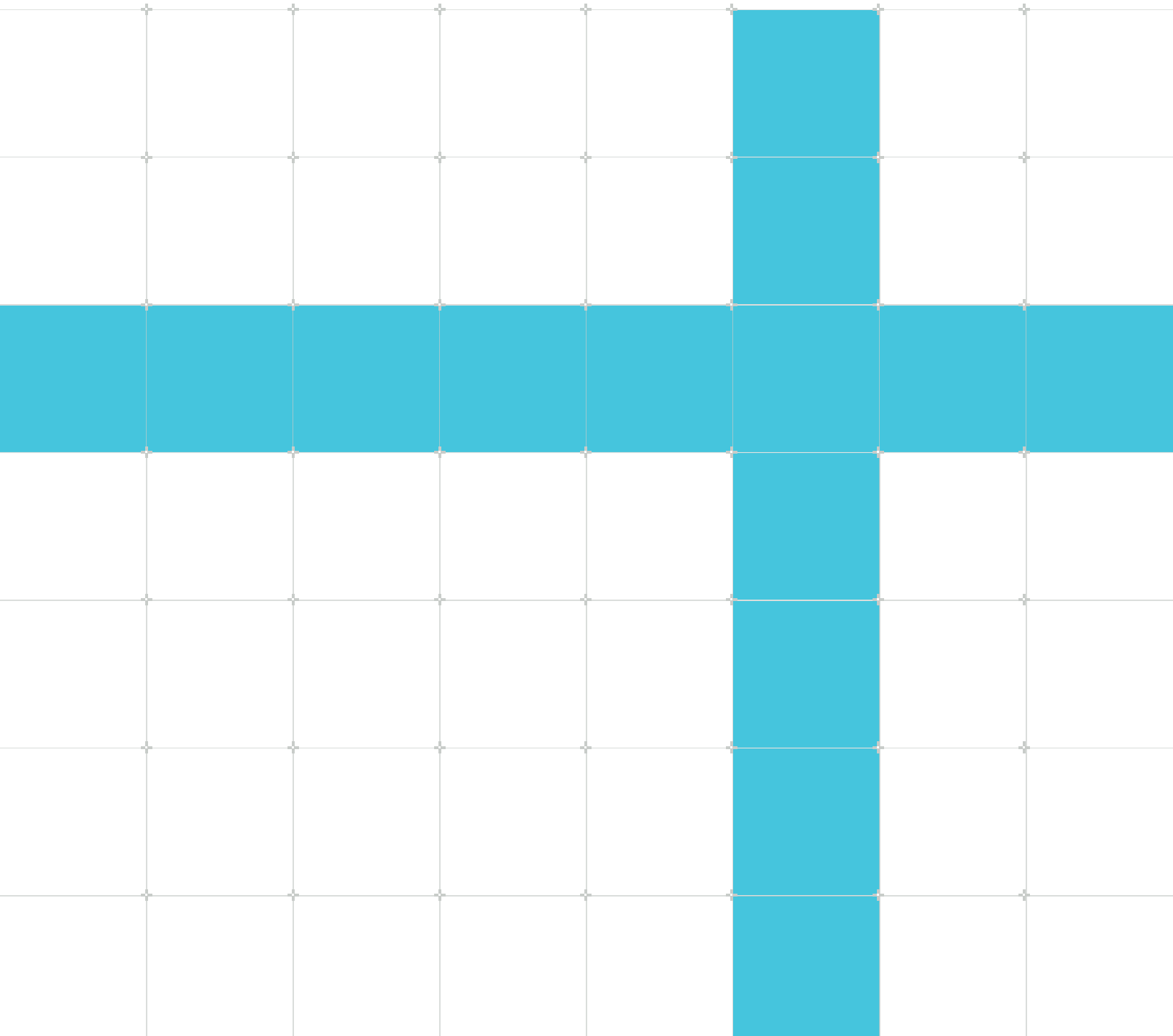
KAN347 - Debug Probe Firmware Update Information

Version 1.0

Application Note

Issue
109243_1.0_en



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Release information

Document history

Issue	Date	Confidentiality	Change
1.0	7 July 2023	Non-Confidential	Initial release

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110 Fulbourn Road, Cambridge, England CB1 9NJ.

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Contents

1. Abstract

Keil Studio (Keil Studio Cloud and Keil Studio Visual Studio Code extensions) in MDK v6 supports a wide variety of debug probes based on CMSIS-DAP v2.x and ST-LINK/V2 and above. Some development boards require an update of the on-board firmware to work with Keil Studio.

This application note points to update information for on-board debug probes.

2. CMSIS-DAP 2.x

Keil Studio supports debug probes that run the CMSIS-DAP protocol.

See the CMSIS-DAP documentation for general information.

The following implementations are available:

- Arm Keil ULINKplus (firmware version 2)
- Arm Mbed DAPLink: boards form various vendors are supported.
- Nuvoton Nu-Link2
- NXP development boards

2.1 NXP development boards

This section explains the different CMSIS-DAP-based options for various NXP development boards.

MCU-Link

The latest debug probe from NXP is the MCU-Link. It is based on the LPC55S69 microcontroller to provide high-performance debug over high-speed USB. Download the latest firmware from the link above and make sure that you flash a version 3.x onto the development board.

Refer to MCU-Link.

i.MXRT10xx development boards

i.MXRT10xx-based development boards contain an on-bard debug adapter that is based on the LPC4322 device.

The application note Modifying Debug Firmware on i.MX RT10xx Boards Featuring An LPC4322-based Debug Probe explains how to update the on-board debug adapter firmware for i.MXRT10xx-based development boards.

OpenSDA

Many NXP boards can be flashed with a CMSIS-DAP 2.x-based OpenSDA firmware (OpenSDA2.x is required). The page for each board explains how to flash the firmware image onto it. Note that additional command line tools might be required.

Board list:

FRDM-K20D50M, FRDM-K22F, FRDM-K28F, FRDM-K32L2A4S, FRDM-K32L2B3, FRDM-K32L3A6, FRDM-K64F, FRDM-K66F, FRDM-K82F, FRDM-KE02Z, FRDM-KE04Z, FRDM-KE06Z, FRDM-KE15Z, FRDM-KL05Z, FRDM-KL25Z, FRDM-KL26Z, FRDM-KL27Z, FRDM-KL28Z, FRDM-KL43Z, FRDM-KL46Z, FRDM-KL82Z, FRDM-KLO2Z, FRDM-KLO3Z, FRDM-KV10Z, FRDM-KV31F, FRDM-KW24D512, FRDM-KW36, FRDM-KW38, FRDM-KW40Z, FRDM-KW41Z, FRDM-KW019032, HVP-KE18F, MIMXRT1010-EVK, MIMXRT1015-EVK,

MIMXRT1020-EVK, MIMXRT1024-EVK, MIMXRT1050-EVK, MIMXRT1060-EVK, MIMXRT1064-EVK, MIMXRT1170-EVK, TRK-KEA8, TRK-KEA64, TRK-KEA128, TWR-K22F120M, TWR-K64F120M, TWR-K65F180M, TWR-K80F150M, TWR-KE18F, TWR-KL25Z48M, TWR-KL28Z72M, TWR-KL43Z48M, TWR-KL46Z48M, TWR-KL82Z72M, TWR-KM34Z50M, TWR-KM35Z75M, TWR-KV10Z32, TWR-KV11Z75M, TWR-KV31F120M, TWR-KV46F150M, TWR-KV58F220M, TWR-KW21D256, TWR-KW24D512, USB-KW38, USB-KW40Z, USB-KW41Z, USB-KW019032

2.2 Linux

The Linux subsystem `udev` supplies the computer with device events. In order to access USB devices, it is common to specify `udev` rules.

Here are some sample rules files for different CMSIS-DAp implementations:

- DAPLink:

```
SUBSYSTEM=="usb", ATTR{idVendor}=="0d28", ATTR{idProduct}=="0204", MODE:="666"
```

- LPC-LinkII:

```
SUBSYSTEM=="usb", ATTR{idVendor}=="1fc9", ATTR{idProduct}=="0090", MODE:="666"
```

- Nu-Link:

```
ACTION!="add|change", GOTO="openocd_nuvoton_rules_end"
SUBSYSTEM!="usb|tty|hidraw", GOTO="openocd_nuvoton_rules_end"

# Nuvoton NuLink VID:PID
ATTRS{idProduct}=="511b", ATTRS{idVendor}=="0416", MODE="660", GROUP="plugdev",
 TAG+="uaccess"
ATTRS{idProduct}=="511c", ATTRS{idVendor}=="0416", MODE="660", GROUP="plugdev",
 TAG+="uaccess"
ATTRS{idProduct}=="511d", ATTRS{idVendor}=="0416", MODE="660", GROUP="plugdev",
 TAG+="uaccess"
ATTRS{idProduct}=="5200", ATTRS{idVendor}=="0416", MODE="660", GROUP="plugdev",
 TAG+="uaccess"

LABEL="openocd_nuvoton_rules_end"
```

- ULINKplus:

```
SUBSYSTEM=="usb", ATTR{idVendor}=="c251", ATTR{idProduct}=="2750", MODE:="666"
```

If you share your Linux system with other users, or just don't like the idea of write permission for everybody, you can replace `MODE:="0666"` with `OWNER:="yourusername"` to create the device owned by you, or with `GROUP:="somegroupname"` and mange access using standard unix groups.

3. STMicroelectronics ST-LINK

Keil Studio supports ST-LINK debug adapters starting with V2. Some issues might arise around drivers and host operating system specific rules.

The recommended versions of the ST-LINK firmware are:

- For ST-LINK/V2 and ST-LINK/V2-1 probes: J36 and later.
- For STLINK-V3 probes: J6 and later.

See “Firmware naming rules” in Overview of ST-LINK derivatives for more details on naming conventions.

3.1 Firmware update

Before using an ST-LINK with Keil Studio, consider upgrading the probe’s firmware.

Use the STSW-LINK007 firmware upgrade application to update the debug adapter firmware on your development board to the latest version.

3.2 Windows

STMicroelectronics devices may require a driver to be installed on Windows before they can be discovered.

Please find the drivers here:

- STSW-LINK009

3.3 Linux

The Linux subsystem `udev` supplies the computer with device events. In order to access USB devices, it is common to specify `udev` rules.

Here are some sample rules files for different ST-LINK hardware:

- STM32-Discovery boards with on-board ST-LINK/V2:

```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="3748",
 MODE:="0666", SYMLINK+="stlinkv2_%n"
```

- STM32-NUCLEO boards with on-board ST-LINK/V2-1:

```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="374b",
 MODE:="0666", SYMLINK+="stlinkv2-1_%n"
```

```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="3752",
 MODE:="0666", SYMLINK+="stlinkv2-1_%n"
```

- STLINK-V3-based boards (standalone and embedded) in usbloader mode and standard (debug) mode:

```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="374d",
 MODE:="0666", SYMLINK+="stlinkv3loader_%n"
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="374e",
 MODE:="0666", SYMLINK+="stlinkv3_%n"
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="374f",
 MODE:="0666", SYMLINK+="stlinkv3_%n"
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="3753",
 MODE:="0666", SYMLINK+="stlinkv3_%n"
```


Note

If you share your Linux system with other users, or just don't like the idea of write permission for everybody, you can replace `MODE:="0666"` with `OWNER:="yourusername"` to create the device owned by you, or with `GROUP:="somegroupname"` and mange access using standard unix groups.