

# ***PIC Microcontroller Kit with LCD***

This modular kit, based on the latest generation Microchip PIC16F1789 microcontroller, starts with the basics and takes you through understanding how microcontrollers work, assembly language and C programming for microcontrollers to developing your own embedded projects. Everything you need in one kit!



## ***PIC Microcontroller Programming Kit***

This PIC kit includes everything you need to learn about PIC microcontroller programming, including, comprehensive HTML tutorials, a book on CD, MPLAB X development software including XC8 C compiler, hardware boards and a PICKit3 programmer and debugger.

It is based on one of the new PIC microcontrollers from Microchip, PIC16F1789, which is far better (and cheaper) than older PIC microcontrollers such as PIC16F877. It teaches you PIC microcontroller programming from the beginning and covers all you need to know to build your own projects and learn embedded C programming.

## ***PIC Microcontroller Course***

The browser based tutorials, linked to the book and many sample projects, teach you all you need to know about PIC microcontrollers and how to write programs in assembly language and C, using the MPLAB X professional integrated development environment (IDE). You will discover how the PIC microcontroller actually works, which is more work at the beginning but you understand how to be an effective embedded system programmer.

The PIC tutorial covers these topics

- PIC Microcontroller layout and structure
- Numbering systems and logic
- Program planning
- How to use MPLAB X IDE properly
- PIC programming in assembly language
- PIC programming in embedded C
- How to download and debug a project
- How to setup and use the PIC microcontroller peripherals
- Discover how to interface UART, LCD, keypads, sensors and much more
- Learn to re-use code and library files to create a complex project
- Create your own projects

## **Microchip PICKit3**

This PIC kit has a genuine Microchip PICKit3 debugger and programmer. The PICKit3 can just download code to the PIC16F1789 or be used as an In Circuit Emulator (ICE) to let you debug your code in real time. A debugger is an essential tool for effective code development, in C or assembler.

PICKit3 can also be run from its own separate software, which makes it ideal for small scale production as you don't have to use MPLAB X for programming. The PICKit3 can power the target board, therefore no external power supply is required.



## **Modular Hardware**

This PIC kit allows extra modules to be connected to the main board when you need them and a complete, custom, project can be assembled in one simple stack ready to fit into a project box. The training board comes with the kit and this can form part of the final project or be removed.

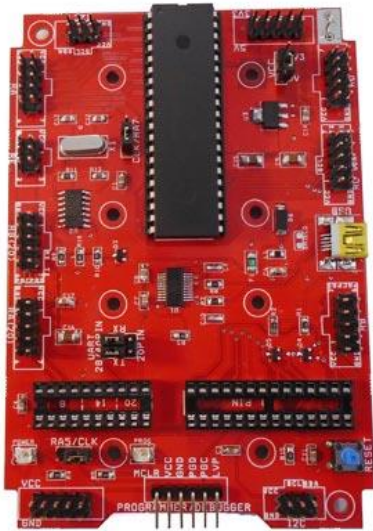


Extra modules, sensors, keypad, LCD and prototyping boards come with mounting pillars and cables and can simply be fitted to the main board or built onto other modules as needed.

## **PIC Main Board**

The main board is compact but has sockets for all 8, 14, 20, 28 and 40-pin PIC microcontrollers, so you can change to a different device if required. It has a 40-pin PIC16F1789 fitted - see below for the advantages of this device. It has an 8MHz crystal but the PIC16F1789 configuration bytes can be set to

run clock at 32MHz. The PIC board has expansion headers for all the port pins and to connect other modules, such as the training board and LCD. It has a USB connector that appears as a virtual serial port on your PC unlike most microcontroller boards that are still fitted with a standard 9-pin serial port. The board can also be powered through this USB connector. It has I2C bus connectors and 3.3 and 5V power rails.



### PIC Training Board

The PIC training board is mounted onto the main board using pillars and ports are connected using ribbon cables to give complete flexibility. It has 8 switches and LEDs, analog voltage pot, buzzer, serial EEPROM memory socket and I2C bus interfaces. Sample code in assembler and C covers these features and many more and the tutorials describe them completely.



### PIC16F1789 Benefits

This is one of the latest Microchip PIC 40-pin microcontrollers and bears about as much resemblance to the once popular PIC16F877 as a modern car does to the Model-T Ford.

- Faster - up to 32MHz
- More program memory - 32KB of code space, not 8KB
- More SRAM data memory - for more efficient C code
- Lower power consumption and wider voltage range

- More peripherals, protection and brownout features
- AND it is much cheaper

It compares favorably to the AVR range and eats the ATmega328P commonly used by Arduino kits for breakfast.

### ***Modular design***

This PIC kit is modular so once you have used the training board to learn PIC microcontroller programming, you can just connect extra modules like a LCD or keypad or use the prototyping boards to create your own circuits. Kanda sell a range of accessory boards including sensors for gas, temperature, humidity, soil moisture and many more. Other modules can also be connected so you can create your own project using the same hardware - the kit that grows with you.

### ***Kit Overview***

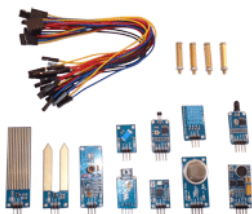
- MICRO-X Motherboard with PIC16F1789 device
- MICRO-X training board
- MICRO-X 16 x 2 LCD
- PICKit3 Debugger and Emulator
- Cables, leads and mounting pillars
- CD with tutorials, sample projects, book, datasheets, guides, schematics and more
- MPLAB X and XC8 C compiler for free download

### ***Accompanied Starter Kit Accessories***

***Power Supply 5V 2.4A USB***



***MICRO-X Sensor Pack***



Complete sensor pack for MICRO-X kit. Comes with mounting pillars and 3 and 4 way connector leads. MPLAB X and STK200-X kits include C code examples for these sensors.

### **Sensor Types:**

11 different sensors with sample MPLAB X projects covering a range of measurements

### Gas Sensor



Sensitive to LPG, natural gas, coal gas and output voltage increases with the concentration of the measured gases. Analog and digital outputs with adjustable sensitivity, 2.5 to 5V with dimensions of 40.0mm \* 21.0mm. Ideal for gas detector.

### Flame Sensor



Sensitive to flame spectrum, with analog and digital outputs. For detecting fire and flames. Note that the sensor itself is not fireproof.

- Spectrum range: 760nm ~ 1100nm
- Detection angle: 0 - 60 degree
- Power: 3.3V ~ 5.3V
- Operating temperature: -25°C ~ 85°C
- Dimension: 27.3mm \* 15.4mm
- Mounting holes size: 2.0mm

### Hall Sensor



For motor speed measurement, object position detection, smart car or electronic bricks. Adjustable sensitivity, with digital and analog outputs. Voltage 2.3V ~ 5.3V, dimension: 27.0mm \* 15.5mm.

### Infrared Reflective Sensor



For robot path tracking, obstacle-avoiding car or pipeline counter. Adjustable sensitivity, with digital and analog outputs. Voltage 3.0V ~ 5.3V, dimensions 25mm \* 15.9mm.

### Laser Sensor



For obstacle detection, pipeline counter, smart robot or obstacle-avoiding car. With boost circuit and signal output indicator. Effective distance: 0.8m (typ), 1.5m (max), Voltage 2.5V ~ 5.0V and dimensions of 47.7mm \* 17.9mm.

### Moisture Sensor



For auto watering systems, flowerpot soil moisture detection or auto pouring systems. Easy to insert into the soil with output voltage increasing with the soil moisture level. Measures analog output with detection depth of 38mm, 2.0V ~ 5.0V and dimensions of 20.0mm \* 51.0mm.

### Sound Sensor



For ambient sound detection and sound level detection. Features onboard audio power amplifier LM386 with audio signal gain up to 200 and adjustable accuracy. Analog and digital output, Mic sensitivity: 52dB, Frequency range: 50Hz ~ 20KHz and Voltage: 3.3V ~ 5.3V.

### Temperature-Humidity Sensor



This is a calibrated digital temperature and humidity module with onboard sensor DHT11. It can be used for detecting ambient temperature and humidity, through the standard single-wire interface.

Temperature Resolution: 1°C, Accuracy: ±2°C, Measuring range: 0°C ~ 50°C Humidity Resolution: 1%RH, Accuracy: ±5%RH (0~50°C), Measuring range: 20%RH ~ 90%RH (25°C). Operating voltage: 3.3V ~ 5.5 V.



### Tilt Sensor



Detects shake signal. For Shake detection, Guard alarm, Smart car or Electric bricks. Dimension: 19.0mm \* 16.0mm, operating voltage: 3.0V ~ 5.5 V. Simple digital output.

### UV Sensor



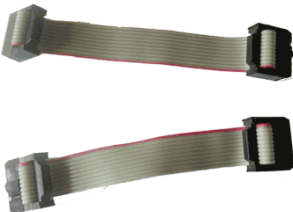
For Ultraviolet tester, Outdoor ultraviolet detector, Germicidal lamp. Features output voltage change with ambient ultraviolet intensity increase and onboard amplifier circuit with adjustable amplification factor and analog output signal. Response spectrum: 200nm-370nm, Dimension: 22.0mm \* 16.0mm and Voltage: 3.3V ~ 5.0V.

### Liquid Level Sensor



For water level alarm, output voltage increases with immersion depth using analog output. Detection depth: 48mm, Power: 2.0V ~ 5.0V, Dimensions: 19.0mm \* 63.0mm.

### Two 10-way Jumper Leads



Set of 2 jumper leads for connecting pin headers on starter kits to external boards, with 10-way pin headers (5 x 2 format).

2 leads with 10-way pin header sockets to fit port headers on AVR and PIC starter kits, including STK-PIC, PIC-TRAIN, all STK200 and STK3000 kits. They are wired pin 1 to pin 1.

These leads are 3 inches or 75mm long.

### ***MICRO-X 4x3 Keypad***

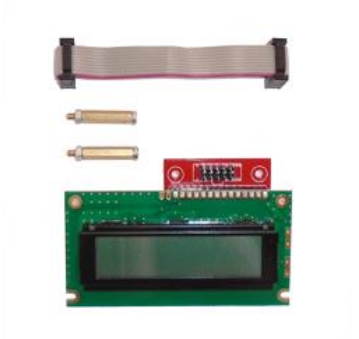


4 x 3 keypad (0...9, \* and # keys) with 10 way connector. Supplied with 10-way ribbon cable for connection to port header on MICRO-X microcontroller board. Mounting pillars are supplied for connection.

MICRO-X kit has tutorials and MPLAB X PIC assembler and C code projects for reading keypad.

Dimensions: 62 x 50 x 10mm (2.5 x 2 x 0.3")

### ***MICRO-X LCD Module***



16 x 2 character LCD module with mounting holes, pillars and 10-way ribbon cable for connection to MICRO-X board. MICRO-X kit comes with tutorials and sample code to program the LCD in assembler and C code. This module is green. LCD screen: 61 x 16mm, PCB size: 83 x 45mm.

### ***5V Stepper Motor + ULN2003 Driver Board***



- Voltage: DC 5V - 12V
- 5 Line 4 phases can be driven by ordinary uln2003 chip can also be connected in phase 2 development board used for Supporting the use of a direct plug and easy to use stepper motor used in the development board.
- Stepper motor driver board with ULN2003.
- A, B, C, D four-phase LED indicates the status of the stepper motor work.



- Stepper motor with a standard interface, when used directly pluggable
- Board Size: 3.2 × 3.5 cm.
- Stepper motor Size: 4.2 × 1.9 cm
- Reduction Ratio: 1/64
- Step Torque Angle: 5.625°/64

### ***Servo Motor FS90R***



The FS90R is a micro-sized servo specifically for continuous rotation. It can be controlled using a direct connection to a single microcontroller I/O line without any additional electronics, which makes it a great miniature actuator for beginner robotics projects.

- Operating Speed: 110RPM (4.8V) , 130RPM (6V)
- Stall Torque: 1.3kg.cm/18.09oz.in(4.8V) , 1.5kg.cm/20.86oz.in(6V)
- Operating Voltage: 4.8V~6V
- Control System: Analog
- Direction: CCW
- Operating Angle: 360degree
- Required Pulse: 900us-2100us
- Bearing Type: None
- Gear Type: Plastic
- Motor Type: Metal
- Connector Wire Length: 20cm
- Dimensions: 23.2×12.5×22mm
- Weight: 9g

### ***Summary***

This microcontroller programming kit is the ideal Arduino alternative. Unlike Arduino it operates in the real world without hiding from you all the basics of embedded system programming. It teaches you how to use professional development environments and debug tools, teaches you assembly language and C programming as well as introducing all the skills you need to do your own microcontroller programming. The kit has everything you need to create your own projects.

*Made in UK*