

(october 2015, january 2016, march 2016)



noForth website

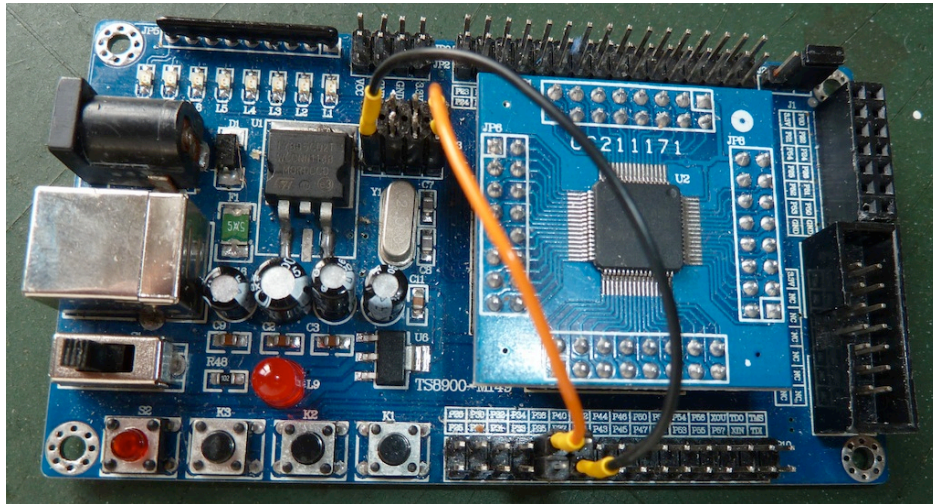
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In this text we refer to these two documents:

- SLAS272F.PDF "MSP430x13x, MSP430x14x, MSP430x14x1 mixed signal microcontroller"
- SLAU049F.PDF "MSP430x1xx Family User's Guide"

1. MSP430F149 Minim core board with noForth 149



Dimensions: 4.06 in x 2.24 in x 0.55 in (10.3 cm x 5.7 cm x 1.4 cm)

Weight: 1.87 oz (53 g) - Price: ca. \$20.-

top seller store - China (Mainland) (Guangdong)

- Aliexpress - Product ID: 597172877
MSP430F149 development board MSP430 Minim core board USB download
- bij DX - Model: I072606
MSP430F149/430 Minimum SCM Development Board w/ USB Cable - Blue

RS232/USB driver

The USB chip on the minim core board is the PL2303hx. It needs a specific driver under Windows. Unzip [this file](#) and execute "PL2303_Prolific_DriverInstaller_v1.11.0.exe". Windows 8 and higher do no longer support the PL2303hx USB-chip. If you have a modern Windows a communication module with an PL2303TA chip could be a solution.

We will use UART1 for communication, because the UART0 connections on the print coincide with the push buttons on the print. Therefore UART1 must be linked with the USB chip:

connect P3.6 to JP3 pin-2 and P3.7 to JP3 pin-8 using wire jumpers.

i/o port connections on Minim core board

Port 1

Digital i/o, TimerA i/o

P1.0 ...
P1.1 Bootloader TX
P1.2 ...
P1.3 ...
P1.4 ...
P1.5 ...
P1.6 ...
P1.7 ...

Port 2

Digital i/o, TimerA i/o

P2.0 Led
P2.1 Led
P2.2 Led/Bootloader RX
P2.3 Led
P2.4 Led
P2.5 Led
P2.6 Led
P2.7 Led

Port 3

Digital i/o, UART0, UART1

P3.0 ...
P3.1 ...
P3.2 SW K1
P3.3 SW K2
P3.4 SW K3/TX0/USB
P3.5 RX0/USB
P3.6 TX1
P3.7 RX1

Port 4

Digital i/o, TimerB i/o

P4.0 NRF905
P4.1 NRF905
P4.2 NRF905
P4.3 ...
P4.4 ...
P4.5 NRF905
P4.6 NRF905
P4.7 ...

Port 5

Digital i/o, UART1 SPI mode

P5.0 NRF905
P5.1 NRF905
P5.2 NRF905
P5.3 NRF905
P5.4 ...
P5.5 ...
P5.6 ...
P5.7 ...

Port 6

Digital i/o, analog inputs

P6.0 ...
P6.1 ...
P6.2 ...
P6.3 ...
P6.4 ...
P6.5 ...
P6.6 ...
P6.7 ...

Connectors on Minim core board

P1 = Power 8V to 12V
USB1 = USB power annex pseudo RS232
S1 = 5 Volt via USB or P1/7805
J1 = NRF905: P2.0, P2.1, P2.2, P2.4, P2.5, P2.6,
P5.0, P5.1, P5.2 and P5.3
J2 = Vref
JP2 = Power select
JP3 = Bootloader P1.1 and P2.2
JP9 = P1, P2.0 to P2.4, P6, Vref, Xtal, 3V3, GND and Reset
JP10 = P2.5 to P2.7, P3, P4, P5, Xtal and JTAG pins
JP11 = JTAG

Hardware on Minim core board

- 8 leds on P2
- 3 switches on P1.2 .. P1.4
- Reset switch S2
- Connection for NRF905 on P4 and P5

2. MSP430F149 i/o ports

Addresses

The MSP430F149 port registers are memory mapped. An overview:

	<u>P1</u>	<u>P2</u>	<u>P3</u>	<u>P4</u>	<u>P5</u>	<u>P6</u>	
PxIN	20	28	18	1C	30	34	In
PxOUT	21	29	19	1D	31	35	Out
PxDIR	22	2A	1A	1E	32	36	Direction
PxIFG	23	2B	-	-	-	-	Interrupt flag
PxIES	24	2C	-	-	-	-	Interrupt edge on
PxIE	25	2D	-	-	-	-	Interrupt on
PxSEL	26	2E	1B	1F	33	37	Select

See: SLAS272F.PDF under "peripheral file map", page 20-23.

PxDir

PxDIR = 0 Floating input
PxDIR = 1 Output

The port register functions are documented in SLAU049F.PDF page 9.2.3.
Texas Instruments recommends to configure unconnected i/o pins as Output.

PxSEL

The PxSEL register is used to assign a special function to an i/o pin. In this way, for example, the ADC can be activated. See SLAU272F.PDF page 40.

PxSEL = 0 Normal i/o
PxSEL = 1 Special function

UART

Registers ME1 and ME2 are used to link the UART's to the physical i/o bits, see SLAU049F.PDF page "13-27".

3. MSP430F149 RAM & ROM

RAM 0200 - 09FF
FlashROM 1100 - FFFF

4. MSP430F149 interrupt vectors

FFDE End of free Flash

FFE0 ...
FFE2 P2
FFE4 USART1 TX
FFE6 USART1 RX
FFE8 P1
FFEA TIMER A3 CCR1 CCR2
FFEC TIMER A3 CCR0
FFEE ADC12

FFF0 USART0 TX
FFF2 USART0 RX
FFF4 WATCHDOG
FFF6 COMPARATOR
FFF8 TIMER B7 CCR1 CCR2 CCR3 ...
FFFA TIMER B7 CCR0
FFFC NMI
FFFE RESET

See SLAS272F.PDF page 13 for details.

5. Processor registers in noForth

All processor registers (R0..R15) have their own name in noForth assembler:

PC	RP (SP in TI texts!)	SR	CG	MSP430 system registers	
SP	IP	TOS	DOX	NXT	noForth system registers
W	DAY	SUN	MOON		Registers, locally used by noForth
XX	YY	ZZ			Unused (free) registers