

# Pic Microprocessors

For Hams

# Why use a microprocessor

- Very Cost Effective
- Eliminates a lot of circuitry
- Implement Complex Functions
- Interface to Computers

# Manufactures

- Microchip - PIC
- Atmel
- Phillips
- NEC
- Freescale

# Typical Microprocessor

- Clock Circuit
- Memory
- Flash
- Programming and Debugging
- Interfaces

# Interfaces

- Serial Ports
- USB Ports
- Ethernet Port
- I2C - SPI
- Analog
- Digital Pins

# Why Use Pic

- Several Families
- Inexpensive
- Many Configurations
- Through Hole Packages
- 5 Volt operation
- Low Power

# PIC Families

- PIC18F4550
- PIC18F14K50
- PIC18F66J50
- PIC24FJ256GB110
- PIC32MX460F512L

# PIC18F4550

- 5 Volt
- 32 K Flash - 1 K Ram
- Lots of Packages
- 24 Mips - More or Less
- USB 1.1 and 2.0



# PIC24FJ256GBI10

- 3.3 Volt
- 32 K Flash
- USB Device or Host
- 4 Serial Ports
- Dynamic Pin Assignment

# Basic Circuit

- Power - 5 or 3.3 Volts
- Clock
- Programming and Debugging
- USB
- Digital Pins
- Analog Pins

# GPIO Pins

- TTL Level
- 3.3 Volt - Not TTL Level
- Inputs or Output
- Weak Pullup

# Analog Pins

- 0 - 5 Volts
- 10 Bit A to D
- Multiplexed

# Analog Output

- 12 bit D to A
- Limited

# Serial Ports

- TTL Level
- TXD and RXD
- Other Functions use GPIO Pins
- USART

# USB Port

- Device Supported
- 16 End Points - 32 on Most
- Some Support Host Mode
- All Require Descriptor Tables

# USB Devices

- HID - Simple and No Drivers
- CDC - Serial Port
- Audio - Should Keep You Busy



# USB Descriptors

- Main Configuration
- Device ID and Manufacture
- Device Type
- End Points

# Programming Environment

- Download Development Tools
- Not Necessary to Buy
- Windows Environment
- Programmer - PicKit/3

# Set Hardware Parameters

- Clock Speed and Processor Speed
- Requirement for USB
- Compile
- Load
- Debug

# USB Code

- Parameter Tables
- HID
- CDC
- USB HID Loader

# Hardware Consierations

- Should Use Printed Circuit
- Ground Plane
- Bypass Power
- Short Clock Runs
- Pullup Resistors

# Pic Processors in Ham Radio

- WinKey
- PSK Meter
- K2

# Resources

- <http://www.microchip.com>
- <http://www.docstoc.com/docs/23352174/Get-Started-with-PIC-USB-Connectivity>
- <http://www.beyondlogic.org/usbnutshell/usb5.htm>
- Google