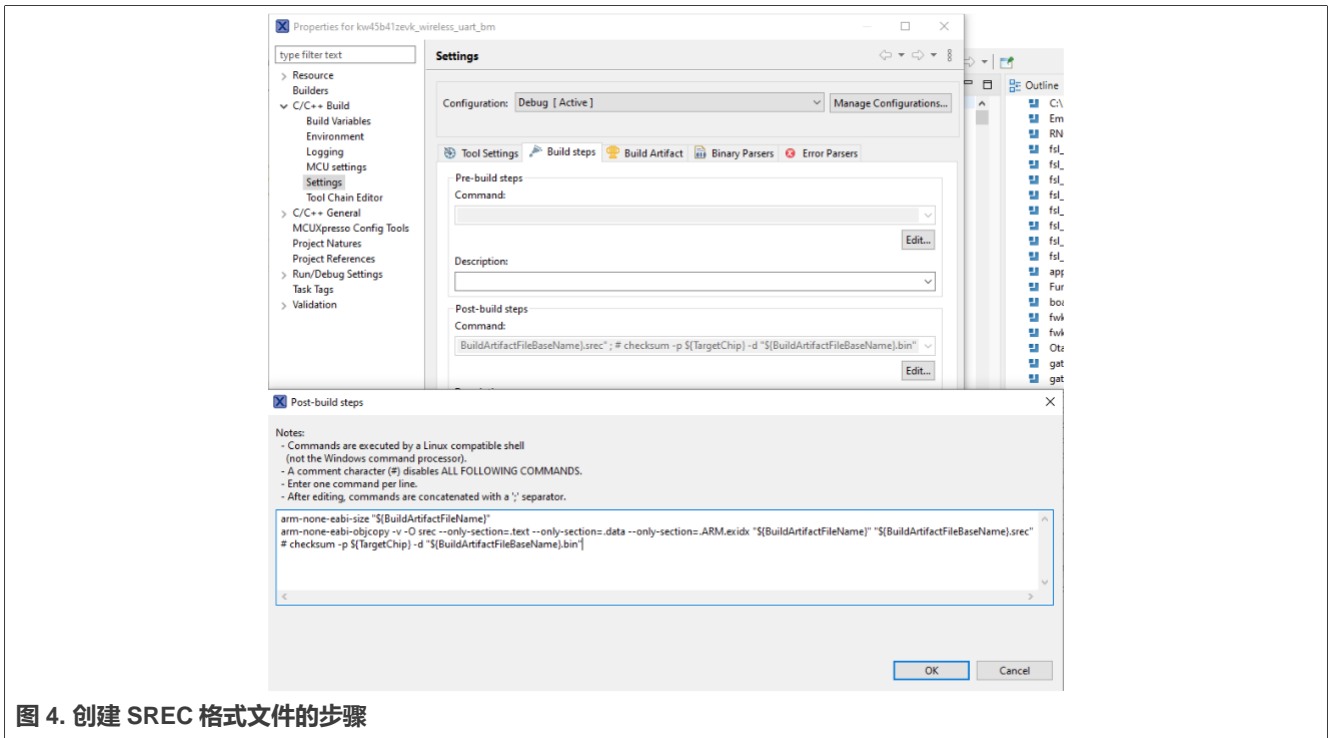


图 3. 用于创建新映像的二进制工具

摩托罗拉 S-record (SREC) 文件是一个包含二进制信息的 ASCII 格式文件。常见的文件扩展名有 .srec, .s19, .s28, .s37 等。大多数现代编译器工具链都可以生成 SREC 格式的可执行文件。在 MCUXpresso IDE 中，转到**项目属性 (Project properties) > 设置 (Settings) > 构建步骤 (Build steps)** 窗口，并按下构建后步骤的**编辑 (Edit)** 按钮。接着将显示**构建后步骤 (Post-build steps)** 窗口，必须在其中添加以下命令：

```
arm-none-eabi-objcopy -v -O srec --only-section=.text --only-section=.data -  
- only-section=.ARM.exidx  
"${BuildArtifactFileName}"  
"${BuildArtifactFileBaseName}.srec"
```

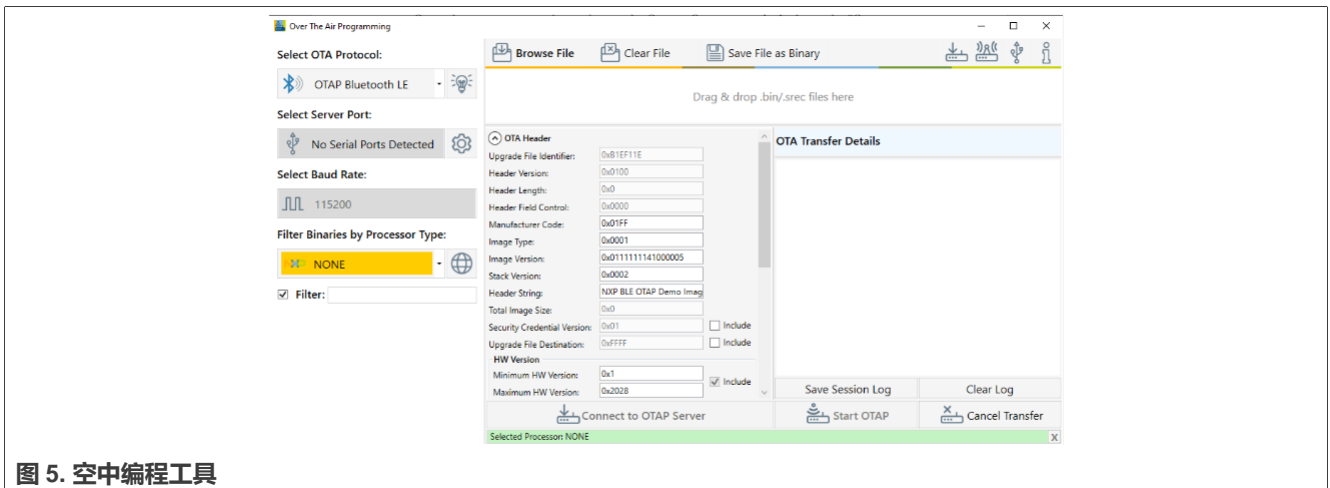
该窗口的截图如图 4 所示。



5 如何使用 OTAP 工具创建映像

本节将介绍为 KW45B41Z-EVK 创建映像所需的步骤：

1. 导航到空中编程 (Over the Air Programming) 工具。



2. 拖放 .s19 / .srec / . 文件。

3. 要处理该二进制文件，请选择 KW45。

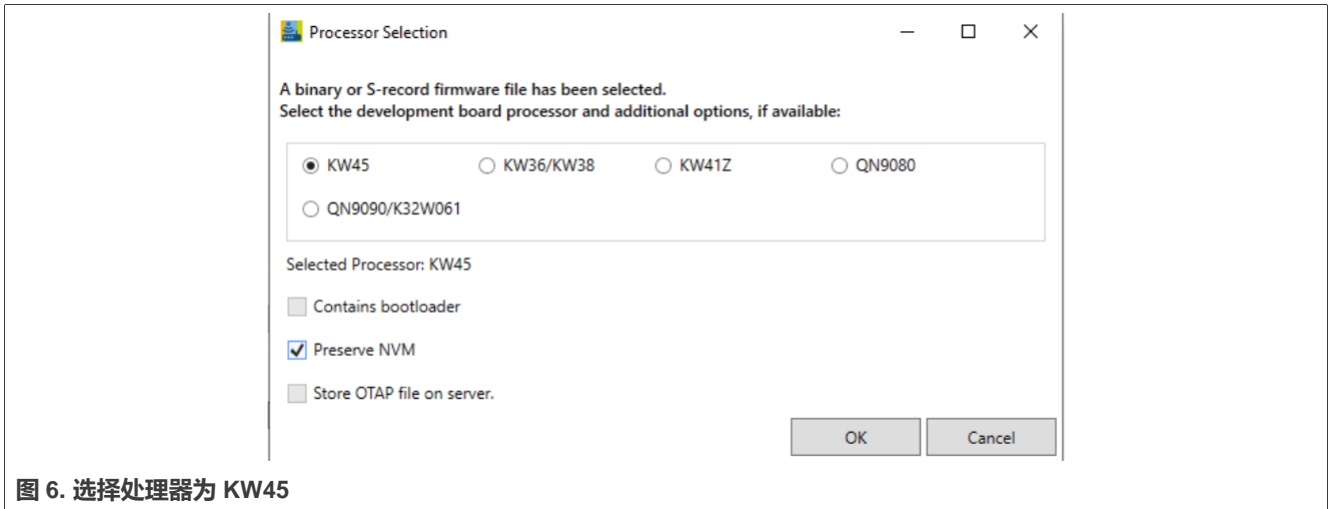


图 6. 选择处理器为 KW45

- 现在可以选择要升级的映像类型。类型可以是应用程序 (**M33**) 或 KW45 无线通讯 (**M3**)，也可以这两者皆选。

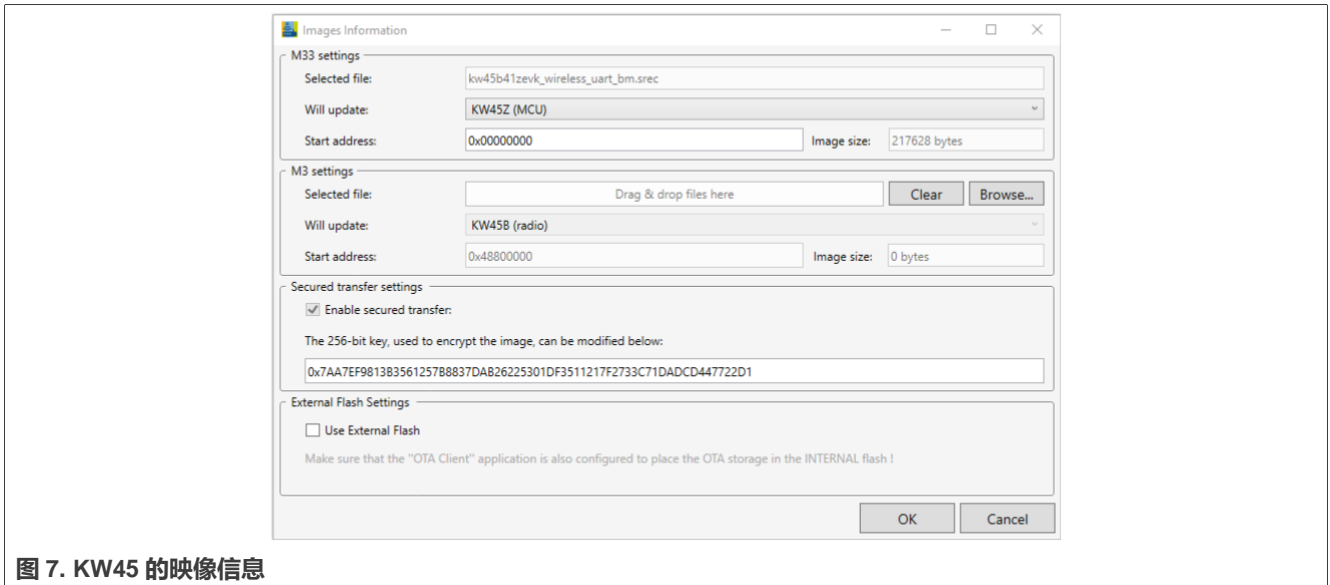


图 7. KW45 的映像信息

- 将此文件保存在一个已知位置。

6 测试 OTAP 软件

测试 OTAP 软件的步骤如下：

- 打开**物联网工具箱 (IoT Toolbox)** 应用并选择 **OTAP** 示例。
- 要开始扫描合适的广播源，请单击**扫描 (SCAN)**。



图 8. 物联网工具箱 (IoT Toolbox)

3. 单击**打开 (Open)** 按钮并搜索无线 OTAP SREC (Wireless OTAP SREC) 文件。

4. 要开始传输，请单击**上传 (Upload)**。然后等待，直到显示确认消息。



图 9. 使用物联网工具箱上传的映像

5. 等待几秒钟，直到 OTAP bootloader 完成对新映像的编程。无线 UART 应用程序会自动启动，同时 RGB LED 会闪烁。

7 修订历史

[表 1](#) 列出了自初版发布以来对本文档所做的实质性变更。

表 1. 修订历史

版本号	日期	实质性变更
第 1 版	2023 年 3 月 21 日	<ul style="list-style-type: none"> 更新了第 2 节中的 otap 工具的下载链接 将标题更新为“使用空中编程工具为 KW45B41Z/K32W148 创建固件更新映像”
第 0 版	2023 年 2 月 10 日	初版发布

8 Legal information

8.1 Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

8.2 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Suitability for use in non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

Translations — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately.

Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at PSIRT@nxp.com) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

8.3 Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

NXP — wordmark and logo are trademarks of NXP B.V.

AMBA, Arm, Arm7, Arm7TDMI, Arm9, Arm11, Artisan, big.LITTLE, Cordio, CoreLink, CoreSight, Cortex, DesignStart, DynamIQ, Jazelle, Keil, Mali, Mbed, Mbed Enabled, NEON, POP, RealView, SecurCore, Socrates, Thumb, TrustZone, ULINK, ULINK2, ULINK-ME, ULINK-PLUS, ULINKpro, µVision, Versatile — are trademarks and/or registered trademarks of Arm Limited (or its subsidiaries or affiliates) in the US and/or elsewhere. The related technology may be protected by any or all of patents, copyrights, designs and trade secrets. All rights reserved.

Bluetooth — the Bluetooth wordmark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by NXP Semiconductors is under license.

目录

1	介绍	2
2	前提条件	2
3	使用 IAR 进行软件设置	2
3.1	OTAP 映像格式文件	3
4	使用 MCUXpresso 进行软件设置	5
5	如何使用 OTAP 工具创建映像	6
6	测试 OTAP 软件	7
7	修订历史	9
8	法律声明	10

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.
