IBDAP - User Manual

Armstart – Makers helping makers

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Introduction

IBDAP is an open source, low cost, cross-platform and vender independent CMSIS-DAP JTAG/SWD debug adapter for programming and debugging ARM Cortex M microcontrollers. It provides debugging functions like stepping, breakpoints, watch points and firmware programming etc., making microcontroller programming easy and affordable. It's fully supported by Keil, Eclipse, OpenOCD, GNU GDB, IAR and other commonly used debugging tools across Windows, Linux and Mac OS.

Besides being functioning as a JTAG/SWD debug probe, IBDAP could also be used as an mbed development board. It has an ARM Cortex M0 processor running at 48Mhz and has peripherals like UART, I2C, SPI, USB. It can be used in applications like USB audio devices, USB mouse/keyboards, USB mass storage devices, USB-TTL adapter device and many many more. It also has 10-bit high precision ADC peripherals which make IBDAP an ideal device for any sensor projects.

IBDAP Pinmap

IBDAP schematic is provided and can be downloaded from the following link:

https://s3.amazonaws.com/armstart/Debug+Tools/IBDAP-LPC11U35/IBDAP-LPC11U35_SCH.pdf
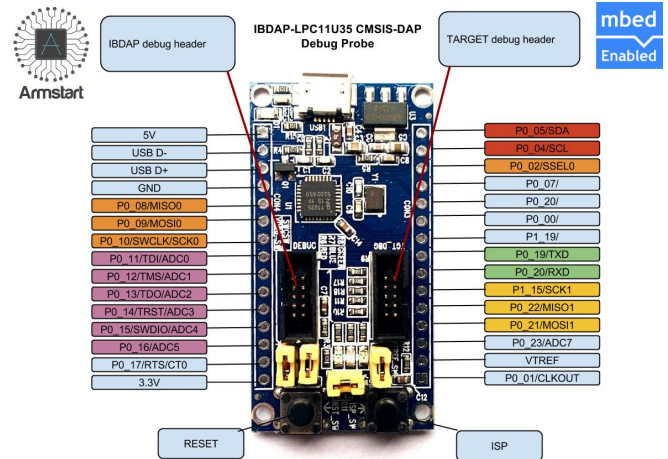

| Features:	Supported target processors including but not limited to:
• NXP LPC11U35FHI33/501 ARM Cortex M0 48Mhz processor • 64kB Flash, 12kB RAM, 2kB EEPROM • 1xUSART, 1xI2C, 2xSPI, 1xUSB2.0, 8xADC(10-bit), 26xGPIO • Armstart GNU gcc-arm and make implementation of CMSIS-DAP with source codes provided. • Supports mbed programming.	• NordicSemi nRF51822 • STM32 ARM Cortex-M series of microcontrollers • Atmel ARM Cortex-M series of microcontrollers • NXP ARM Cortex-M series of microcontrollers • Freescale ARM Cortex-M series of microcontrollers

IBDAP voltage levels and power supply

IBDAP supports target boards that run at 3.3V level. The VTSW jumper (please refer to schematic file) is used to enable or disable 3.3V direct power supply to the target board, a convenient way to provide powers directly from debug cable.
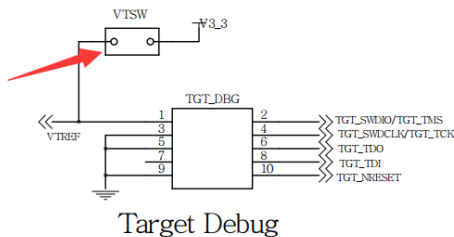
In case that the target board requires 20-pin 0.05'' JTAG header or some none standard connector, you can always easily bridge the IBDAP TGT_DBG connector over using the **IBDAPC10J20 ARM 20-pin 0.1'' to Cortex 10-pin 0.05'' JTAG/SWD Adapter** which is included in the IBDAP product.

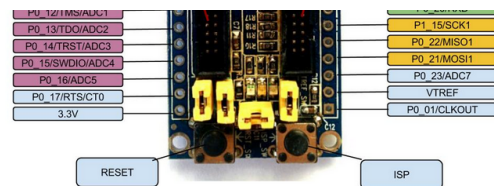http://www.armstart.com/products/ibdap-cmsis-dap-jtag-swd-firmware-debug-probe
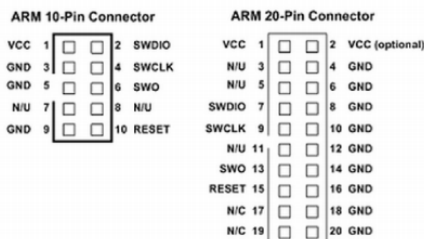
Using IBDAP as a CMSIS-DAP Debugger

Flash IBDAP firmware onto IBDAP board

By pressing RESET and ISP buttons at the same time and then release them, a USB mass storage device will be shown up with a single file "firmware.bin". Delete it and paste in the IBDAP-latest.bin file from below, then press RESET button again. Now Firmware flashing complete.

Firmware Binary: https://s3.amazonaws.com/armstart/Debug+Tools/IBDAP-LPC11U35/IBDAP-latest.bin

Firmware source code: https://github.com/Armstart-com/IBDAP-CMSIS-DAP


How to build IBDAP firmware from source

To building IBDAP CMSIS-DAP firmware you need Linux/Ubuntu. You also need to install GNU ARM embedded toolchain, which can be download from here: https://launchpad.net/gcc-arm-embedded

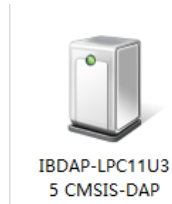Open a Terminal and run the following command to build IBDAP.bin:

$ git clone https://github.com/Armstart-com/IBDAP-CMSIS-DAP.git
$ cd build/
$ make

How to use IBDAP to debug a target device

Connect IBDAP's TGT_DBG 10-pin header to the target board (note, VTREF pin at TGT_DBG provides 3.3V for the target board, but you can switch off by removing the corresponding jumper), connect IBDAP and PC via USB cable.
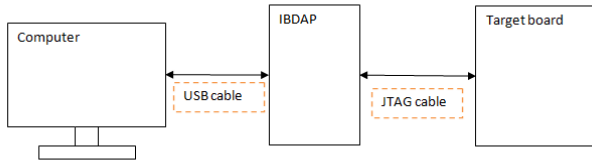
If your system is Windows, you should be able to see a USB HID device called "IBDAP-LPC11U35 CMSIS-DAP" in your control panel "Devices and Printers".

IBDAP-LPC11U3
5 CMSIS-DAP

If you are using Keil

From your Keil project, click on "Options for Target" button just besides the target, choose "Debug" tab, select use: "CMSIS-DAP Debugger", then click "settings", you should be able to see the "IBDAP-LPC11U35 CMSIS-DAP" device as the picture shown below, if yes, then we are all set.

Note: For some devices, nRF51822 for example, Keil doesn't have the correct Flash Erase algorithm for full-chip erase, if you have any issue flashing, please use OpenOCD method instead.

If you are using OpenOCD

OpenOCD is software that can communicate with the hardware JTAG port, it bridges hardware IC and your firmware debugging software. OpenOCD can be installed on **Windows**, **Linux** and **Mac OS**. If you want to install the prebuilt binaries instead of building from source code yourself, you can download from sourceforge:
http://sourceforge.net/projects/gnuarmeclipse/files/OpenOCD/

If you prefer building from source code, please visit http://www.armstart.com for details.

Here we used IB51822 as our target device to demonstrate how to flash firmware onto a nRF51822 BLE ARM Cortex M0 device.

First run the following command in an admin privileged terminal to start OpenOCD:

$ openocd.exe -f interface/cmsis-dap.cfg -f target/nrf51.cfg

Then run telnet in another admin privleged terminal to flash your firmware.hex onto IB51822:

$ telnet localhost 4444
> reset halt
> flash write_image erase /file/path/to//firmware.hex 0x0

Some chips like nRF51822 have flash protection mechanism enabled, if you ever encountered error while flashing, run mass_erase command to disable the protection before flashing the firmware.
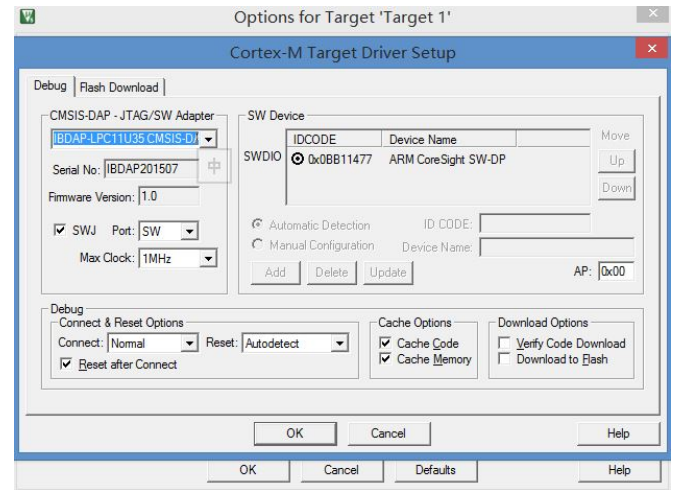
> nrf51 mass_erase

Use IBDAP as general development board

IBDAP uses NXP LPC11U35FHI33/501 ARM Cortex M0 chip, and LPCXpresso or mbed can be used to develop firmwares.

- LPCXpresso： http://www.lpcware.com/lpcxpresso
- mbed: https://developer.mbed.org/

For more information please refer to the corresponding websites.

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