october 2015, .. february 2020

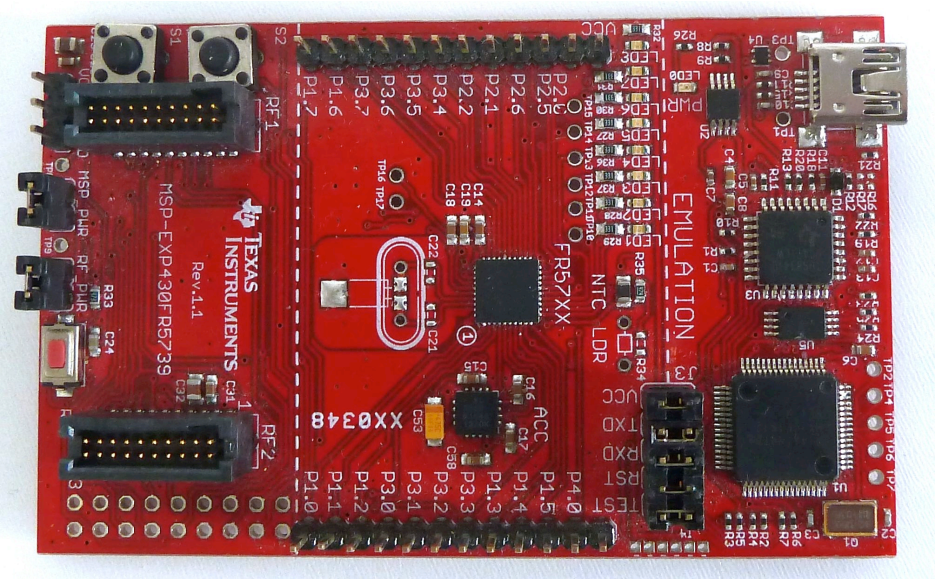
noForth website

MSP-EXP430FR5739 with noForth 5739

In this text we refer to these two documents:

- MSP430FR5739.PDF "MSP430FR573x, MSP430FR572x mixed signal microcontroller"
- SLAU272D.PDF "MSP430x5xx Family User's Guide"

1. MSP-EXP430FR5739 with noForth 5739



MSP-EXP430FR5739 Experimenters board
Core Sub-Architecture: MSP430
Kit Contents: LaunchPad Emulator, Mini USB-B Cable, Quick Start Guide

- Farnell - Ordercode: 1893308, TEXAS INSTRUMENTS - MSP-EXP430FR5739
- Aliexpress - Product ID: 1566452317, MSP-EXP430FR5739

i/o port connections on MSP-EXP430FR5739

Port 1	Port 2	Port J
P1.0 - ...	P2.0 - RX	PJ.0 - LED1
P1.1 - ...	P2.1 - TX	PJ.1 - LED2
P1.2 - ...	P2.2 - ...	PJ.2 - LED3
P1.3 - ...	P2.3 - ...	PJ.3 - LED4
P1.4 - NTC	P2.4 - ...	PJ.4 - XINB
P1.5 - ...	P2.5 - ...	PJ.5 - XOUTB
P1.6 - ...	P2.6 - ...	
P1.7 - ...	P2.7 - VS accelerometer	

Port 3	Port 4
P3.0 - XOUT	P4.0 - S1
P3.1 - YOUT	P4.1 - S2
P3.2 - ZOUT	
P3.3 - LDR	
P3.4 - LED5	
P3.5 - LED6	
P3.6 - LED7	
P3.7 - LED8	

Connectors on MSP-EXP430FR5739

```
SV1     = i/o P1, P3, P4 and GND
SV2     = i/o P1, P2, P3, Test and VCC
J3      = Programmer connection and USB RS232
J4      = eZ430 interface
RF1     = CCxxxx daughter cards
RF2     = CCxxxx daughter cards
J6      = External power (2,5V tot 3,6V)
EZ_USB  = USB RS232 and programmer interface
MSP_PWR = MSP current measure
RF_PWR  = RF current measure
TP1 = +5 Volt
TP3 = GND
```

Hardware on MSP-EXP430FR5739

- Eight blue leds on PJ.0 to PJ.3 and P3.4 TO P3.7
- Switch S1 on P4.0
- Switch S2 on P4.1
- LDR on P1.3 (Not present)
- Accelerometer on P3.0, P3.1, P3.2 and P2.7
- NTC on P1.4
- Reset switch RST

2. MSP430FR5739 i/o ports

Port addresses

The MSP430FR5739 port registers are memory mapped. An overview:

Label	P1	P2	P3	P4	PJ	Function
PxIN	200	201	220	221	320	Input
PxOUT	202	203	222	223	322	Output
PxDIR	204	205	224	225	324	Direction
PxREN	206	207	226	227	326	Resistor enable
PxSEL0	20A	20B	22A	22B	32A	Select 0
PxSEL1	20C	20D	22C	22D	32C	Select 1
PxIV	20E	21E	22E	22F		Interrupt vector word
PxSELC	210	211	230	231		Complement selection
PxIES	218	219	238	239		Interrupt edge select
PxIE	21A	21B	23A	23B		Interrupt on
PxIFG	21C	21D	23C	23D		Interrupt flag

PxDir, PxREN and PxOUT

The three registers PxDIR, PxREN and PxOUT are used to configure an i/o pin:

PxDIR	PxREN	PxOUT	Pin configuration
0	0	x	Floating input
0	1	0	Input with resistor to GND
0	1	1	Input with resistor to VCC
1	x	x	Output

More info in SLAU272D.PDF page 293.
Texas Instruments recommends to configure unconnected i/o pins as Output.

PxSEL and PxSEL2

The registers PxSEL and PxSEL2 are used to assign a special function to an i/o pin. In this way, for example, the ADC of UART can be activated. See SLAU272D.PDF page 294.

PxSEL2	PxSEL	i/o-function
0	0	Normal i/o
0	1	Basic extra function
1	0	Controller specific!
1	1	Second extra function

RS232/USB driver

Download the USB driver for the MSP-EXP430FR5739 under Windows to your PC. The eUSCI A0 is used as UART. Pins P2.0 (TX) and P2.1 (RX) are used, the default baudrate is 9600 baud.

3. MSP430FR5739 RAM and ROM

```
RAM 1C00 - 1FFF,  ROM C200 - FFFF
```

4. MSP430FR5739 interrupt vector table

```
FFCC  - End of free flash
FFCE  - RTC

FFD0  - P4
FFD2  - P3
FFD4  - TIMER B2 CCR1 CCR2
FFD6  - TIMER B2 CCR0
FFD8  - P2
FFDA  - TIMER B1 CCR1 CCR2
FFDC  - TIMER B1 CCR0
FFDE  - P1

FFE0  - TIMER A1 CCR1 CCR2
FFE2  - TIMER A1 CCR0
FFE4  - DMA
FFE6  - USCI 1 RX/TX
FFE8  - TIMER A0 CCR1 CCR2
FFEA  - TIMER A0 CCR0
FFEC  - ADC10
FFEE  - USCI 0 RX/TX

FFF0  - USCI 0 RX/TX
FFF2  - WATCHDOG
FFF4  - TIMER B0 CCR1 CCR2
FFF6  - TIMER B0 CCR0
FFF8  - COMPARATOR
FFFA  - NMI USER
FFFC  - NMI SYSTEM
FFFE  - RESET
```

See MSP430FR5739.PDF page 45-46.

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