n-PRO-10

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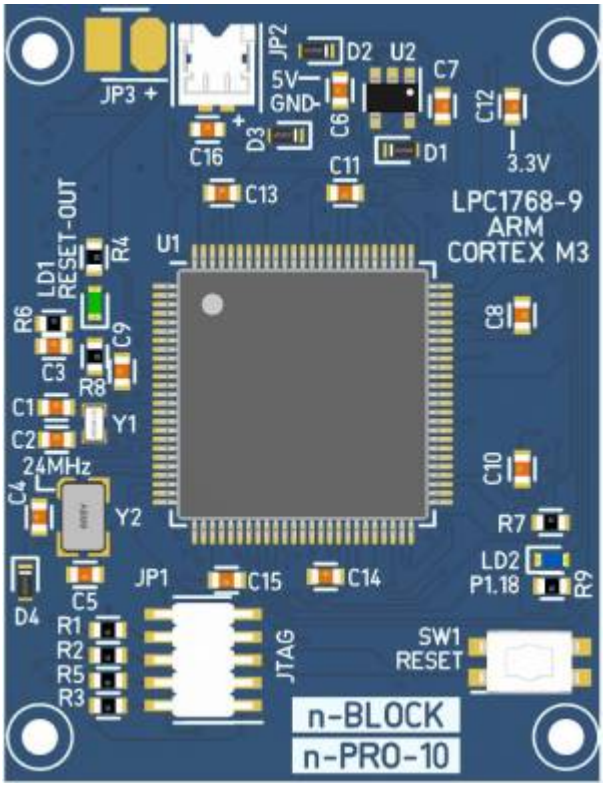
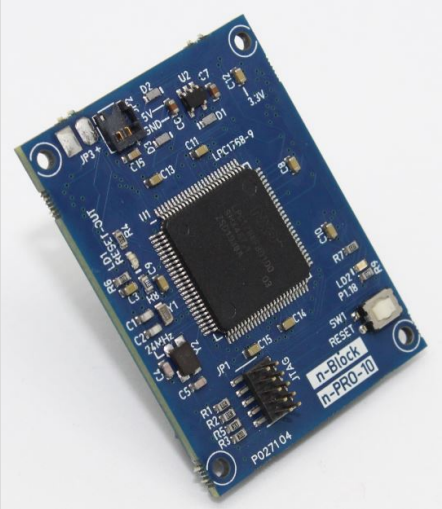
n-PRO-10

n-PRO-10 is an mbed-enabled ARM Cortex M3 LPC1769 development board from the n-Blocks family designed for rapid prototyping, in the n-Blocks PRO form factor.



n-PRO-10



LPC1769 full breakout in n-PRO modular form factor

License	GPL 2.0
Status	Tested
Buy at:	
Categories	
Hardware repo	Bitbucket
Firmware repo	

Overview

n-PRO-10 board features NXP's LPC1769 microcontroller and is designed to quickly get started with the ARM Cortex-M3.The board allow engineers to develop their applications from initial prototype to final production. n-PRO-10 development board is compatible with various toolchains used in the industry. The board includes an onboard, CMSIS-DAP compatible debug probe as well as a connector for use with 3rd party debug probes.

MCU Features

- Arm® Cortex-M3 processor, running at frequencies of up to 120 MHz
- Arm Cortex-M3 built-in Nested Vectored Interrupt Controller (NVIC)
- Up to 512 kB on-chip flash memory
- Up to 64 kB On-chip SRAM
- In-System Programming (ISP) and In-Application Programming (IAP)
- 8 channel General Purpose DMA controller (GPDMA)
- Ethernet MAC with RMII interface and dedicated DMA controller
- USB 2.0 full-speed device/Host/OTG controller
- 4 UARTs with fractional baud rate generation, internal FIFO, and DMA support
- CAN 2.0B controller with two channels
- SPI controller with synchronous, serial, full duplex communication
- 2 × SSP controllers with FIFO and multi-protocol capabilities
- 3 × I2C bus interfaces, I2S (Inter-IC Sound) interface
- 70 × GPIOs with configurable pull-up/down resistors
- 12-bit/8-ch Analog/Digital Converter (ADC) with conversion rates up to 200 kHz
- 10-bit Digital/Analog Converter (DAC) with dedicated conversion timer and DMA
- 4 × general purpose timers/counters
- Motor control PWM with support for three-phase motor control
- Quadrature encoder interface that can monitor one external quadrature encoder

- PWM/timer block with external count input
- Low power RTC with a separate power domain and dedicated oscillator
- WatchDog Timer (WDT)
- Arm Cortex-M3 system tick timer, including an external clock input option
- Repetitive interrupt timer provides programmable and repeating timed interrupts
- Standard JTAG test/debug interface for compatibility with existing tools
- Integrated PMU (Power Management Unit)
- 4 reduced power modes: Sleep, Deep-sleep, Power-down, and Deep power-down
- Single 3.3 V power supply (2.4 V to 3.6 V)
- 4 × external interrupt inputs configurable as edge/level sensitive
- Non-maskable Interrupt (NMI) input
- Wake-up Interrupt Controller (WIC)
- Processor wake-up from Power-down mode via any interrupt
- Brownout detect with separate threshold for interrupt and forced reset
- Power-On Reset (POR)
- Crystal oscillator with an operating range of 1 MHz to 25 MHz
- 4 MHz internal RC oscillator trimmed to 1 % accuracy
- Code Read Protection (CRP) with different security levels
- Unique device serial number for identification purposes

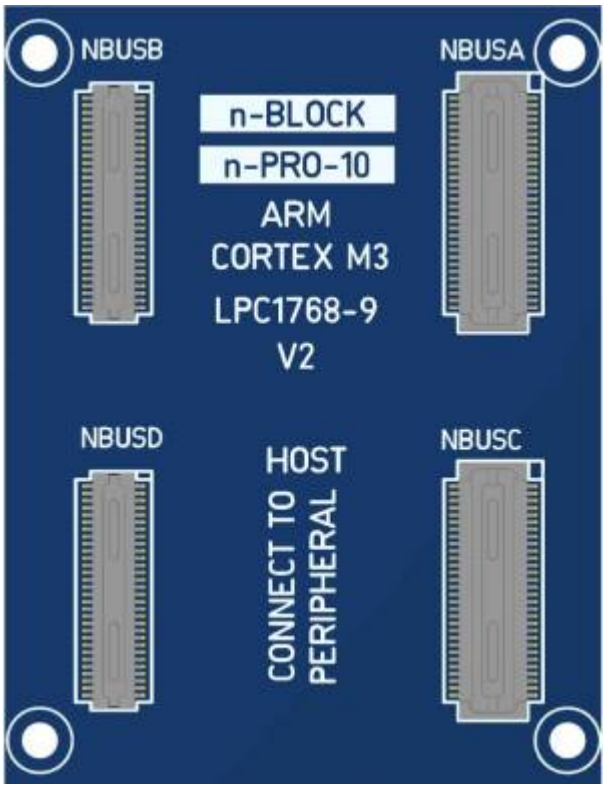
n-PRO-10 Features

- Standard form-factor
- Drag-and-drop programming, with the board represented as a USB drive
- 100 MHz ARM with 64 KB of SRAM, 512 KB of Flash
- Ethernet, USB OTG, SPI, I2C, UART, CAN, GPIO, PWM, ADC, DAC

- Mbed compatibile
- Web-based C/C++ programming environment
- API-driven development using libraries with intuitive interfaces

Board Pinout

n-PRO-10 is a **HOST** board with four Hirose DF30-series 60-pin low profile connectors at bottom side, following the n-Blocks PRO form factor.



NBUS-A

LQFP100 PIN NO	FUNCTION 3	FUNCTION 2	FUNCTION 1	GPIO	MAIN FUNCTION	CON PIN NO
					1-WIRE	A60
					GND	A59
					+2.8V	A58
81	CAP2.0	CAN2RD	I2SRX-CLK	P0.4	CAN2-RD	A57
80	CAP2.1	CAN2-TD	I2SRX_WS	P0.5	CAN2-TD	A56
99		AD0.6	RXD0	P0.3	RXD0	A55
98		AD0.7	TXD0	P0.2	TXD0	A54
68	TRACED0	DTR1	PWM1.6	P2.5	PWM1	A53
36	MAT1.0	USB-PWRD	MOT.PWM0.B	P1.22	PWM2	A52
6	RXD3	AOUT	AD0.3	P0.26	ADC3	A51
7	TXD3	I2SRX-SDA	ADC0.2	P0.25	ADC2	A50
43	CAO0.1	USB-OVRCR	CLKOUT	P1.27	CLKOUT	A49
19				VBAT	VBAT	A48
66		RTS1/RS485-OE	CAN2RD	P2.7	MOSFET	A47
79	MAT2.0	SSEL1	I2SRX-SDA	P0.6	CS1	A46
78	MAT2.1	SCK1	I2STX-CLK	P0.7	SCK1	A45
76	MAT2.3	MOSI1	I2STX-SDA	P0.9	MOSI1	A44
77	MAT2.2	MISO1	I2STX-WS	P0.8	MISO1	A43
58		SCL1	DTR1	P0.20	SCL2	A42
59		SDA1	DSR1	P0.19	SDA2	A41
82	TXD3	MAT2.0	I2S-RX-MCLK	P4.28	TXD4	A40
85	RXD3	MAT2.1	I2S-TX-MCLK	P4.29	RXD4	A39
						A38
						A37
						A36
						A35
						A34
					+5V	A33
					GND	A32
					3.3V	A31

CON PIN NO	MAIN FUNCTION	GPIO	FUNCTION 1	FUNCTION 2	FUNCTION 3	LQFP100 PIN NO
A1	1.8V					
A2	GND					
A3	+2.8V					
A4	RXD1	P2.0	RXD1	PWM1.1		75
A5	TXD1	P2.1	TXD1	PWM1.2		74
A6	SDA1	P0.10	TXD2	SDA2	MAT3.0	48
A7	SCL1	P0.11	RXD2	SCL2	MAT3.1	49
A8	MISO0	P0.17	CTS1	MISO0	MISO	61
A9	MOSI0	P0.18	DCD1	MOSI0	MOSI	60
A10	SCK0	P0.15	TXD1	SCK0	SCK	62
A11	SS0	P0.16	RXD1	SSEL0	SSEL	63
A12	RESET-CPU	RESET				17
A13	USB-CON	P2.9	USB-CON	RXD2		64
A14	QENCB	P1.23	MCI1/QENCB	PWM1.4	MISO0	37
A15	ADC0	P0.23	ADC0.0	I2SRX-CLK	CAP3.0	9
A16	ADC1	P0.24	ADC0.1	I2SRX-WS	CAP3.1	8
A17	EINT3	P2.13	EINT3	I2STX_SDA		50
A18	EINT2	P2.12	EINT2	I2STX-WS		51
A19	USB-DP	P0.29	USB-D+			29
A20	USB-DN	P0.30	USB-D-			30
A21	CAN1-TD	P0.22	RTS1/RS485 OE	CAN1-TD		56
A22	CAN1-RD	P0.21	RI1	CAN1-RD		57
A23	SLEEP					
A24	SENSOR1					
A25	SENSOR2					
A26	SENSOR3					
A27	SENSOR4					
A28	+5V					
A29	GND					
A30	3.3V					

NBUS-B

LQFP100 PIN NO	FUNCTION 3	FUNCTION 2	FUNCTION 1	GPIO	MAIN FUNCTION	CON PIN NO
					1WIRE	B60
					GND	B59
					V-IO	B58
53	NMI	EINT0	ISP	P2.10	ISP	B57
32	CAP1.0	PWM1.1	USB-UP-LED	P1.18	LED1	B56
33	CAP1.1	USB-PPWR	MCPWM0.A	P1.19	LED2	B55
34			MCPWM0/QENC-A	P1.20	LED3	B54
35	SSEL0	PWM1.3	MCABORT	P1.21	LED4	B53
67	TRACECLK	RI1	PCAP1.0	P2.6	GPIO	B52
39	MAT1.1	PWM1.6	MCPWM1.A	P1.25	GPIO	B51
44	MAT0.0	PCAP1.0	MCPWM2.A	P1.28	GPIO	B50
3				SWDIO	SWDIO	B49
					SLEEP	B48
5				SWDCLK	SWDCLK	B47
69	TRACED1	DSR1	PWM1.5	P2.4	J-TDO	B46
44	MAT0.0	PCAP1.0	MCPWM2.A	P1.28	J-TDI	B45
20		AD0.5	SCK1	P1.31	GPIO	B44
21			VBUS?	P1.30	GPIO	B43
47	SCL1	RXD3	CAN1-TD	P0.1	SCL4	B42
46	SDA1	TXD3	CAN1-RD	P0.0	SDA4	B41
45	MAT0.1	PCAP1.1	MCPWM2.B	P1.29	GPIO	B40
52		I2STX-CLK	EINT1	P2.11	GPIO	B39
						B38
						B37
						B36
						B35
						B34
					+5V	B33
					GND	B32
					3.3V	B31

CON PIN NO	MAIN FUNCTION	GPIO	FUNCTION 1	FUNCTION 2	FUNCTION 3	LQFP100 PIN NO
B1	AREF0					
B2	GND					
B3	AREF1					
B4		P2.2	PWM1.3	CTS1	TRACED3	73
B5		P2.3	PWM1.4	DCD1	TRACED2	70
B6	SDA3	P0.27	SDA0(OPEN-D)	USB-SDA		25
B7	SCL3	P0.28	SCL0(OPEN-D)	USB-SCL		24
B8		P1.26	MCPWM.B1	PWM1.6	CAP0.0	40
B9		P1.24	MCPWM.2/QENC-I	MOSI0		38
B10		BAT				
B11		P3.26	STCLK	MAT0.1	PWM1.3	26
B12	RESET-CPU	RESET				
B13		P1.16	ETH-MDC			87
B14		P3.25	MAT0.0	PWM1.2		27
B15		P1.0	ETH-TXD0			95
B16		P1.16	ETH-TXD1			87
B17		P1.4	ETH-TXEN			93
B18		P1.8	ETH-CRS			92
B19		P1.9	ETH-RXD0			91
B20		P1.10	ETH-RXD1			90
B21		P1.14	ETH-RXER			89
B22		P1.15	ETH-CLK			88
B23		P1.17	ETH-MDIO			86
B24	RESET-OUT	RESET-OUT	ETH-RESET			
B25	SENSOR2					
B26	SENSOR3					
B27	SENSOR4					
B28	+5V					
B29	GND					
B30	3.3V					

NBUS-C

LQFP100 PIN NO	FUNCTION 3	FUNCTION 2	FUNCTION 1	GPIO	MAIN FUNCTION	CON PIN NO		CON PIN NO	MAIN FUNCTION	GPIO	FUNCTION 1	FUNCTION 2	FUNCTION 3	LQFP100 PIN NO
					1-WIRE	C60		C1	1.8V					
					GND	C59		C2	GND					
					+2.8V	C58		C3	+2.8V					
						C57		C4	RXD2					
						C56		C5	TXD2					
						C55		C6						
						C54		C7						
						C53		C8						
						C52		C9						
						C51		C10						
						C50		C11						
						C49		C12	RESET-CPU	RESET				17
19				VBAT	VBAT	C48		C13						
66		RTS1/RS485-OE	CAN2RD	P2.7	MOSFET	C47		C14						
79	MAT2.0	SSEL1	I2SRX-SDA	P0.6	CS1	C46		C15						
78	MAT2.1	SCK1	I2STX-CLK	P0.7	SCK1	C45		C16						
76	MAT2.3	MOSI1	I2STX-SDA	P0.9	MOSI1	C44		C17						
77	MAT2.2	MISO1	I2STX-WS	P0.8	MISO1	C43		C18						
58		SCL1	DTR1	P0.20	SCL2	C42		C19						
59		SDA1	DSR1	P0.19	SDA2	C41		C20						
82	TXD3	MAT2.0	I2S-RX-MCLK	P4.28	TXD4	C40		C21						
85	RXD3	MAT2.1	I2S-TX-MCLK	P4.29	RXD4	C39		C22						
						C38		C23						
						C37		C24						
						C36		C25						
						C35		C26						
						C34		C27						
					+5V	C33		C28	+5V					
					GND	C32		C29	GND					
					3.3V	C31		C30	3.3V					

NBUS-D

LQFP100 PIN NO	FUNCTION 3	FUNCTION 2	FUNCTION 1	GPIO	MAIN FUNCTION	CON PIN NO		CON PIN NO	MAIN FUNCTION	GPIO	FUNCTION 1	FUNCTION 2	FUNCTION 3	LQFP100 PIN NO
					1-WIRE	D60		D1	1.8V					
					GND	D59		D2	GND					
					+2.8V	D58		D3	+2.8V					
						D57		D4						
						D56		D5						
						D55		D6						
						D54		D7						
						D53		D8						
						D52		D9						
						D51		D10						
						D50		D11						
						D49		D12	RESET-CPU	RESET				17
19				VBAT	VBAT	D48		D13						
66		RTS1/RS485-OE	CAN2RD	P2.7	MOSFET	D47		D14						
79	MAT2.0	SSEL1	I2SRX-SDA	P0.6	CS1	D46		D15						
78	MAT2.1	SCK1	I2STX-CLK	P0.7	SCK1	D45		D16						
76	MAT2.3	MOSI1	I2STX-SDA	P0.9	MOSI1	D44		D17						
77	MAT2.2	MISO1	I2STX-WS	P0.8	MISO1	D43		D18						
58		SCL1	DTR1	P0.20	SCL2	D42		D19						
59		SDA1	DSR1	P0.19	SDA2	D41		D20						
82	TXD3	MAT2.0	I2S-RX-MCLK	P4.28	TXD4	D40		D21						
85	RXD3	MAT2.1	I2S-TX-MCLK	P4.29	RXD4	D39		D22						
						D38		D23						
						D37		D24						
						D36		D25						
						D35		D26						
						D34		D27						
					+5V	D33		D28	+5V					
					GND	D32		D29	GND					
					3.3V	D31		D30	3.3V					

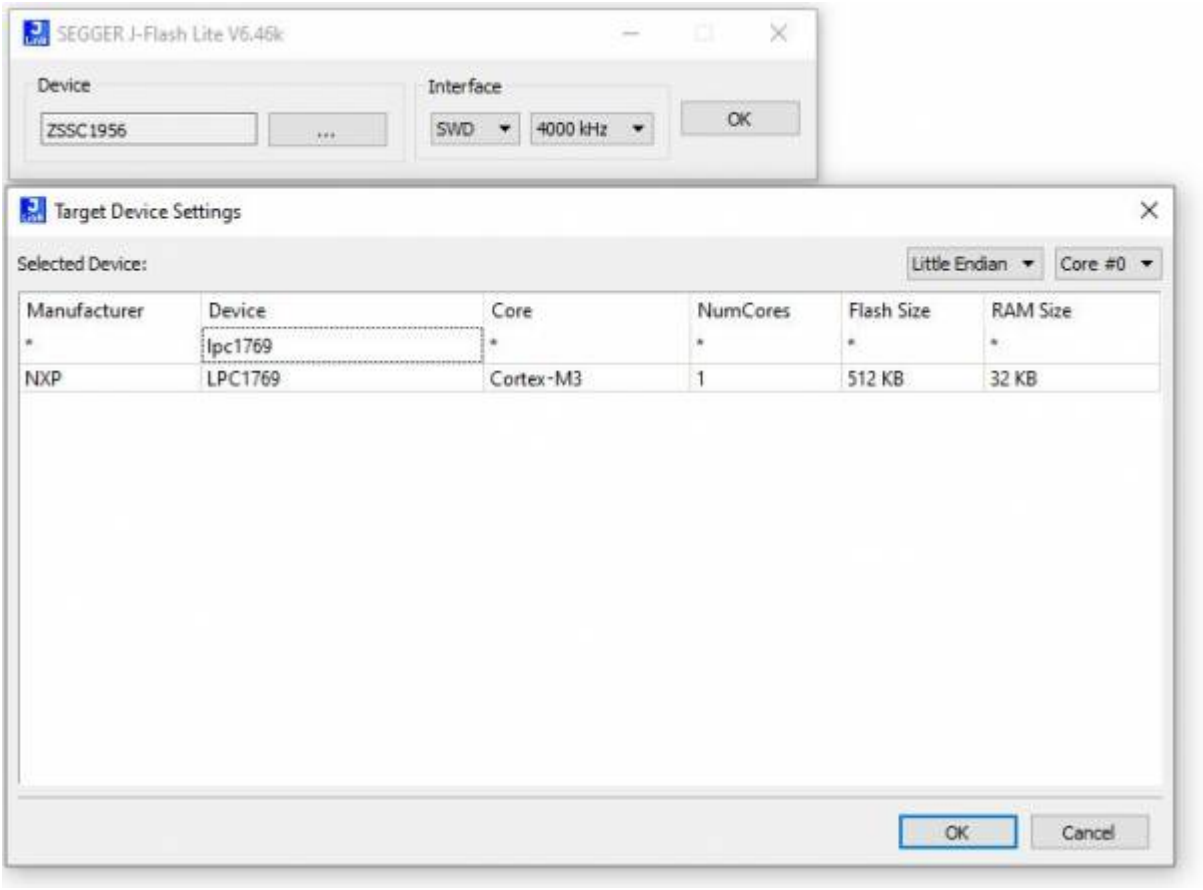
Getting started

- Connect the board to the battery or power supply.
- Press the reset button, green LED will indicate that you have power connected.
- Select target on mbed online compiler
- Create a blinky program like below. Compile and it will get downloaded.

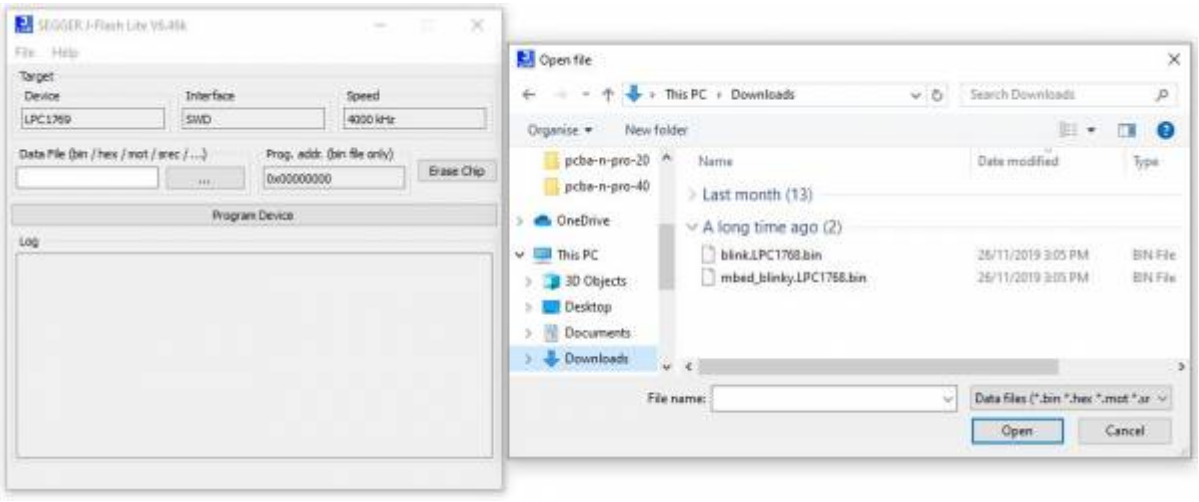
```
#include "mbed.h"

DigitalOut led1(P1_18);

// main() runs in its own thread in the OS
int main() {
    while (true) {
        led1 = !led1;
        wait(0.05);
    }
}
```

- Connect the board to j-link.

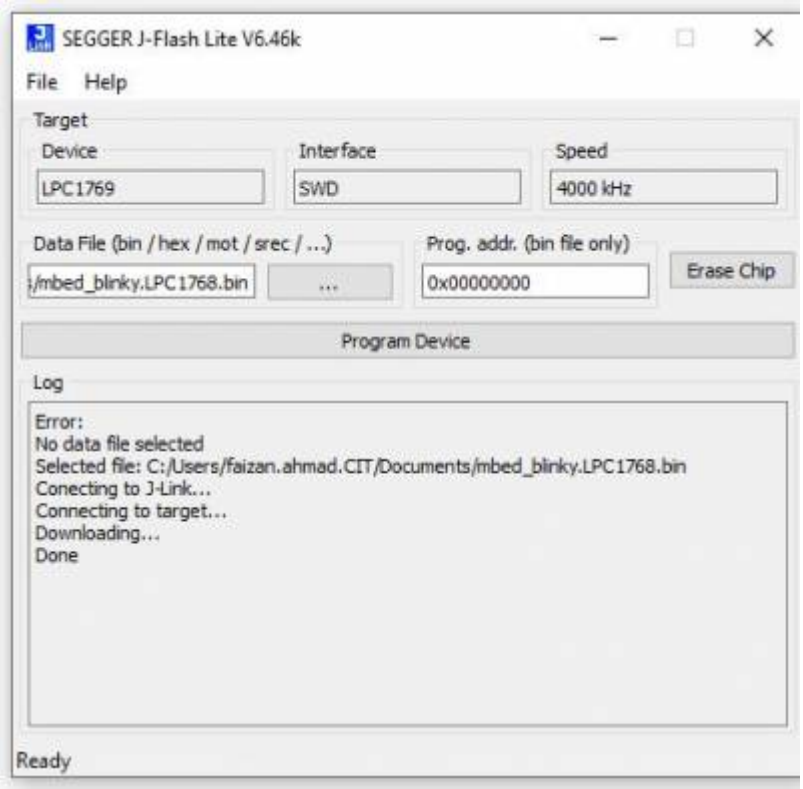
- Open J-Flash Lite, select the device.



- Select the bin file downloaded from mbed compiler.



- Click on Program device



- Press RESET, and the board will now be running your code.

USB Serial Port

- To use the debug serial port out of the LPC1769 to emulate a serial port over USB see example here.

References

- LPC1769 Datasheet
- https://os.mbed.com/handbook/mbed-NXP-LPC1768-Getting-Started
- https://www.embeddedartists.com/products/lpc1769-lpcxpresso/

Related articles in this Wiki

- n-PRO-10

RF, CPU, nblock, BLE, nsensorRF

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