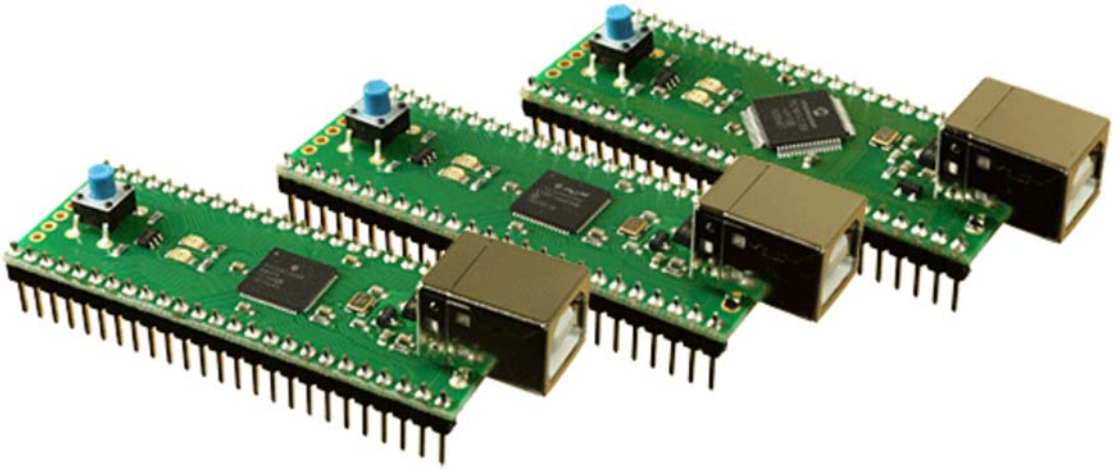
DEV Series, General Purpose Processor Modules

DEV-PIC18F67J50, DEV-PIC24FJ256GB206, DEV-P32MX795F512H

Technical Specification



Overview

The **DEV**elopment range of processor modules consists of three types covering the PIC18, PIC24 and PIC32 processors from Microchip. They have a consistent footprint making it easy to target processor families for new applications, or as an easy way to use a surface mounted processor. The modules all feature USB, 12MHz Crystal, Reset controller and have Microchip's USB Boot-loader already programmed in. The modules can be powered directly from the USB cable, or if using it as a stand alone system from a regulated 3.3v supply or a 4.5v-9v unregulated supply. The two rows are on a 0.8" pitch and easily plug into standard prototyping blocks.

Schematics

The schematics of the DEV range modules are here:

DEV-PIC18F67J50	-	128k Flash, 3.9k bytes RAM, 12mips 8-bit CPU
DEV-PIC24FJ256GB206	-	256k Flash, 96k bytes RAM, 16mips 16-bit CPU
DEV-PIC32MX795F512H	-	512k Flash, 128k bytes RAM, 80mips 32-bit CPU

Power

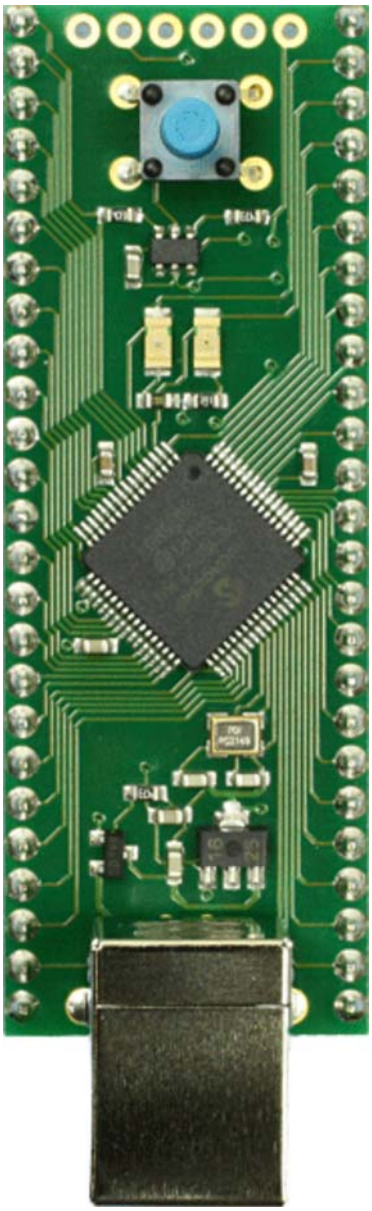
The modules may be powered from the USB bus or if you are not using USB, by applying 4.5 to 9v to pin 50 and 0v Ground to pin 25.
In either case a 3.3v supply is available on pin 26 from an on-board 150mA regulator. The amount of available current on the 3.3v pin depends on which module is used and its clock speed. Check the device sheets for power requirements.

Connections

The diagram below shows the connections for the various modes.

DEV-PIC18F67J50

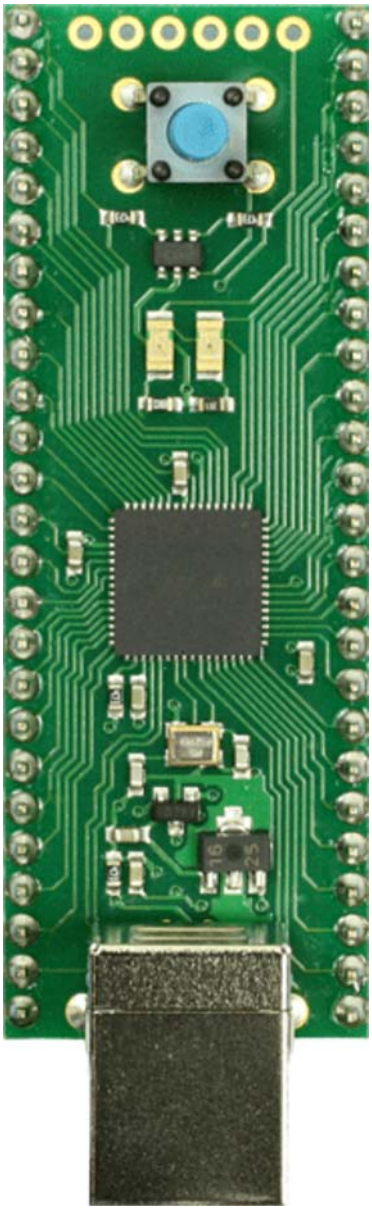
RG1/PMA7/TX2/CK2 - 1
RG2/PMA6/RX2/DT2 - 2
RG3/PMCS1/CCP4/P3D - 3
RG4/PMCS2/CCP5/P1D - 4
RF7/SS1/C1OUT - 5
RF6/AN11/C1INA - 6
RF5/AN10/C1INB/CVREF - 7
RF2/PMA5/AN7/C2INB - 8
RA3/AN3/VREF+ - 9
RA2/AN2/VREF - 10
RA1/AN1 - 11
RA0/AN0 - 12
RA5/AN4/C2INA - 13
RA4/T0CKI - 14
RC1/T1OSI/ECCP2/P2A - 15
RC0/T1OSO/T13CKI - 16
RC6/TX1/CK1 - 17
RC7/RX1/DT1 - 18
RC2/ECCP1/P1A - 19
RC3/SCK1/SCL1 - 20
RC4/SDI1/SDA1 - 21
RC5/SDO1/C2OUT - 22
RB7/KBI3/PGD - 23
RB6/KBI2/PGC - 24
0v Ground - 25



50 - External 4.5v to 9v Supply
49 - RG0/PMA8/ECCP3/P3A
48 - RE0/PMRD/P2D
47 - RE1/PMWR/P2C
46 - RE2/PMBE/P2B
45 - RE3/PMA13/P3C/REFO
44 - RE4/PMA12/P3B
43 - RE5/PMA11/P1C
42 - RE6/PMA10/P1B
41 - RE7/PMA9/ECCP2/P2A
40 - RD0/PMD0
39 - RD1/PMD1
38 - RD2/PMD2
37 - RD3/PMD3
36 - RD4/PMD4/SDO2
35 - RD5/PMD5/SDI2/SDA2
34 - RD6/PMD6/SCK2/SCL2
33 - RD7/PMD7/SS21
32 - RB0/FLT0/INT0
31 - RB1/INT1/PMA4
30 - RB2/INT2/PMA3
29 - RB3/INT3/PMA2
28 - RB4/KBI0/PMA1
27 - RB5/KBI1/PMA0
26 - 3.3v

DEV-PIC24FJ256GB206

C1IND/RP21/PMA5/CN8/RG6 - 1
C1INC/RP26/PMA4/CN9/RG7 - 2
C2IND/RP19/PMA3/CN10/RG8 - 3
C2INC/RP27/PMA2/CN11/RG9 - 4
PGEC3/AN5/C1INA/RP18/CN7/RB5 - 5
PGED3/AN4/C1INB/RP28/CN6/RB4 - 6
AN3/C2INA/CN5/RB3 - 7
AN2/C2INB/RP13/CN4/RB2 - 8
PGEC1/AN1/VREF-/RP1/CN3/RB1 - 9
PGED1/AN0/VREF+/PMA6/RP0/CN2/RB0 - 10
PGEC2/AN6/RP6/CN24/RB6 - 11
PGED2/AN7/RP7/RCV/CN25/RB7 - 12
AN8/RP8/CN26/RB8 - 13
AN9/RP9/PMA7/CN27/RB9 - 14
TMS/CVREF/AN10/PMA13/CN28/RB10 - 15
TDO/AN11/PMA12/CN29/RB11 - 16
TCK/AN12/CTEDG2/PMA11/CN30/RB12 - 17
TDI/AN13CTEDG1/PMA10/CN31/RB13 - 18
AN14/CTPLS/RP14/PMA1/CN32/RB14 - 19
AN15/RP29/REFO/PMA0/CN12/RB15 - 20
SDA2/RP10/PMA9/CN17/RF4 - 21
SCL2/RP17/PMA8/CN18/RF5 - 22
RP16/USBID/CN71/RF3 - 23
RTCC/RP2/CN53/RD8 - 24
0v Ground - 25



50 - External 4.5v to 9v Supply
49 - SDA3/PMD7/CN65/RE7
48 - SCL3/PMD6/CN64/RE6
47 - PMD5/CN63/RE5
46 - PMD4/CN62/RE4
45 - PMD3/CN61/RE3
44 - PMD2/CN60/RE2
43 - PMD1/CN59/RE1
42 - PMD0/CN58/RE0
41 - VCMPST2/SESSVLD/CN69/RF1
40 - CN68/RF0
39 - C3INA/SESSEND/CN16/RD7
38 - C3INB/CN15/RD6
37 - RP20/PMRD/CN14/RD5
36 - RP25/PMWR/CN13/RD4
35 - RP22/PMBE0/CN52/RD3
34 - RP23/PMACK1/CN51/RD2
33 - RP24/VBUSCHG/CN50/RD1
32 - SOSCO/SCLKI/T1CK/C3INC/RPI37 /CN0/RC14
31 - SOSCI/C3IND/CN1/RC13
30 - RP11/INT0/CN49/RD0
29 - RP12/PMACK2/CN56/RD11
28 - SCL1/RP3/PMA15/PMCS2/CN55/RD10
27 - SDA1/RP4/PMA14/PMCS1/CN54/RD9
26 - 3.3v

DEV-PIC32MX795F512H

SCK2A/U2BTX/U2ARTS/PMA5/CN8/RG6 - 1

SDA2A/SDI2A/U2ARX/PMA4/CN9/RG7 - 2

SCL2A/SDO2A/U2ATX/PMA3/CN10/RG8 - 3

SS2A/U2BRX/U2ACTS/PMA2/CN11/RG9 - 4

AN5/C1IN+/VBUSON/CN7/RB5 - 5

AN4/C1IN-/CN6/RB4 - 6

AN3/C2IN+/CN5/RB3 - 7

AN2/C2IN-/CN4/RB2 - 8

PGEC1/AN1/VREF-/CVREF-/CN3/RB1 - 9

PGED1/AN0/VREF+/CVREF+ /PMA6/CN2/RB0 - 10

PGEC2/AN6/OCFA/RB6 - 11

PGED2/AN7/RB7 - 12

AN8/C2TX/SS3A/U3BRX/U3ACTS /C1OUT/RB8 - 13

AN9/C2OUT/PMA7/RB9 - 14

TMS/AN10/CVREFOUT/PMA13/RB10 - 15

TDO/AN11/PMA12/RB11 - 16

TCK/AN12/PMA11/RB12 - 17

TDI/AN13/PMA10/RB13 - 18

AN14/C2RX/SCK3A/U3BTX/U3ARTS /PMALH/PMA1/RB14 - 19

AN15/EMDC/AEMDC/OCFB/PMALL /PMA0/CN12/RB15 - 20

AC1TX/SDA3A/SDI3A/U3ARX /PMA9/CN17/RF4 - 21

AC1RX/SCL3A/SDO3A/U3ATX /PMA8/CN18/RF5 - 22

USBID/RF3 - 23

RTCC/AERXD1/ETXD3/IC1/INT1/RD8 - 24

0v Ground - 25

50 - External 4.5v to 9v Supply

49 - ETXD1/PMD7/RE7

48 - ETXD0/PMD6/RE6

47 - ETXEN/PMD5/RE5

46 - ERXERR/PMD4/RE4

45 - ERXCLK/EREFCLKPMD3/RE3

44 - ERXDV/ECRSDV/PMD2/RE2

43 - ERXD0/PMD1/RE1

42 - ERXD1/PMD0/RE0

41 - C1TX/AETXD0/ERXD2/RF1

40 - C1RX/AETXD1/ERXD3/RF0

39 - ETXCLK/AERXERR/CN16/RD7

38 - AETXEN/ETXERR/CN15/RD6

37 - PMRD/CN14/RD5

36 - OC5/IC5/PMWR/CN13/RD4

35 - SCL1A/SDO1A/U1ATX/OC4/RD3

34 - SDA1A/SDI1A/U1ARX/OC3/RD2

33 - EMDIO/AEMDIO/SCK1A/U1BTX/U1ARTS /OC2/RD1

32 - SOSCO/T1CK/CN0/RC14

31 - SOSCI/CN1/RC13

30 - OC1/INT0/RD0

29 - ECRS/AEREFCLK/IC4/PMCS1/PMA14 /INT4/RD11

28 - ECOL/AECRSDV/SCL1/IC3/PMCS2/PMA15 /INT3/RD10

27 AERXD0/ETXD2/SS1A/U1BRX/U1ACTS /SDA1/IC2/INT2/RD9

26 - 3.3v

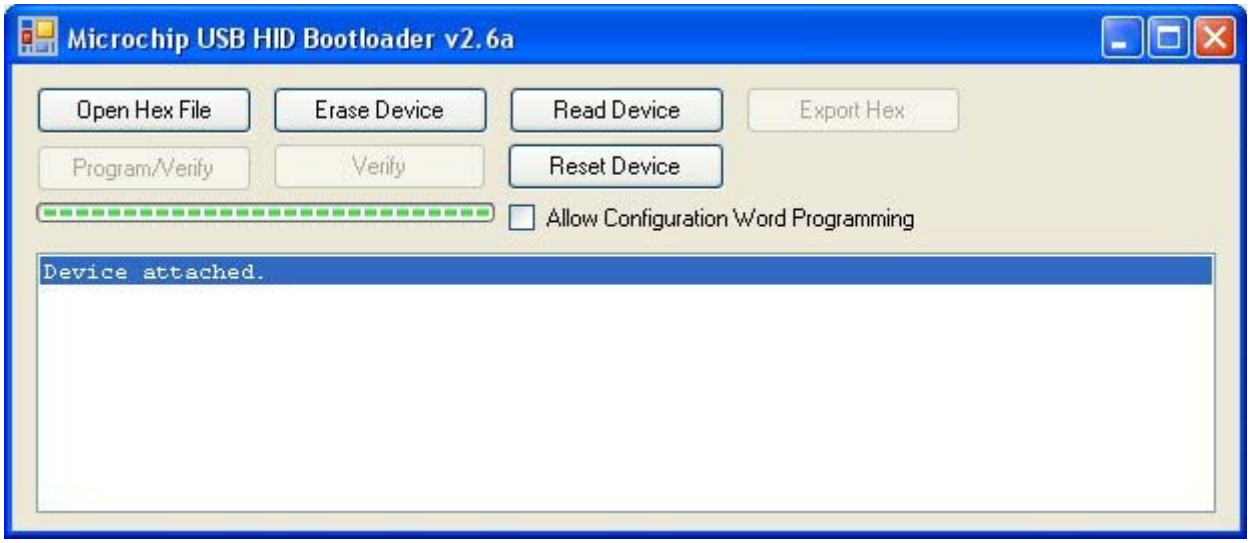
Software Requirements
To use the DEV modules you will need at least the following:
MPLAB Microchips IDE,
A compiler for your selected module,
Microchip Application Libraries.

If you don't have them, you should go to www.microchip.com and download and install them now.

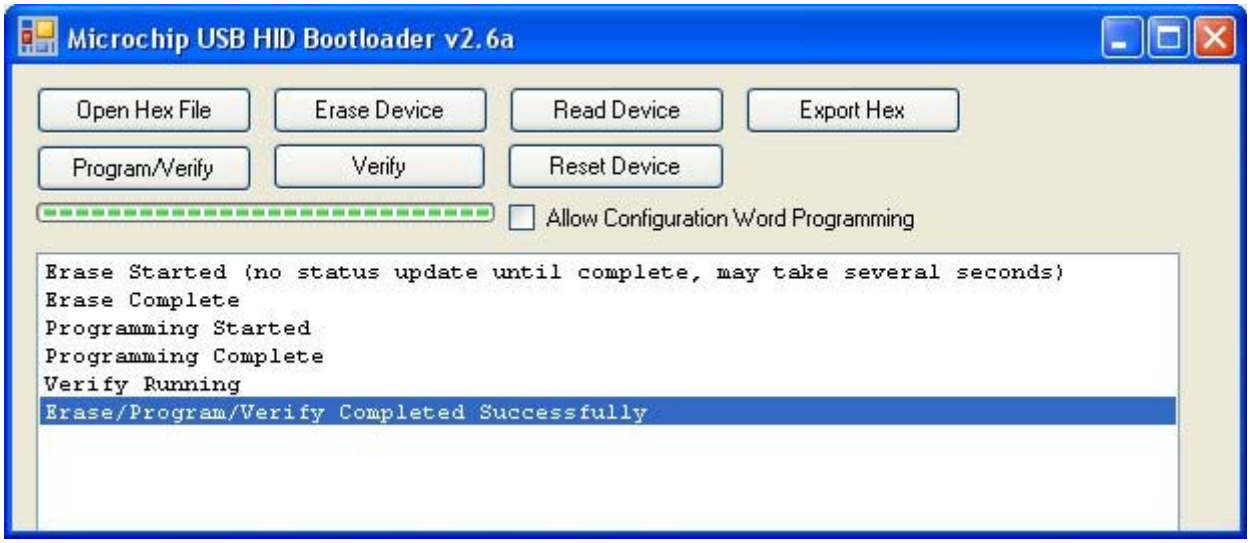
Reset Controller
The reset controller will reset the module to application mode (where it runs your program) or into boot-loader mode. A short press will reset the module into application mode, as will a power-on reset. A longer press of greater than about 0.5 Second (actually 460mS) will reset it into boot loader mode. The Green LED indicates application mode and the Red LED indicates boot loader mode, but remember your application can do anything it wants with the LEDs, so... .. . be careful!

Boot Loader
The built in boot loader is the one provided by Microchip as part of the Application Libraries. We've hacked it just a bit to control the LEDs and to use pin1 (RG1 on the PIC18, RG6 on the PIC24 and PIC32) to monitor application/boot mode from the reset controller. You will need to download the Microchip Application Libraries as they contain "HIDBootLoader.exe". This is the PC side driver program which downloads your software to the modules. If you installed the libraries in the default position it will be here:
C:\Microchip Solutions\USB Device - Bootloaders\HID - Bootloader\HIDBootLoader.exe

When you first power up the Green LED will be on, the Red LED will be flashing and all other pins will be high impedance. This is a very simple application program we load after testing the module in our workshop. To download your own program you must first put the module into boot-loader mode. Do this by pressing the reset button for more than 0.5 seconds until the Red LED lights. Now run HIDBootLoader.exe and you should see:



Open the hex file for your project and press Program/Verify. This will down load your program into the module.



Now briefly press the reset button or click "Reset Device". This will reset the module and run your application.

Examples
We have some starter projects for you to try.
PinTest is a program which sets one pin low at a time and cycles through all 47 I/O pins. Wiring an LED via a 390 ohm resistor to 3.3v will make a nice test for the I/O lines.
DemoToggle is the simple Green LED flashing program that was in the module when you received it. It also demonstrates the use of a timer interrupt.
DemoCDC is a USB com port example (from the Microchip Application Library). It sets the module as a com port and echoes back each character you send it incremented by 1. 'A' comes back as 'B'.
Bootloader is the boot loader that is already programmed into the module when you purchased it. We've included it in case you need to modify it or re-program the module.

Compiling programs to run with the boot-loader
The boot loader occupies internal program memory:
PIC18, 0x0000 - 0x0FFF. Application programs start at 0x1000. High/Low interrupt Vectors are at 0x1008/0x1018
PIC24, 0x0400 - 0x13FF. Application programs start at 0x1400.
PIC32, 0x9D000000 - 0x9D004FFF. ebase is at 0x9D005000 and application programs starting at 0x9D006000.
Microchip provides specific linker scripts so you do not need to be concerned with these. We have provided those scripts in the example project folders.

For the PIC18 and PIC24 modules the linker script must be included in the project.
The PIC32 linker script just needs to be in the project folder. Don't add it to the project or you will get build errors.

Using PICKIT3 or other programmer
It is also possible to use Microchips Pickit3 Programmer/Debugger with the modules. In this case you will not use the bootloader and will erase it when you program your stand alone code into the module. You can always get the bootloader back by re-programming the module with the appropriate bootloader, included with the start projects above.