october 2015, .. march 2016

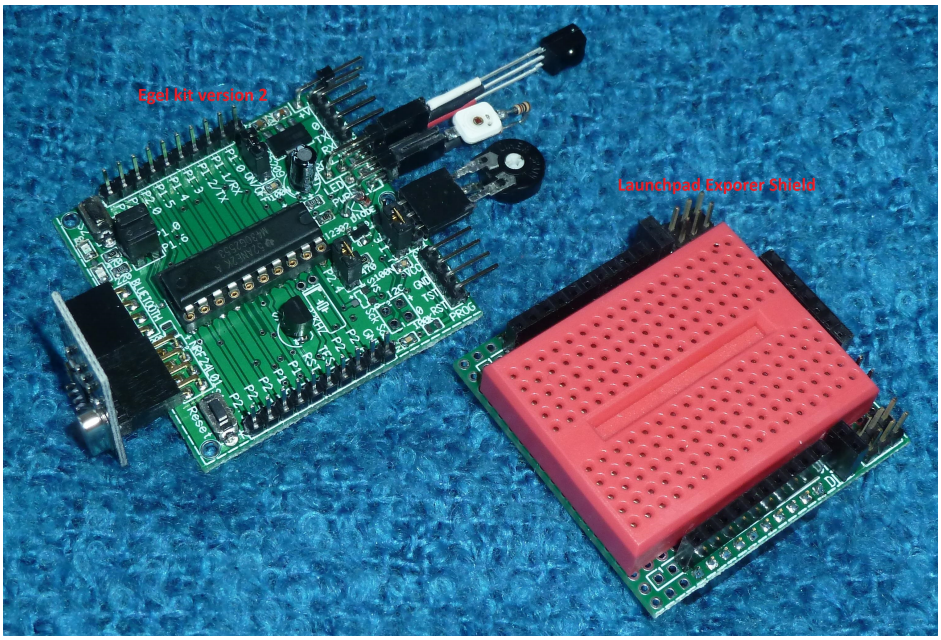
noForth website

MSP430G2553 on Egel kit with noForth 2553

In this text we refer to these three documents:

- SLAS735J.PDF "MSP430G2x53, MSP430G2x131 mixed signal microcontroller"
- SLAU144J.PDF "MSP430x2xx Family User's Guide"
- MSP430 Egel kit data vsn-2.PDF

1. MSP430G2553 on Egel Kit with noForth 2553

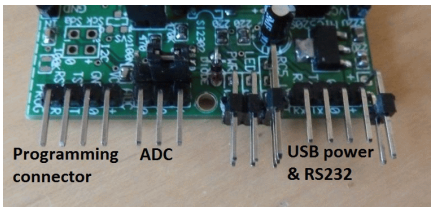


Egel kit vsn-2
Core Sub-Architecture: MSP430
Kit Contents: Two printed cirquits and all components,
USB-RS232 Cable, Building instructions

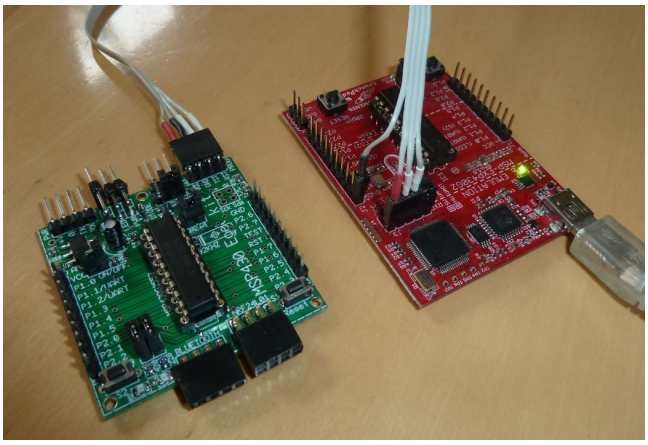
- May be ordered at HCC Forth gg

RS232/USB driver

The Egel kit uses an USB to RS232 cable with a PL2303TA chip. This Prolific USB-chip needs a specific driver under Windows. Unzip this file and execute "PL2303_Prolific_DriverInstaller_v1.11.0.exe".



At the right side an RS232/USB-connection and power supply. The connector on the left uses a MSP-EXP430G2 starter kit as programmer. Make a simple four wire cable, as shown.



MSP-EXP430G programs the Egel kit processor

i/o port connections on Egel kit

Port 1		Port 2	
Digital i/o, UART		Digital i/o	
P1.0	Led red	P2.0	RC5-input
P1.1	Uart	P2.1	IR Led
P1.2	Uart	P2.2	...
P1.3	S2/ADC	P2.3	nRF-CE
P1.4	STE/nRF-CSN	P2.4	Power
P1.5	CLK/nRF-SCK	P2.5	nRF-IRQ
P1.6	SCL/nRF-MISO/Led green	P2.6	Xin
P1.7	SDA/ADC/nRF-MOSI	P2.7	Xout

Connectors on Egel kit

```
J1           = i/o P1, P2 and VCC
J2           = i/o P1, P2, Reset, Test and GND
UART         = 5 Volt power connector and USB RS232
PROG         = Programmer connector to MSP-EXP430G2
                    and 3 Volt power input
RC5          = RC5 receiver connector
LED          = (IR) Led output connector
PWR          = Mosfet output max. 2 Amp. connector
ADC          = ADC input selectable P1.3/P1.7
I2C          = I2C bus connector
BLUETOOTH    = Bluetooth transceiver connector
+NRF24L01    = nRF24L01 connector
JP P1.0/P1.6 = Jumpers to red led and green led
ON/OFF       = Power on/off and current measure point
JP P2.4      = Mosfet on/off
+V           = 5 Volt power output
```

Hardware on Egel kit

- Red led on P1.0
- Green led on P1.6
- 2 Amp. Mosfet on P2.4
- Switch S2 on P1.3
- Reset switch S1

2. MSP430G2553 i/o ports

Port addresses

The MSP430G2553 port registers are memory mapped. An overview:

Label	P1	P2	Function
PxIN	20	28	In
PxOUT	21	29	Out
PxDIR	22	2A	Direction
PxIFG	23	2B	Interrupt flag
PxIES	24	2C	Interrupt edge on
PxIE	25	2D	Interrupt on
PxSEL	26	2E	Select
PxREN	27	2F	Resistor on/off
PxSEL2	41	42	Select 2

See: SLAS735J.PDF under "peripheral file map", from page 18-20.

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 SLAU144J.PDF page 328-329.
Texas Instruments recommends to configure unconnected i/o pins as Output.

PxSEL and PxSEL2

The registers PxSEL and PxSEL2 are to assign a special function to an i/o pin.
In this way, for example, the ADC or UART can be activated.
More info: SLAS735J.PDF page 42-57: Port Pin Functions.

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

3. MSP430G2553 RAM & ROM

```
RAM         0200 - 03FF
FlashROM    C000 - FFFF
```

4. MSP430G2553 Interrupt vectors

```
FFDE    End of free Flash

FFE0    ...
FFE2    ...
FFE4    P1
FFE6    P2
FFE8    ...
FFEA    ADC
FFEC    USCI B0 TX
FFEE    USCI B0 RX

FFF0    TIMER0A0 CCR1 CCR2
FFF2    TIMER A0 CCR0
FFF4    WATCHDOG
FFF6    COMPARATOR
FFF8    TIMER A1 CCR1 CCR2
FFFA    TIMER A1 CCR0
FFFC    NMI
FFFE    RESET
```

See SLAS735J.PDF page 11 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