

1 如何更新 i.MXRT10xx 板载调试器的固件

多款 NXP i.MX RT10xx 系列的开发板是基于 LPC4322 MCU 开发的调试电路。除了默认固件外，该电路还可以使用基于 NXP 的 CMSIS-DAP 专有固件，该固件也支持 SWO 功能，也被称为 LPC-Link2。另外，固件可以提供除了拖拽以外的高性能 flash 烧录。LPC4322 调试电路还支持了 SEGGER 公司 J-Link 的测试版本。i.MX RT10xx EVK 出厂被烧录为基于 OpenSDA 的 CMSIS-DAP，同时拥有拖拽烧录的能力，但是它可以选择运行以上任意三种固件。

需要注意的是，只有 OpenSDA 固件版本（出厂默认固件）才能使能供电功能。

当使用其他版本之外的固件时，需要使用其他的供电端口供电，比如说桶形供电端子 J1 或者 USB1 接口。更多的电源选择的信息，可以阅读硬件使用指南（Hardware User's Guide）。当使用 USB1 进行供电时，需要确保供电设备可以提供至少 500mA 来保证设备在高供电应用中顺利运行（如图像的背光显示）。

本文档介绍了板载调试器如何烧录成 LINK2-CMSIS 或者 J-Link 固件以及如何切换回 OpenSDA 固件（默认固件）。

文档中使用的硬件是 MIMXRT1060-EVK (Rev.A1) 开发板，但可以为应用基于 LPC4322 调试器的 i.MX RT10xx EVK 系列的开发板做参考。升级固件所用到的工具叫做 LPCScrypt，可在 [LPCScrypt v2.1.2](#) 找到。当用 LPCScrypt 烧录 J-Link 固件的时候，可能需要从 [SEGGER](#) 中下载固件（因为经常需要升级到他们的固件）。

表 1 给出了三种固件功能的对比：

表 1. 对比三种固件

	OpenSDA Daplink	LPC-Link2 CMSIS-DAP	LPC-Link2 Segger J-link
USB 供电（自动连接到目标控制器）	√	X	X
SWD debug with MCUXpresso IDE	√	√	√
SWO trace/profiling/ITM	X	√	X
Drag/drop programming	√	X	X
UART-USB (VCOM)	√	√	√
Flash programming 速度 (relative to OpenSDA)	1X	3-4X	4X

2 烧录 LINK2 CMSIS

1. 下载安装 [LPCScrypt](#)。
2. 使用跳线帽短接 J42 来开启 DFU boot 模式。

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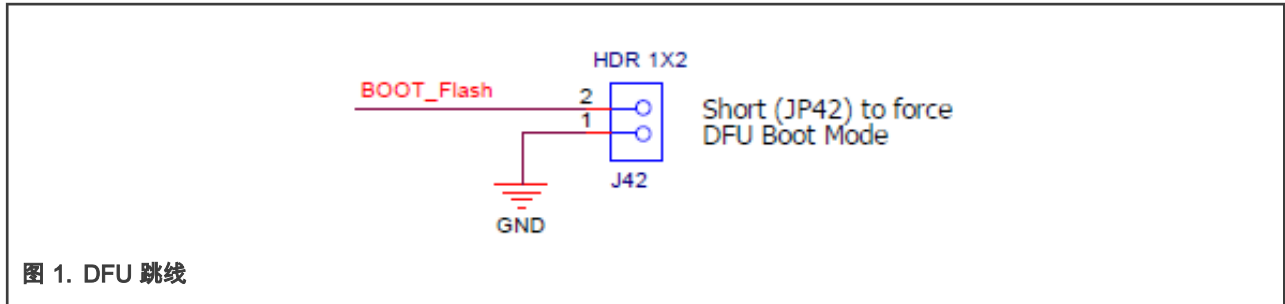


图 1. DFU 跳线

- 通过调试器 USB 接口上电 (MIMXRT1060-EVK 上的 J41)，然后连接 LINK 2 到 LPC 4322 调试接口 J34。调整 J1 跳线帽到 3-4。
- 找到安装路径，运行 program_CMSIS.cmd 文件。默认的路径为：

```
C:\nxp\LPCScript_2.1.2_57\scripts
```

aeskey.cmd	2018/6/19 9:51	Windows Command ...	1 KB
boot_lpcscript.cmd	2018/6/19 9:51	Windows Command ...	2 KB
encrypt_and_program.cmd	2018/6/19 9:51	Windows Command ...	1 KB
encrypt_and_program.scy	2018/6/19 9:51	SCY File	1 KB
ListComPorts.cmd	2018/6/19 9:51	Windows Command ...	1 KB
ListLPCComPorts.cmd	2018/6/19 9:51	Windows Command ...	1 KB
LPCScript_CLI.cmd	2018/6/19 9:51	Windows Command ...	2 KB
program_CMSIS.cmd	2018/6/19 9:51	Windows Command ...	5 KB
program_JLINK.cmd	2018/6/19 9:51	Windows Command ...	4 KB

图 2. 选择 program_cmsis

- 根据屏幕的指示，按任意按键加载程序，programmed successfully 表明固件升级成功。

```
LPCScript - CMSIS-DAP firmware programming script v2.0.0 June 2018.

Connect an LPC-Link2 or LPCXpresso V2/V3 Board via USB then press Space.

Press any key to continue . . .

Booting LPCScript target with "LPCScript_218.bin.hdr"
LPCScript target booted

Programming LPCXpresso V2/V3 with "LPC432x_IAP_CMSIS_DAP_V5_183.bin"

- LPCXpresso V2/V3 programmed successfully and has the unique ID: FRAZCQER
- To use: remove DFU link and reboot.

Connect Next Board then press Space (or CTRL-C to Quit)
```

图 3. CMSIS 固件烧录结果

- 如 图 3 所示，页面将显示更新成功的提示。接着，移除 J42 跳线帽后，重新给开发板上电。

3 烧录 J-Link

升级固件为 J-Link 的方法和 LINK2 CMSIS 相同，除了运行的文件是 program_JLINK.cmd。

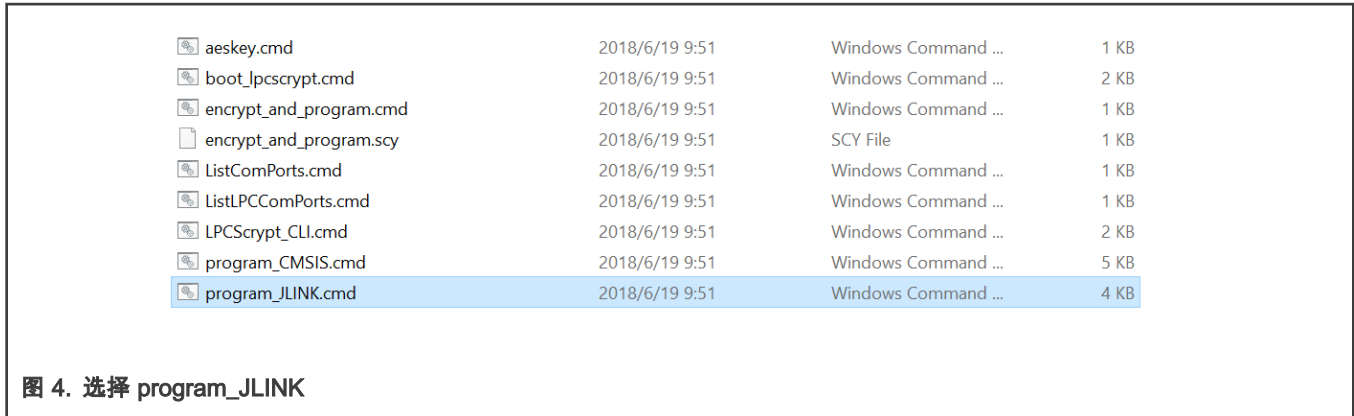
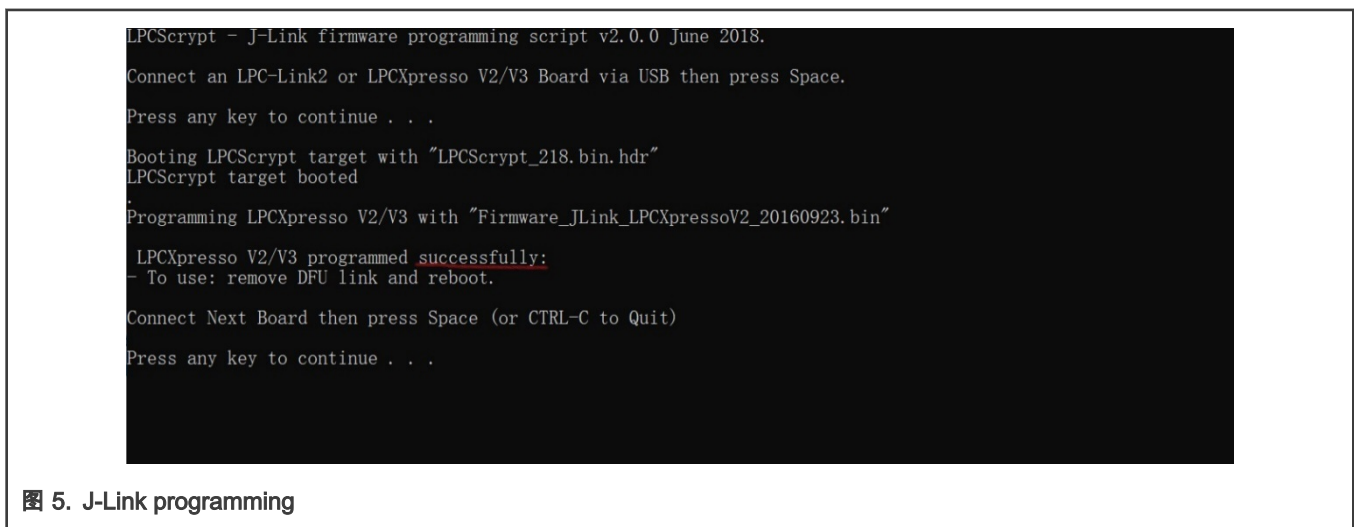


图 5 显示了成功升级所显示的结果。



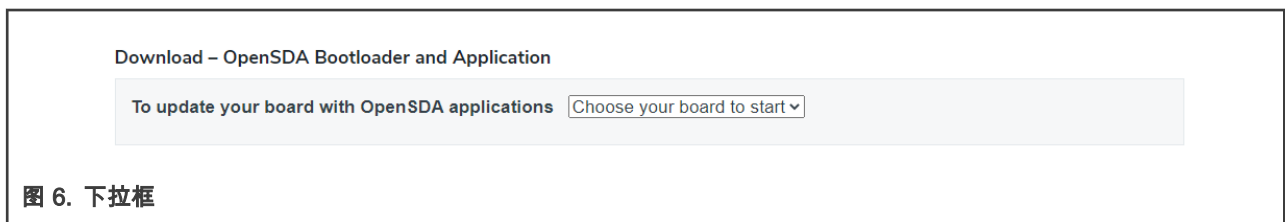
4 切换为 OpenSDA 固件 (出厂默认固件)

升级完固件为 LINK2 CMSIS 或者 J-Link 之后，可以根据下面的方法切换回默认固件。这个方法大致可以分为两步：

1. 下载 Bootloader。
2. 用拖拽方法烧录 OpenSDA 固件。

4.1 下载固件

1. 从 [OpenSDA Serial and Debug Adapter](#) 下载 bootloader 和默认固件。
2. 在下拉列表中选择 MIMXRT1060-EVK 开发板，如 [图 6](#) 所示：



3. 选中开发板之后，屏幕上会显示需要下载的固件：

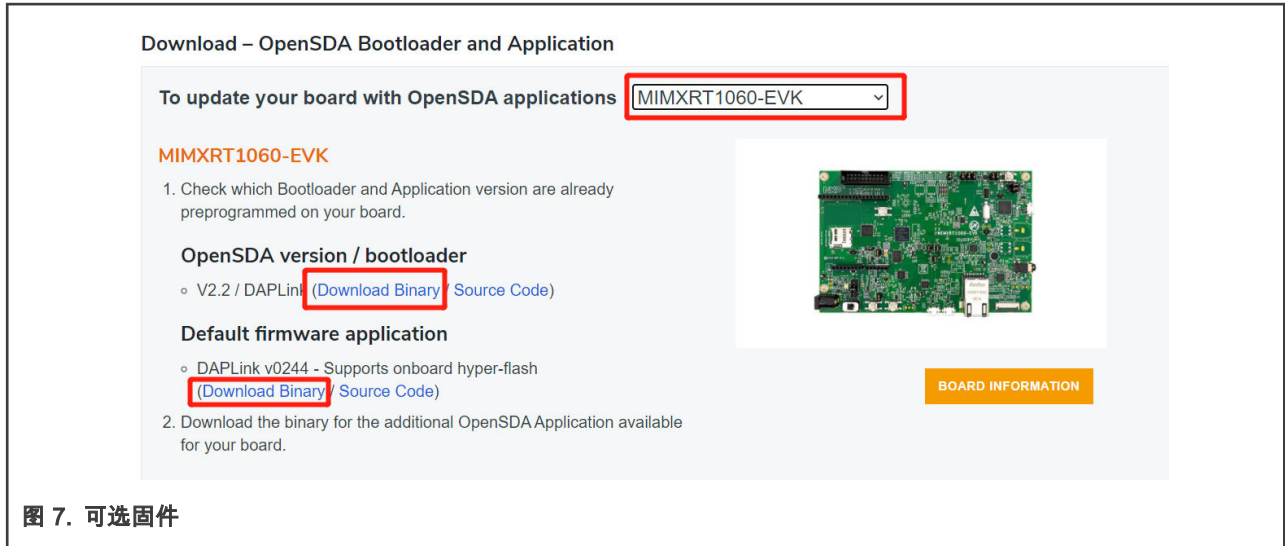


图 7. 可选固件

- 把 bootloader 二进制文件放到一个临时文件夹 Temp 里, 如 c:\Temp\bootloader。
- 使用跳线帽连接 J42 进入 DFU 模式, 然后给板子重新上电。
- 打开命令窗口然后进入 LPCS crypt 文件夹下的 bin 文件然后运行 boot_lpcscrypt.cmd:

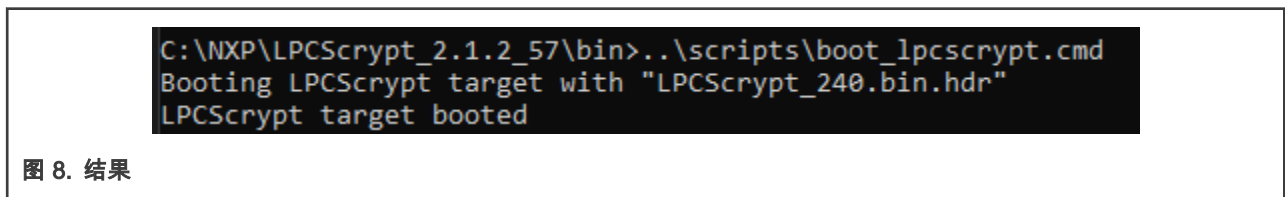


图 8. 结果

- 输入命令:

```
lpcscrypt erase all
```

可能会有报错提示但可以忽略。

- 输入命令把 bootloader 加载到 BankA (地址 0x1a000000):

```
lpcscrypt program c:\Temp\bootloader\lpc4322_b1_crc_20180810.bin 0x1a000000
```

- 几秒后, 结果如 图 9 所示。

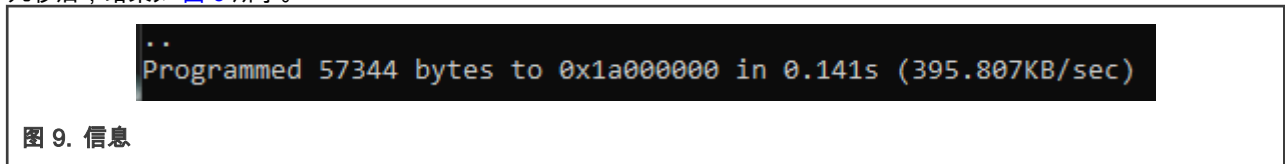


图 9. 信息

- 拔掉跳线, 重新上电。开发板会在计算机上产生一个新的驱动 **MAINTENANCE**。
- 把下载的二进制文件拖拽进 MAINTENANCE 驱动。J41 旁的 LED 会闪烁几次。有 30 秒的时间等待 boot loading/固件升级。然后驱动名称会变为具体的开发板名称, 如 RT1060-EVK。

这时默认固件升级已经完成。

5 版本历史

版本号	日期	描述
0	04/2021	首次发布

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