



# RADIX SERIES PIC DEVELOPMENT SYSTEM

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Thankyou for purchasing one of HavenTechnik's products. The following information will get you started with using your purchase. If at anytime further assistance is needed, please email: [contactus@haventechnik.com](mailto:contactus@haventechnik.com).

## Introduction

The RADIX, available from [HavenTechnik](#) is a PIC development board designed to assist with rapid development. The RADIX is available a compact form supporting a 28 PIN device which offers a number of extensible features.

## PIC Device

The current revision of the PCB offers the PIC18F25K22. The device offers the following features internally.



The device is surface mount soldered onto the PCB.  
Permanent alteration of the PCB will void the warranty.

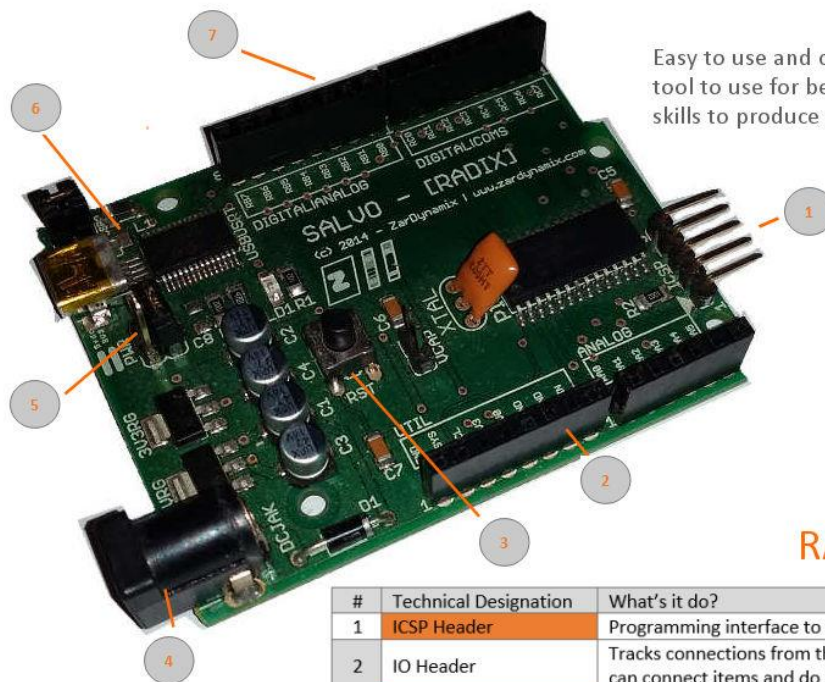
The following features list is from the Microchip website. For more details, [click here](#).

- C Compiler optimized architecture/instruction set
- Data EEPROM to 1024 bytes
- Linear program memory addressing to 64 Kbytes
- Linear data memory addressing to 4 Kbytes
- Up to 16 MIPS operation
- 16-bit wide instructions, 8-bit wide data path
- Priority levels for interrupts
- 31-level, software accessible hardware stack
- 8 x 8 Single-Cycle Hardware Multiplier
- Sleep mode: 100 nA, typical
- Watchdog Timer: 500 nA, typical
- Timer1 Oscillator: 500 nA @ typical 32 kHz
- Factory calibrated to  $\pm 1\%$
- Software selectable frequencies range of 31 kHz to 16 MHz
- 64 MHz performance available using PLL
- no external components required
- Four Crystal modes up to 64 MHz
- Two external Clock modes up to 64 MHz
- 4X Phase Lock Loop (PLL)
- Secondary oscillator using Timer1 @ 32 kHz
- Allows for safe shutdown if peripheral clock stops
- Two-Speed Oscillator Start-up
- Full 5.5V operation (PIC18F2XK22/4XK22)
- Low voltage option available for 1.8V-3.6V operation (PIC18LF2XK22/4XK22)
- Self-reprogrammable under software control
- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Programmable Brown-out Reset (BOR)
- Extended Watchdog Timer (WDT) with on-chip oscillator and software enable
- Programmable code protection
- In-Circuit Serial Programming™ (ICSP™) via two pins
- In-Circuit Debug via two pins
- 10-bit resolution

17 analog input channels (PIC18F/LF2XK22)  
28 analog input channels (PIC18F/LF4XK22)  
Auto acquisition capability  
Conversion available during Sleep  
Programmable High/Low Voltage Detection (PLVD) module  
Up to 28 channels for button, sensor or slider input  
Two rail-to-rail analog comparators  
Comparator inputs and outputs externally accessible and configurable  
Programmable On-chip Voltage Reference (CVREF) module (% of VDD)  
Selectable on-chip fixed voltage reference  
High current sink/source 25 mA/25 mA  
Individually programmable weak pull-ups  
Individually programmable interrupt-on-pin change  
Three external interrupt pins  
Up to four 16-bit timers/counters with prescaler  
Up to three 8-bit timers/counters  
Dedicated, low-power Timer1 oscillator  
Up to two Capture/Compare/PWM (CCP) modules  
One, two or four PWM outputs  
Selectable polarity  
Programmable dead time  
Auto-shutdown and Auto-restart  
PWM output steering control  
3-wire SPI (supports all 4 SPI modes)  
I2C™ Master and Slave modes (Slave mode with address masking)  
Supports RS-232, RS-485 and LIN 2.0  
Auto-Baud Detect  
Auto Wake-up on Start bit

## Getting Started

Shown in the image below is the breakdown of the RADIX and the key items that make up the product.



Easy to use and compact, the RADIX is an ideal tool to use for beginners and those who have the skills to produce great projects.

### RADIX - PIC18F25K22

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www.haventechnik.com

#	Technical Designation	What's it do?
1	ICSP Header	Programming interface to load code
2	IO Header	Tracks connections from the board edge to the MICRO so that you can connect items and do awesome thing
3	Reset Button	Resets the micro, which resets the program to start again
4	DC Power Plug	Allows you to power you Radix separately
5	Power Jumper	Allows you to choose between 3Volt lower power and 5 Volt normal powered operation
6	USB to UART Bridge	Interfaces your Radix to a normal PC for USB powered serial communication and boot loading / programming code onto the Radix
7	IO Header	Tracks connections from the board edge to the MICRO so that you can connect items and do awesome thing

### ICSP Header

ICSP or in-circuit Serial Programming is the method used to load the compiled code onto the device.



The device is bootloader capable.

### IO Headers

The IO Headers link the exterior of the PCB directly to the device. The device is rated to handle 5V0 at 20MA when driving an output. Jumper type cables can be used to connect the PCB to a breadboard or external devices.

### Reset Button

The reset button will reset the device, restarting the code installed on the device.

When the button is pressed, the voltage applied to the !MCLR pin is brought low and then when released the voltage is returned to the previous 3.3VDC | 5VDC.

### DC Power Plug

The RADIX power requirements are listed below.

- The DC plug is a 2.1MM jack.
- Input voltage is > 5VDC and <9VDC.
- The rated current for the PCB is 1 Amp.

### Power Jumper

The RADIX can be operated at two onboard voltages. The PWR jumper is used to select the voltage required, either 3V3dc or 5V0dc. The PCB is labelled indicating which jumper selection sets the PCB voltage.

### USB to UART Bridge

The RADIX has an FTR232 included on the PCB. This device converts the USB data to standard RS232 voltage levels. The PCB is USB self-powered, with a ferrite bead in place to protect the PCB from sudden spikes.

The maximum current that can be supplied by a USB Port is 500mA. This restricts the PCB usage in an application where more current is required. When this is the case, it would be advisable that either the devices connected to the RADIX have their own power supplies but operate at the same voltage or that the onboard PSU be used, and the PCB is powered by an external DC power source.

## Creating Projects and Applications

To create an application two items are needed once you have the RADIX. A software application to create and compile the code and a hardware tool to install the code onto the device.

### Developing Code

Code is written using an IDE or integrated Design Environment. There are a number of options available various software vendors.

Microchip offers MPLABX which is free of charge and can be downloaded from their website. This tool will enable you to develop code for all their device available including the PIC18F25K22. Once the code has been compiled into a Hex file a programming tool is needed to physically install the hex file onto the PIC.

An alternative to MPLAB X is MikroC from MikroElektronika. This is a free to use option with a 2 K word limit on the code development.

### Programming the Device

The PICKIT4 is available from Microchip or various other resellers. This device is used to flash the memory of the PIC and install the code onto the device.

MikroElektronika also supplies a MikroProg programming tool for PICs. The tool integrates directly with their compiler allowing ease of programming of the device.

## The Legal Stuff

### Disclaimer

No liability is accepted for loss or damage to the user's or operator's person, their property while the device is in use or left unattended. The device is not certified for medical applications and must not be used in these applications.

### Warranty

The product mentioned in this document is manufactured and tested to operate as described. Any alteration to the device by using standard electronic tools by either adding, removing, or tampering with the unit constitutes a void in the warranty.

### Appendix

No content at present.