

NGX ARM USB JTAG



<u>Features:</u>

- USB 2.0 Full Speed device (12 Mbits/sec) interface
- Can be used to debug and program all ARM processors supported by OpenOCD
- Provides a standard 2X10 pin JTAG interface
- Adds a virtual RS232 serial port to your computer or laptop
- No external power supply required it runs off of the USB power from the host computer
- Complete schematic provided
- Supported by open source debugger OpenOCD and commercial tools like Crossworks

The 'NGX ARM USB JTAG' is a compact USB to JTAG in-circuit debugger and programmer designed for ARM cores. It connects via USB to the host PC. The 'NGX ARM USB JTAG' provides a standard 20-pin JTAG interface as well as a standard RS232 port.



It is based on FTDI's popular FT2232 Dual USB UART/FIFO integrated circuit. The FT2232 has two devices integrated on it:

- Channel A: USB to JTAG interface
- Channel B: USB to SERIAL UART

JTAG Interface

It provides a standard ARM-compatible 20-pin JTAG interface. The JTAG interface enables access to the on-chip debug module which is integrated into the ARM CPU. The debug module enables a programmer to debug the software on an embedded target system.

Serial UART

'NGX ARM USB JTAG' serial port provides you with an independent functional "USB to RS-232" serial device. For Linux, the RS232 driver for the FT2232 is part of the main kernel tree and is provided in most standard Linux distributions. In Windows, you have to load the Windows driver for the FT2232. Once the driver is loaded, Windows will assign a virtual COM port to the serial port. It operates just like a standard COM port. You can use it on laptops or PC's that do not have a 9-pin legacy serial connector.

How to use the 'NGX ARM USB JTAG' with Crossworks?

Before you can use the 'NGX ARM USB JTAG', you need to install the FTDI USB drivers. Here are steps to install the drivers. Download the drivers file from http://www.ftdichip.com/Drivers/CDM/CDM20600.exe and run the downloaded exe

Note: The latest driver, when this document was created is version 2.06.00. The above link might not work when a new driver version is released and updated on the FTDI website

When you connect the 'NGX ARM USB JTAG' you should find a USB device listed under windows device manager

🚚 Devid	ce Manager
File A	ction View Help
$\leftarrow \rightarrow$	
É.	Universal Serial Bus controllers
	- 🕰 CA-200
	- 😴 Intel(R) ICH9 Family USB Universal Host Controller - 2934
	- 🚓 Intel(R) ICH9 Family USB Universal Host Controller - 2935
	- 🚓 Intel(R) ICH9 Family USB Universal Host Controller - 2936
	- 🚔 Intel(R) ICH9 Family USB Universal Host Controller - 2937
	- 🚓 Intel(R) ICH9 Family USB Universal Host Controller - 2938
	- 🚔 Intel(R) ICH9 Family USB Universal Host Controller - 2939
	- ॡ Intel(R) ICH9 Family USB2 Enhanced Host Controller - 293A
	Intel(R) ICH9 Family USB2 Enhanced Host Controller - 293C
	C USB Composite Device
	USB Root Hub
l l	🗝 🕰 USB Root Hub
	🛛 🕰 USB Root Hub
l l	🛛 🕰 USB Root Hub
l l	🥰 USB Root Hub
2	🛛 🕰 USB Root Hub
l l	🛛 🕰 USB Root Hub
	Contract Hub
(🕰 USB Serial Converter A 💦
1	USB Serial Converter B



Once the drivers are installed; integrating with the Rowley CrossWorks IDE is pretty simple. Here are the steps:



Step1: Open any 'Crossworks' workspace and go to 'Target' tab and select 'Targets' option (last options)

Targ	et Tools Window Help	
5	1 Connect USB CrossConnect for ARM	Ctrl+T, 1
	2 Connect USB CrossConnect for ARM-RTCK	Ctrl+T, 2
	<u>3</u> Connect Macraigor Wiggler (20 Pin)	Ctrl+T, 3
	4 Connect Macraigor Wiggler (14 Pin)	Ctrl+T, 4
	5 Connect Olimex ARM-USB-OCD	Ctrl+T, 5
	6 Connect Olimex ARM-USB-TINY	Ctrl+T, 6
	Z Connect Amontec JTAGkey	Ctrl+T, 7
	8 Connect Luminary USB Debug	Ctrl+T, 8
	9 Connect STR9-comStick	Ctrl+T, 9
	Connect Segger J-Link	
	Connect ARM Simulator	
300	Disconnect	Ctrl+T, C
-	R <u>e</u> connect.	Ctrl+T, E
-	<u>R</u> eset	Ctrl+T, S
	Sho <u>n</u> Target Log	
1	Targets	Ctrl+Alt+1



Step2: Next, in the right pane; select targets and 'Right click then go to \rightarrow New Target Interface \rightarrow Generic FT2232 Device

🔀 CrossStudio for ARM - Targets						FX
File Edit View Search Project Build Debug Target Tools Wi	indow Help					
D • 😅 • 🔲 🖨 🖪 🖁 🛱 • X 10 • 00 • 1	*, □•�₽.]₫	(年) 🗐 🦉 🛑 📮 🤇	, , #	1.0 0. 06 . • •.		
🔄 BlueBoard 🔹 🏹 ARM Flash Debug 💌 🍘 🍟 🍎	alte fe fe fe f "z	🕂 🛛 🗣 🗣 🗣	1 mg			
🛛 🍬 🔿 📅 C:/Program Files/Rowley Associates Limiter 🗢 🗇 💠 🎄	· [] 都 你 你 都 [*6] *	₩] # <u>1</u> 1 1	δ. δ. δ.	66		
Help		×	Targets			×
CrossWorks for ARM			***	🌢 🐚 🗳		
CrossWorks for ARM			🚓 USB କି USB	CrossConnect for ARM CrossConnect for ARM-RTCI	ĸ	
Welcome to CrossWorks for ARM!	-	Macro Macro Macro	aigor Wiggler (20 Pin) aigor Wiggler (14 Pin)			
CrossWorks for ARM is a streamlined integrated development envi building, testing, and deploying applications on ARM7, ARM9, XSca	s, and libraries for ntrollers.	AP-AP-AP-AP-AP-AP-AP-AP-AP-AP-AP-AP-AP-A	<u>C</u> onnect			
Documentation overview		\$15	Reconnect	1		
A comprehensive collection of technical documentation, including r	2	Reset	1			
resources also include getting started documents, API references,	and cross-references for a	related topics.	ø 1	Erase All	1	
Catting Started Support Deckages	Delesse Notes			Erase Range		
The CrossStudio Tutorial View the details of the device	Please take a moment to r	read		Download File	Targets	
section gives an overview of and board support packages the how to get started with you currently have installed.	the release notes for this version of CrossWorks.	a na thorna	Mem	⊻erify File ►		×
CrossWorks for ARM.	2002223 (D-0204	Macraigor Wiggler (20 F	Pin)	New Target Interface 🔸		
Library C Library I Documentation on the Comprehensive I	ARM Library Documentation covering	Macraigor Wiggler (14 F	Pin)	New <u>Folder</u>		
× Show output from: Build Log		ARM Simulator	mation available			
	Serial Loader	ж	Cu <u>t</u>			
	USB CrossConnect for a	ARM	⊆ору			
	Olimex ARM-USB-OCD	R	Paste			
	Olimex ARM-USB-TINY	×	Delete		×	
	Amontec JIAGkey	aje	Rena <u>m</u> e			
	Segger 1 Liek		Properties		1	
	Jeyger J-Link				-	
T		Device 1	уре			
Terminal Emulator 🔯 Output			The detec	ted type of the currently con	nected target device.	
			Disco	nnected 🗿 Built OK 🕬	READ	



Step3: In the 'Target Window', Right click on 'Generic FT2232 Device' and select 'Properties' from the drop down list





Step 4: Go to properties window. The Window looks similar to the image given below

AL C Generic ET 2232 Device Properties	
T2232 Pin Configuration	_
- 🔝 Connected LED Inversion Mask: 0x0000	
Connected LED Mask: 0x0000	
- 📰 nSRST Inversion Mask: <u>0x0000</u>	
🔝 nSRST Mask: <u>0x0200</u>	
- 💼 nTRST Inversion Mask: <u>0x0000</u>	
💼 nTRST Mask:: <u>0x0400</u>	
- 💼 Output Pins: <u>0x0F1B</u>	
- 💼 Output Value: <u>0x0C08</u>	
- 📰 Running LED Inversion Mask: <u>0x0000</u>	
🔤 💼 Running LED Mask: <u>0x0000</u>	
T2232 USB	
- 🕄 PID: 0x6010	
1 VID: 0x0403	
evice Type	
he detected tune of the currently connected target device	
The detected type of the culterity connected target devict	с.



Step 5: Change nSRST Mask to 0x0400, nTRST Mask to 0x0200, Output Value to 0x0608 and clock divider to a value greater or equal to 6 as shown below

₽	Generic FT2232 Device Properties
Curren	t
8:-	Device Type: < <u>(none></u>
FT223	2 Pin Configuration
	Connected LED Inversion Mask: <u>0x0000</u> Connected LED Mask: <u>0x0000</u> nSRST Inversion Mask: <u>0x0000</u> nTRST Mask: <u>0x0400</u> nTRST Inversion Mask: <u>0x0000</u> nTRST Mask: <u>0x0200</u> Output Pins: <u>0x0F1B</u> Output Value: <u>0x0608</u> Running LED Inversion Mask: <u>0x0000</u> Running LED Mask: <u>0x0000</u>
:	PID: <u>0x6010</u> VID: <u>0x0403</u>
Interfa	ce
	Serial Number: <u><none></none></u> Use Serial Number: <u><none></none></u> Version: <u><none></none></u>

Step 6: We are now all set to use the NGX USB ARM JTAG. Right click on the 'Generic FT2232 Device' and click on 'Rename' and rename it to 'NGX USB ARM JTAG'





Step 7: Connect the USB JTAG to the ARM board using the 20 pin ribbon cable provided, right click on the 'NGX USB ARM JTAG' and click on 'Connect'



Step 8: Once connected go the 'Debug' option and select 'Start Debugging' option or alternatively press F5 to flash the code using NGX USB ARM JTAG.

Build	Deb	ug	Target	Tools	Winde	w	Help			
b 🔁		Det	bug Wi <u>n</u> d	ows				•	-	
C:/P		Bre	akpoints					•		1
1		⊆or	ntrol					•		
	ţ⊒	Sta	irt Debug	ging			F5			
* * * * *	e	Ste	p I <u>n</u> to De	ebugging	Ctr	1+Sł	nift+F11			
	₽⊒	<u>R</u> es	set And D	ebug		Ctrl	+Alt+F5			
	íj	Att	ach <u>D</u> ebu	ıgger		C	trl+T, H			
a 393	1	Sta	irt Withou	ut Debugg	jing		Ctrl+F5			
ts() FLASH	√⊒	⊻er	ify			C	trl+T, V			
). E	Go								
M ST	11	Bre	ak				Ctrl+.			
ur_51.	- 111-	Sto	P				5hift+F5			
	B=	<u>R</u> e:	start		C	trl+S	5hift+F5			



Step 9: After flashing the code you can set breakpoints and step into the code as shown below



For using with OpenOCD for debugging please refer to the below links:

http://www.siwawi.arubi.uni-kl.de/avr_projects/arm_projects/openocd_intro/index.html -by Martin Thomas

http://www.yagarto.de/ - by Michael Fischer

Schematics:

The schematics for the NGX ARM USB JTAG can be found at <u>http://blueboard-lpc214x.googlecode.com/files/ARM_USB_JTAG.pdf</u>



Troubleshooting:

- 1. CrossWorks reports "No devices with USB PID/VID of 0x0403/0x6010 attached"
 - ⇒ CrossWorks is unable to find the NGX ARM USB JTAG, please check that module is connected and powered through USB and also ensure the FTDI drivers are installed. This can be confirmed by looking at the device manager
- 2. "Cannot Identify Target. Check JTAG connections and that the target is powered"
 - ⇒ This is reported when the target board is not RESET or the 20-pin ribbon cable is not connected. Connect the 20-pin JTAG cable between the JTAG and the ARM board, reset the ARM board and now try connecting again.