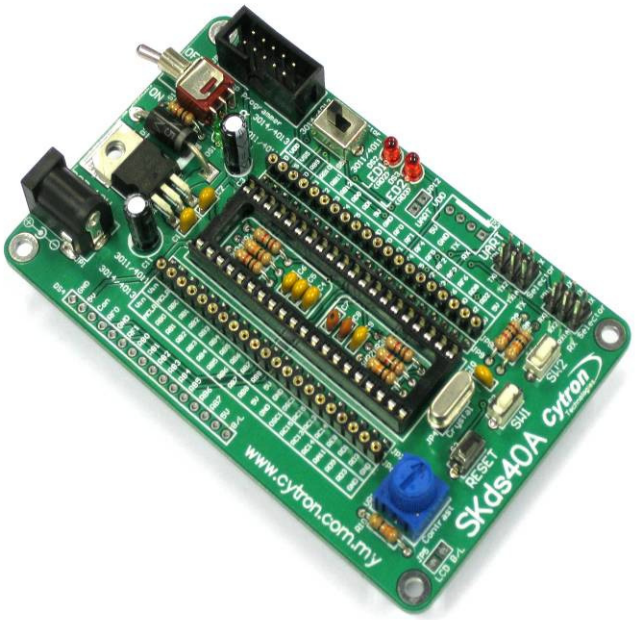
# 40 PINS dsPIC START-UP KIT

# SKds40A




# User's Manual

## V1.0

## March 2011

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# 1. INTRODUCTION AND OVERVIEW

SKds40A is microcontroller start up kit designed for Microchip 40-pin dsPIC30F. It is designed to support dsPIC30F3011, dsPIC30F4011, dsPIC30F3014 and dsPIC30F4013. This board comes with basic components for user to begin project development. However, all interface and program should be developed by user. It offers plug and use features.

Features:

- Every board is fully tested before shipped to customer
- Compact, powerful, flexible and robust start-up platform
- Suitable for hobbyists and experts
- Save development and soldering time
- No extra components required for the dsPIC to function
- **All I/O pins** are nicely labeled to avoid miss-connection by users
- **Ready Connector for UIC00A/B** (low cost USB ICSP PIC Programmer) - simple and fast method to load program
- No more frustrated work plugging dsPIC out and back for re-programming
- With UIC00A/B, program can be loaded in less than 5 seconds
- Maximum current is 1 A.
- 2 x Programmable switch
- 2 x LED indicator
- Socket for external crystal oscillator, it is changeable.
- Ready with pad for parallel 2x16 LCD (optional)
- Jumper to select UART1, UART1A (Alternative) and UART2
- Ready with pad for UC00A (USB to UART Converter)
- And all the necessities to eliminate users difficulty in using dsPIC
- **Dimension:** 102mm x 63mm

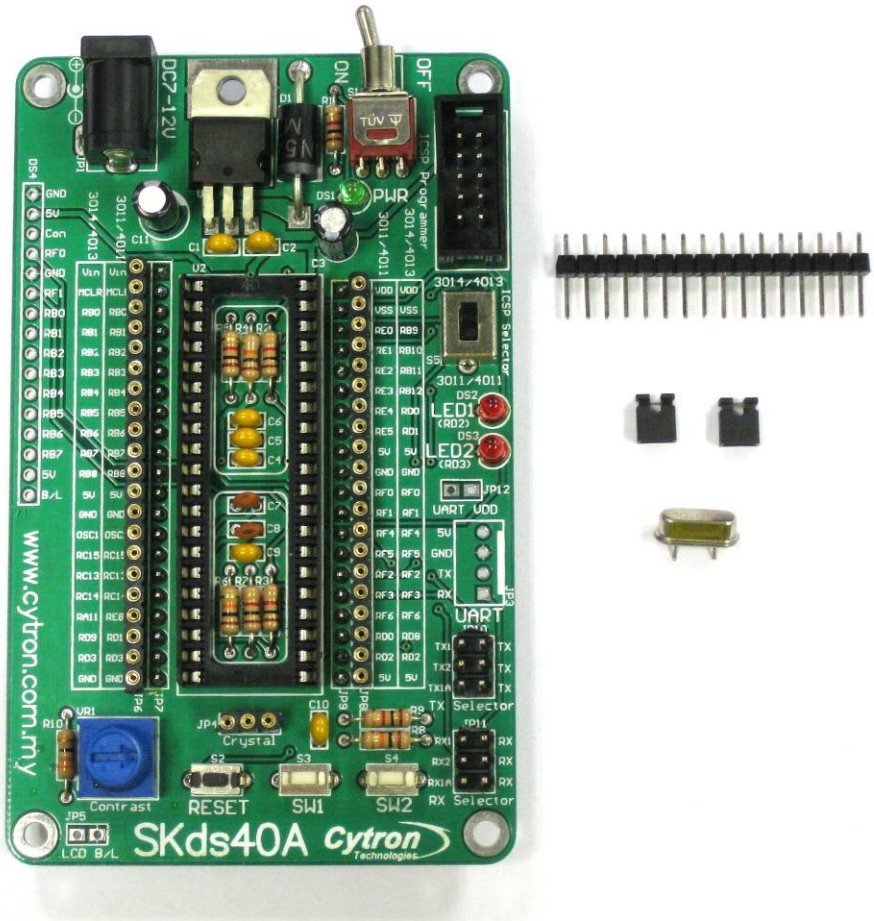
Users are able to utilize the function of dsPIC by directly plug in the I/O components in whatever way that is convenient to user. With UIC00A/B connector on board, user can start developing projects and have fun with this kit right away. This kit comes **WITHOUT** dsPIC microcontroller to provide the freedom for user to choose dsPIC type.

This document explains the method to use SKsd40A.

## 2. PACKING LIST

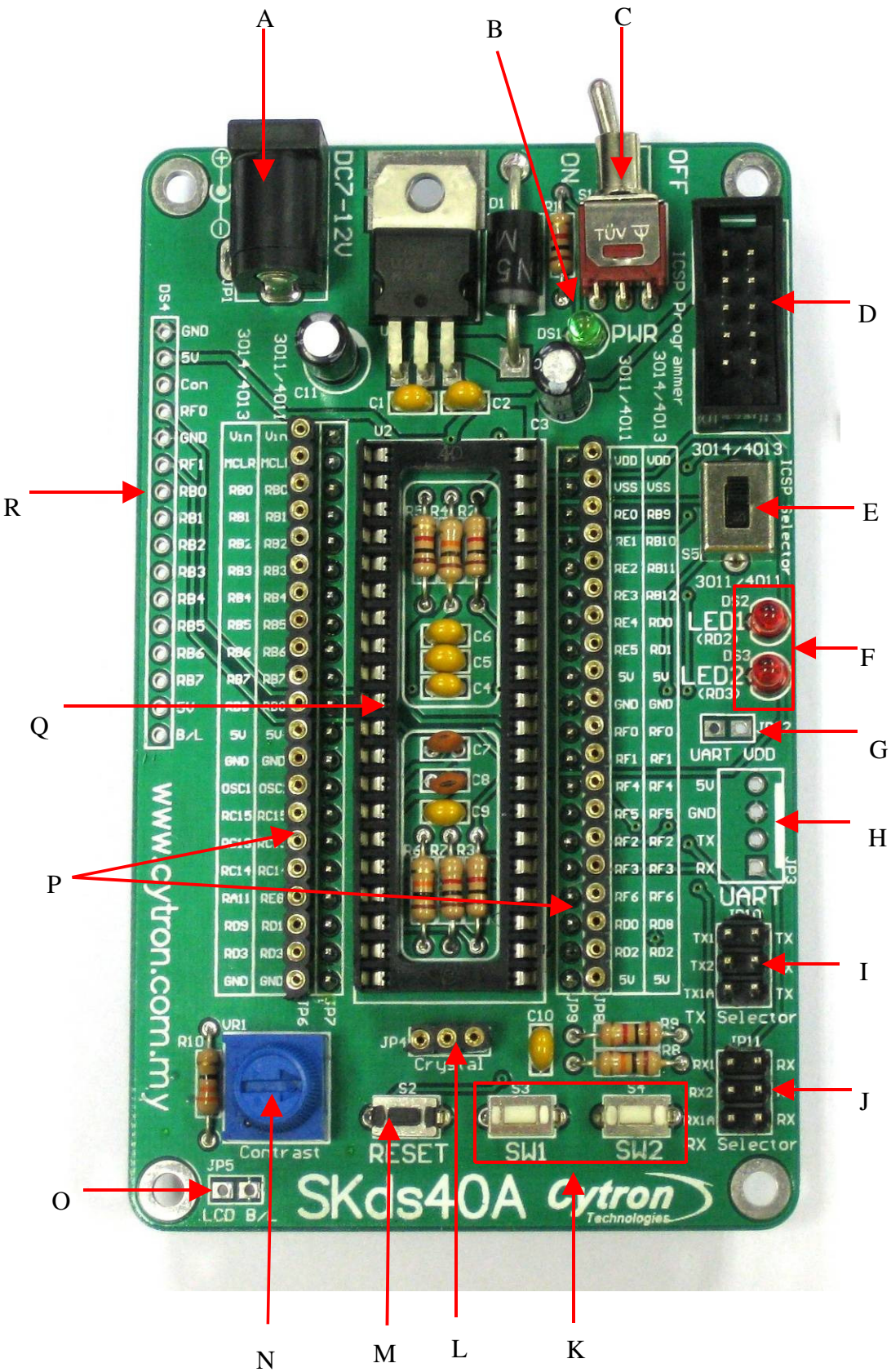
Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.




1. 1 x SKds40A board with all components shown soldered
2. 1 x 16 Header pin for 2x16 characters LCD.
3. 1 x 10M Hz Crystal
4. 2 x mini jumper, for UART selector (TX Selector and RX Selector)
5. dsPIC – Not included, please purchase separately from Cytron website
6. UIC00A/B – Not included, please purchase separately from Cytron website
7. User's Manual – Not included, please download from Cytron website

## 3. BOARD LAYOUT



| Label | Function | Label | Function |
|---|---|---|---|
| **A** | DC power adaptor socket | **J** | Rx Selector |
| **B** | Power indicator LED | **K** | Programmable Push Button |
| **C** | Toggle Switch for power supply | **L** | Turn pin for external crystal oscillator |
| **D** | Connector for UIC00A/B Programmer | **M** | Reset button |
| **E** | ICSP Selector | **N** | LCD contrast |
| **F** | Programmable LEDs | **O** | JP5 for LCD Backlight |
| **G** | UART Power | **P** | Header pin and turn pin |
| **H** | UART Connector | **Q** | 40 pin IC socket for dsPIC MCU |
| **I** | Tx Selector | **R** | Pads for 2x16 Parallel LCD |

**A** – DC power adaptor socket for user to plug in DC adaptor. The input voltage should be in the range from 7 to 15V.

**B** – Power indicator LED. It will light ON as long as the input power is correctly connected and sufficient to power the on board devices.

**C** – Toggle switch to On/Off the power supply from DC adaptor.

**D** – 2x5 box header for UIC00A/B, USB ICSP PIC Programmer.

**E** – ICSP selector to select dsPIC used for program loading.

**F** – 2 LEDs (connected to RD2 and RD3) as active High output for dsPIC MCU. These LEDs are controllable from dsPIC MCU.

**G** – Reserved for supply VDD power to UART. A mini jumper is set at JP12 for UART VDD power.

**H** – Reserved for UART communication, pin arrangement is compatible with UC00A.

**I** – Tx selector used to select Tx pin used for UART communication.

**J** – Rx selector used to select Rx pin used for UART communication.

**K** – 2 x Push button connected to pin 17 (RA11 for dsPIC30F3014/4013, RE8 for dsPIC30F3011/4011) and pin 23 (RD8 for dsPIC30F3014/4013, RD0 for dsPIC30F3011/4011). This is extra input button for user. It can be programmed as input switch.

**L** – Turn pin is provided for crystal. 10M Hz is default crystal provided in SKds40A. However, this crystal can be replaced with other preferable crystal.

**M** – Push button with the function of Reset for dsPIC MCU.

**N** – 5K of trimmer to tune LCD contrast.

**O** – JP5 is provided for LCD Backlight. LCD will have backlight if this pin is shorted.

**P** – Consist of several columns of header pin and turn pin. Header pin provide connector for user to solder SKds40A to prototype board and use the I/O of dsPIC MCU. Turn pin offer simple way to check voltage with multi-meter probe. 40 pins of dsPIC MCU are extended out to these pins. dsPIC30F3014/4013 have different pin distribution with dsPIC30F3011/4011. The pins distribution for dsPIC is labeled on the SKds40A. There is an extra pin on top of MCLR which is labeled as Vin, is connected to the input power.

**Q** - 40 pin IC socket for user to plug in 40-pin dsPIC MCU (16 bit). It can either be dsPIc30F3011, dsPIC30F4011, dsPIC30F3014 or dsPIC30F4013. **Please ensure the first pin is at the top side.**

**R** - Reserved for 2 x 16 parallel LCD. User may solder 2x16 LCD at this pad if want to use it.

Table below shows pin connection for **'Label R'** (2x16 Parallel LCD).

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 1 | GND | Ground | GND |
| 2 | VDD | Positive supply for LCD | 5V |
| 3 | Con | Contrast adjustment | Connected to a preset to adjust contrast |
| 4 | RF0 | Select register, select instruction or data register | Pin RS of LCD |
| 5 | GND | Ground | GND |
| 6 | RF1 | Enable LCD to read data from data port | Pin E of LCD |
| 7 | RB0 | LCD Data bus pin | Pin D0 of LCD |
| 8 | RB1 | LCD Data bus pin | Pin D1 of LCD |
| 9 | RB2 | LCD Data bus pin | Pin D2 of LCD |
| 10 | RB3 | LCD Data bus pin | Pin D3 of LCD |
| 11 | RB4 | LCD Data bus pin | Pin D4 of LCD |
| 12 | RB5 | LCD Data bus pin | Pin D5 of LCD |
| 13 | RB6 | LCD Data bus pin | Pin D6 of LCD |
| 14 | RB7 | LCD Data bus pin | Pin D7 of LCD |
| 15 | 5V | Backlight positive input | VDD |
| 16 | B/L | Backlight negative input | Connect to JP5 through a current limiting resistor |

Table below shows pin connection for **'Label L'** (Turn pin for crystal).

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 13 | OSC1 | Crystal | Turn pin (JP4) |
| 14/RC15 | OSC2 | Crystal | Turn pin (JP4) |

Table below shows pin connection for **'Label K'** (Push button).

**dsPIC30F3014/4013**

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 17/RA11 | SW1 | Digital Input | 'SW1' SWITCH |
| 23/RD8 | SW2 | Digital Input | 'SW2' SWITCH |

**dsPIc30F3011/4011**

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 17/RE8 | SW1 | Digital Input | 'SW1' SWITCH |
| 23/RD0 | SW2 | Digital Input | 'SW2' SWITCH |

Table below shows pin connection for **'H'** (UART).

**dsPIC30F3014/4013**

| Pin/Label | Name | Pin function | Connection |
|---|---|---|---|
| 25/RF3/U1TX | TX1 | UART 1 Transmit pin | TX pin of UART |
| 26/RF2/U1RX | RX1 | UART 1 Receive pin | RX pin of UART |
| 27/RF5/U2TX | TX2 | UART 2 Transmit pin | TX pin of UART |
| 28/RF4/U2RX | RX2 | UART 2 Receive pin | RX pin of UART |
| 15/RC13/UA1TX | TX1A | UART Alternative 1 Transmit pin | TX pin of UART |
| 16/RC14/U1ARX | RX1A | UART Alternative 1 Receive pin | RX pin of UART |

**dsPIC30F3011/4011**

| Pin/Label | Name | Pin function | Connection |
|---|---|---|---|
| 25/RF3/U1TX | TX1 | UART 1 Transmit pin | TX pin of UART |
| 26/RF2/U1RX | RX1 | UART 1 Receive pin | RX pin of UART |
| 27/RF5/U2TX | TX2 | UART 2 Transmit pin | TX pin of UART |
| 28/RF4/U2RX | RX2 | UART 2 Receive pin | RX pin of UART |
| 15/RC13/U1ATX | TX1A | UART Alternative 1 Transmit pin | TX pin of UART |
| 16/RC14/U1ARX | RX1A | UART Alternative 1 Receive pin | RX pin of UART |

Table below shows pin connection for **'Label D'** (ICSP Programmer).

**dsPIC30F3014/4013**

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 8/RB6 | PGC | In Circuit Serial Programming | Connector for UIC00A/B Programmer |
| 9/RB7 | PGD | In Circuit Serial Programming | Connector for UIC00A/B Programmer |

**dsPIC30F3011/4011**

| Pin | Name | Pin function | Connection |
|---|---|---|---|
| 25/RF3 | PGD | In Circuit Serial Programming | Connector for UIC00A/B Programmer |
| 26/RF2 | PGC | In Circuit Serial Programming | Connector for UIC00A/B Programmer |

## 4. PRODUCT SPECIFICATION

SKds40A is designed to offer starting up platform for development, the specification of dsPIC MCU used should be referred.

Absolute Maximum Rating

| Symbol | Parameter | Min | Max | Unit |
|---|---|---|---|---|
| Vin | Operating voltage for SKds40A | 7 | 15 | V |
| 5V | Output voltage from 7805 Voltage regulator | 4.75 | 5.25 | V |
| $I_{max}$ | Maximum output current from on board Voltage Regulator (5V) | - | 1 | A |

Under 16-bit product family of MCU, there are only 4 models come in 40-pins PDIP package that can be powered with 5V, other is either SMD or other package type. The 4 models of dsPIC supported by SKds40A are :

- dsPIC30F3011
- dsPIC30F4011
- dsPIC30F3014
- dsPIC30F4013

Note: Only 1 power supply should be provided to SKds40A.

## 5.0 INSTALLATION (SOFTWARE)

SKds40A is hardware platform which is independent from programming language. User may use Assembly Language, C Programming Language from any supported compiler. Anyway the sample source code provided is developed using MPLAB IDE and compiled with MPLAB C30 Compiler.

The MPLAB® C30 C Compiler for dsPIC DSCs is a full-featured ANSI compliant C compiler for the Microchip 16-bit devices: dsPIC30F and dsPIC33F. MPLAB C is a 32-bit Windows® console application as well as a fully integrated component of Microchip's MPLAB Integrated Development Environment (IDE), allowing source level debugging with the MPLAB REAL ICE™ Emulator, MPLAB ICD 2 In-Circuit Debugger and MPLAB SIM Simulator.

### 5.1 C30 Compiler Installation

C30 compiler Installation software can be downloaded at Cytron's website www.cytron.com.my. Please do install MPLAB IDE first before installing C30 compiler. To install MPLAB C30, run the setup program. If installing an MPLAB C30 upgrade, run the upgrade setup program downloaded from the Microchip web site. To create project and compile the source code, steps are same as using MPLAB with HI-TECH C Compiler, just choose Microchip C30 Toolsuite instead of HITECH Universal Toolsuite.

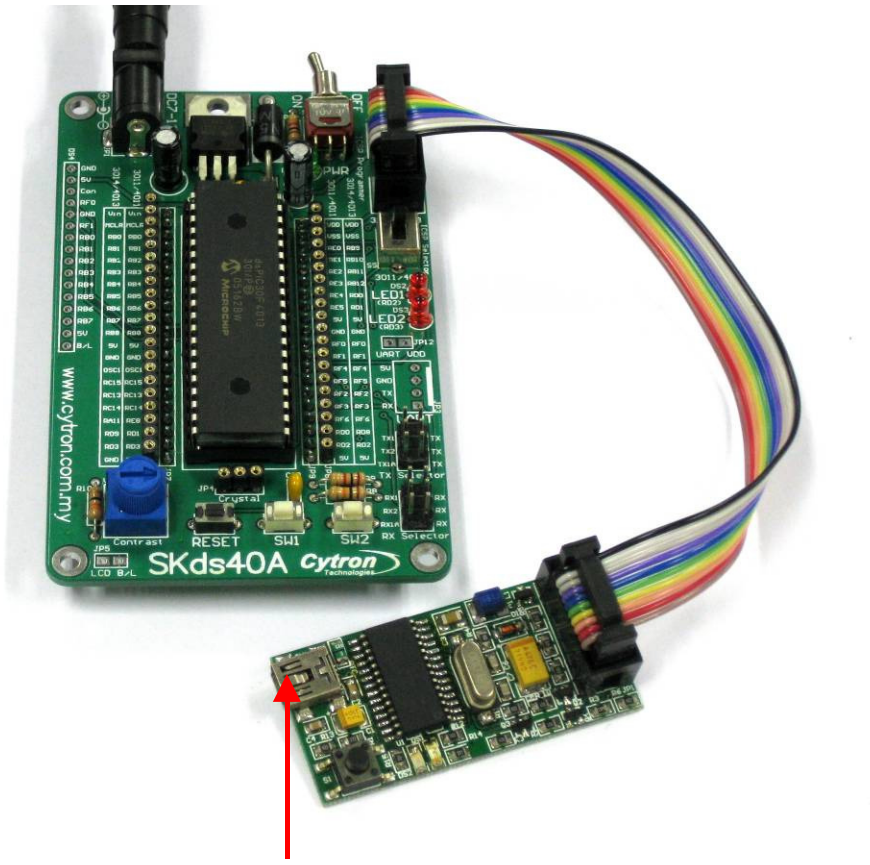
## 6.0 INSTALLATION (HARDWARE)

SKds40A come with UIC00A/B ICSP USB programmer connector to offer simple way for downloading program. UIC00A/B ICSP programmer is very easy and save plenty of development time.

### 6.1 Loading Program Using UIC00A/B Programmer

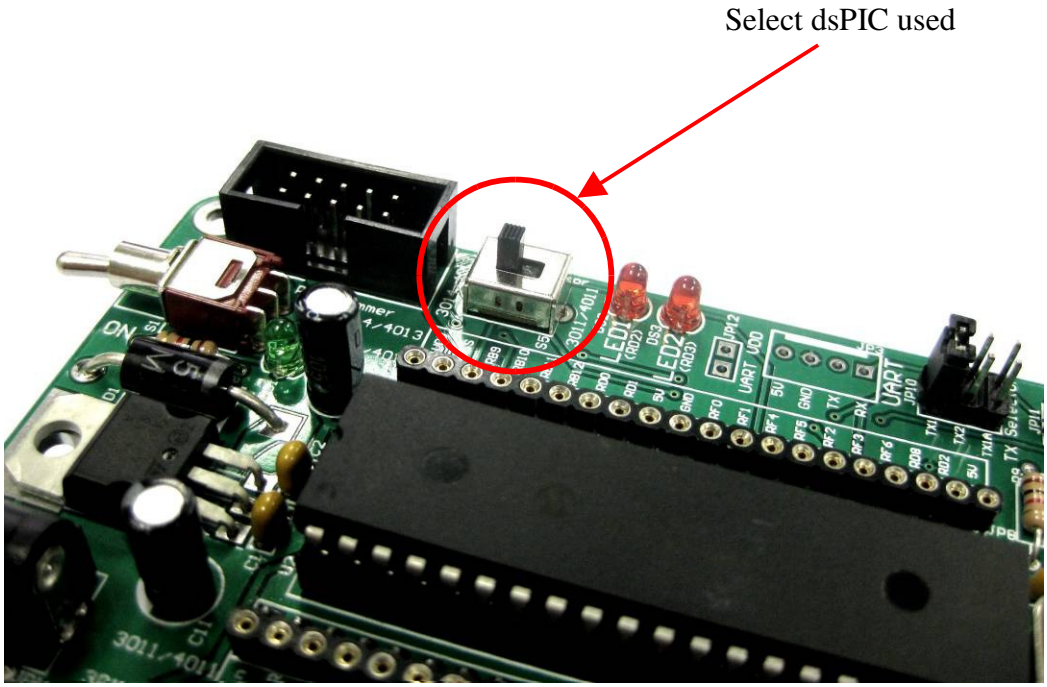
We have provided sample code to test the basic functionalities of SKds40A. Please download from the product page of SKds40A. Loading program to SKds40A will require a PIC programmer. We will show the commonly used UIC00A/B method.

1. Connect SKds40A as shown in following figure.




Connect to PC using USB mini cable

2. After plug in 40 pin dsPIC MCU (make sure the orientation is correct), select dsPIC used at ICSP Selector. SKds40A should be powered by **DC adaptor**. Now, the hex code is ready to be loaded to SKds40A. For the usage of UIC00A/B, please refer to UIC00A/B User's Manual.

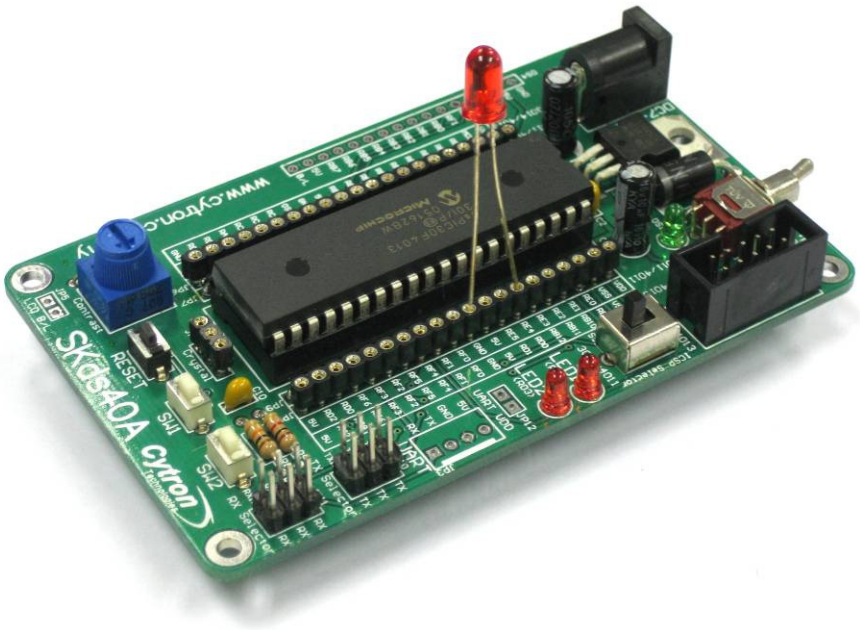


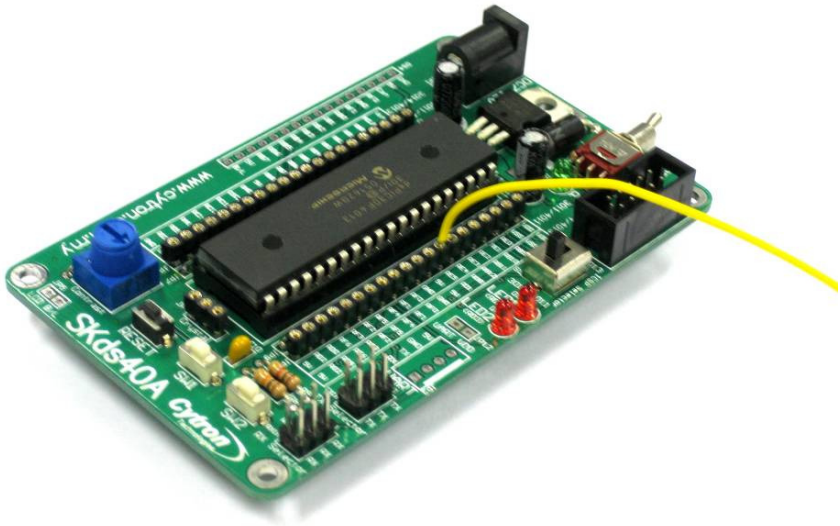
### 6.2 I/O Port (to electronic components)

This section shows some example to use I/O ports of SKds40A.

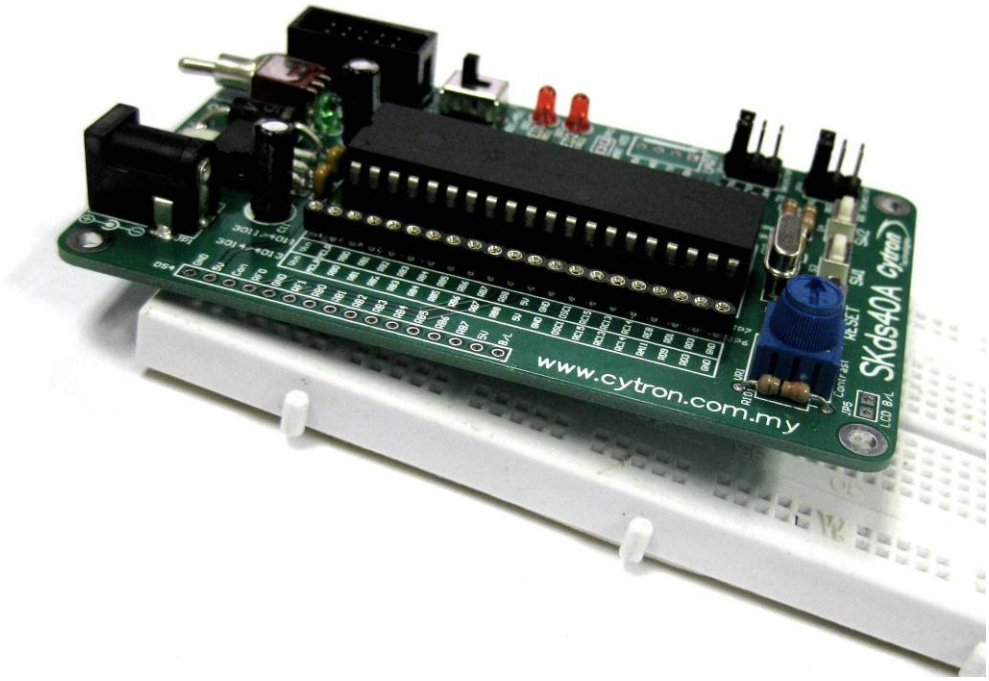
a. Connect the components that needed onto the I/O port.



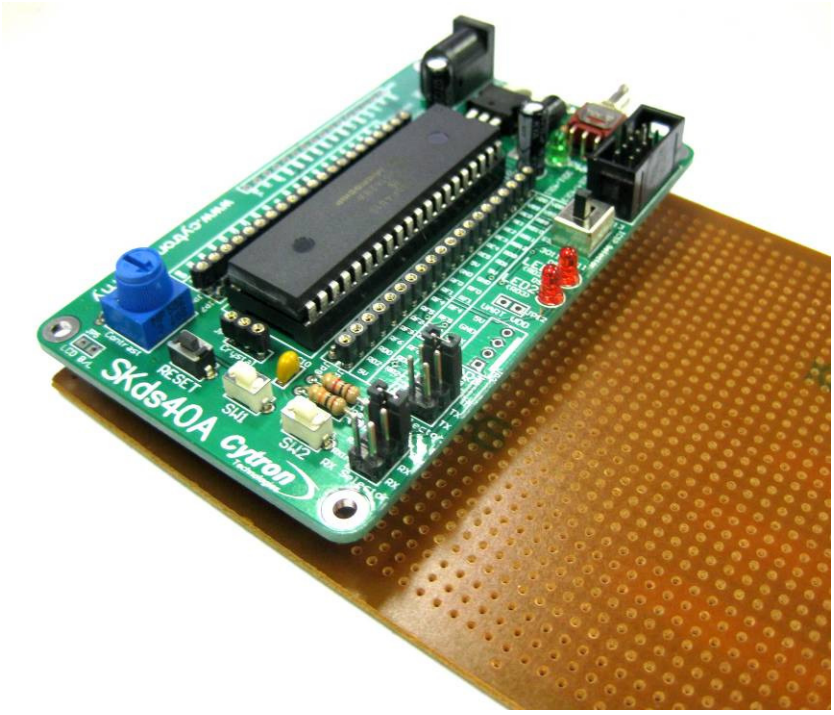

b. Extend the I/O port to another board using jumper wire.



c. Plug the I/O pins of the Start-up Kit onto a breadboard. Further access I/O pin through the breadboard.



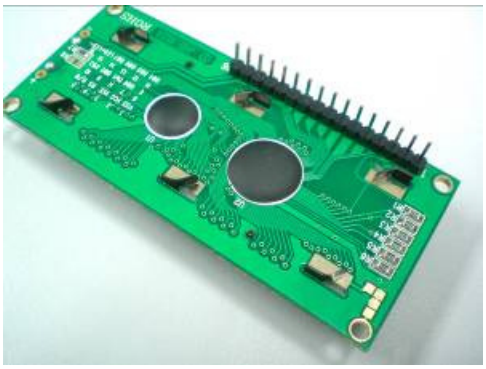

d. Plug the I/O pins of the Start-up Kit onto a donut board. Solder the pins onto the board to access the I/O.



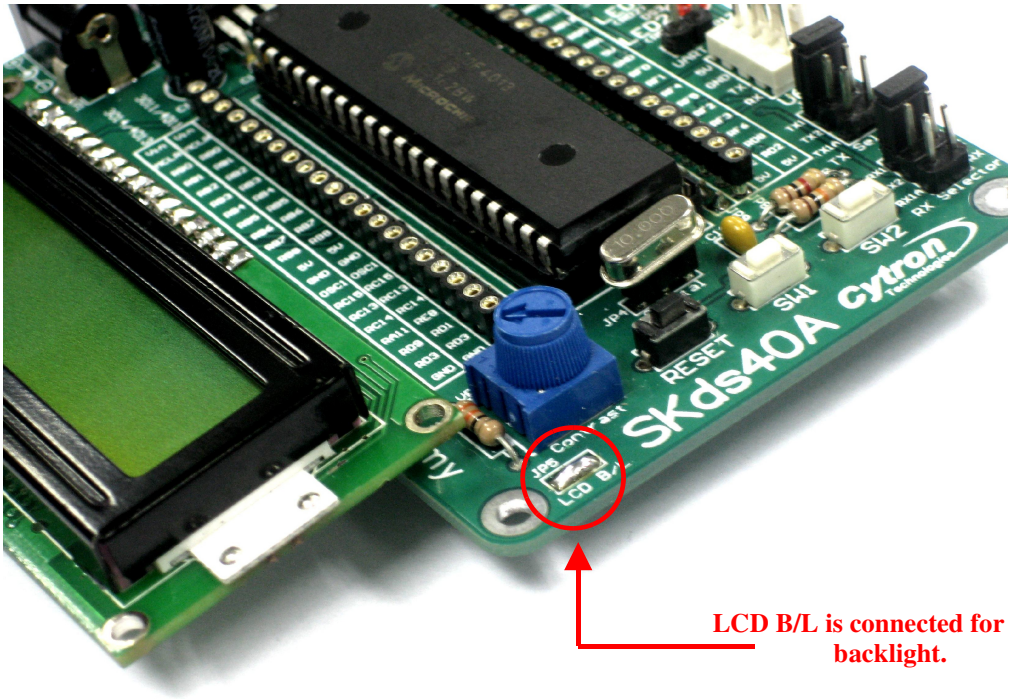
### 6.3 2x16 Character LCD

SKds40A provides the option to solder and mount 2x16 characters LCD. It is not pre-soldered and it is not included in SKds40A packing list. User may get the LCD from Cytron Technologies separately.

- To use the LCD, user has to solder 16 header pin to the LCD.




- Solder LCD display at the site of SKds40A. To activate the LCD backlight (optional), solder two pads at JP5 (LCD B/L).

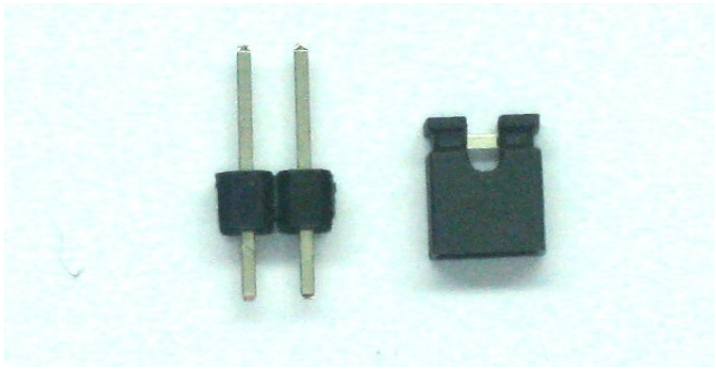


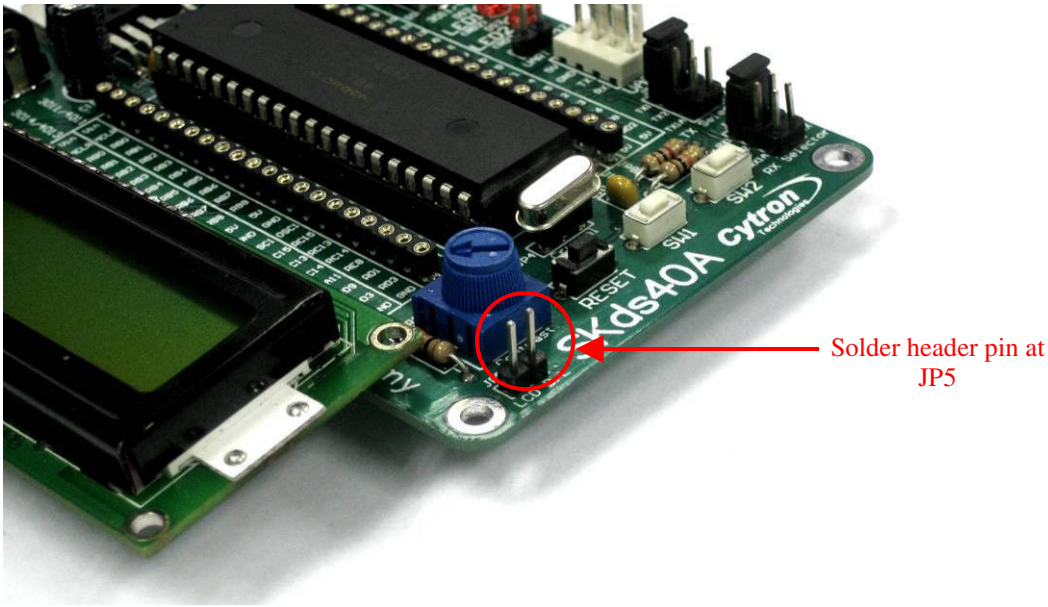

Below shows the different between LCD with backlight and LCD without backlight.

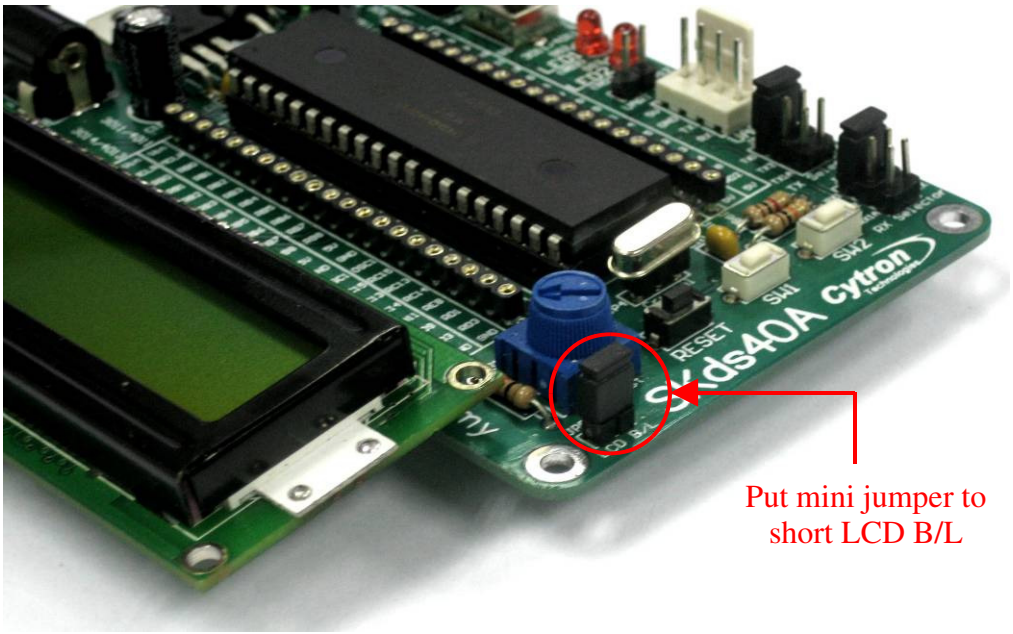

a) With backlight


b) Without backlight

- Besides, user may also use header pin and mini jumper to short LCD B/L. Header pin and mini jumper is **not provided** in SKds40A packing list. Users need to buy separately.

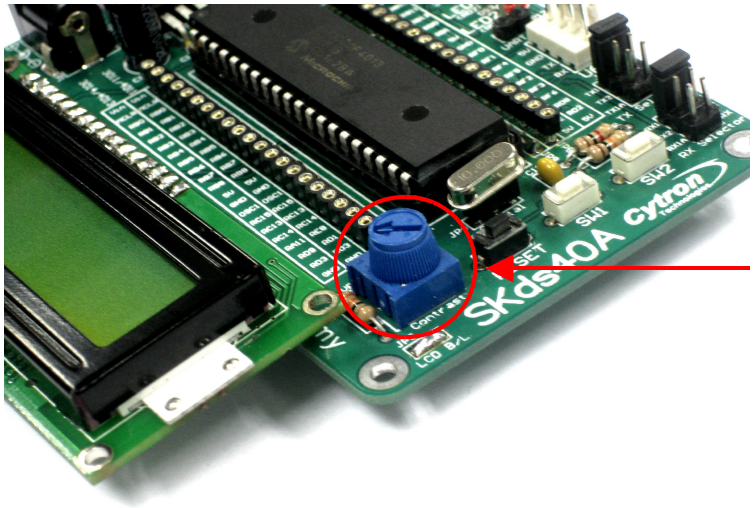




- Potential meter is used to adjust the contrast of LCD. Turn left or right to adjust the contrast.

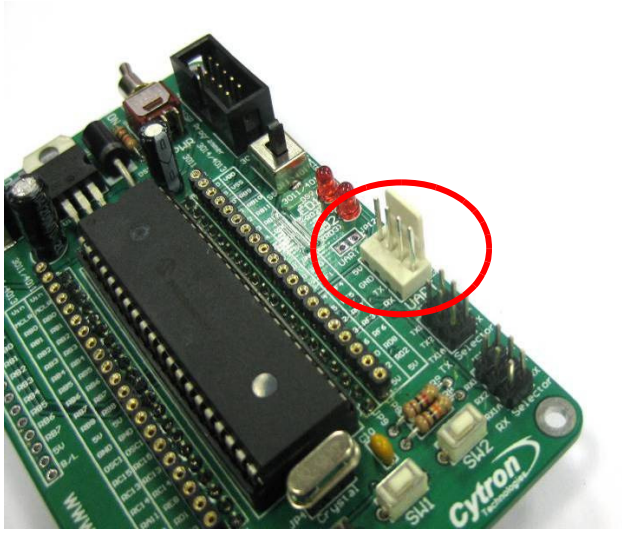


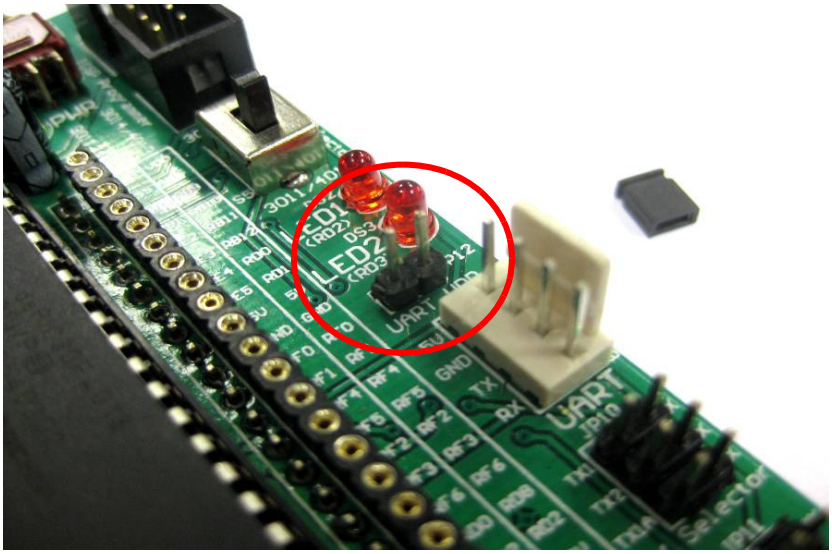
### 6.4 UART Interface

UART pad is provided in SKds40A for communication to microcontroller or computer. Users need to solder 2510-04 connector to use it. If user want to supply 5V from microcontroller to UART, 2 ways header pin should be solder on JP12 and a mini jumper used to set the 5V. 2510-04 connector, 2 ways header pin and mini jumper are not included on SKds40A packing list.

- Solder 2510-04 connector at UART reserved place.

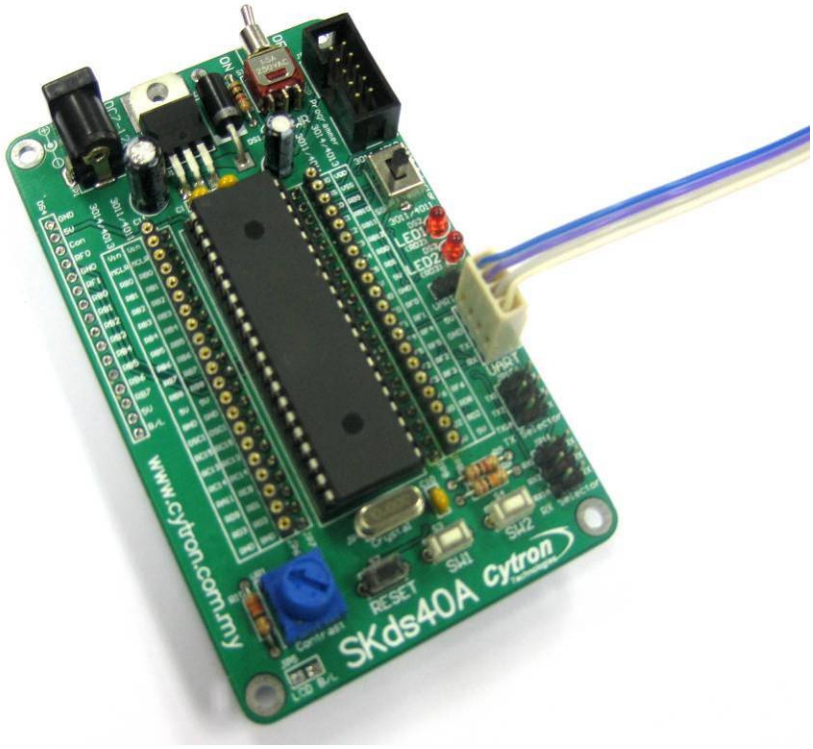


- Solder 2 ways header pin on JP12 and set the 5V using mini jumper if want to supply 5V to UART.

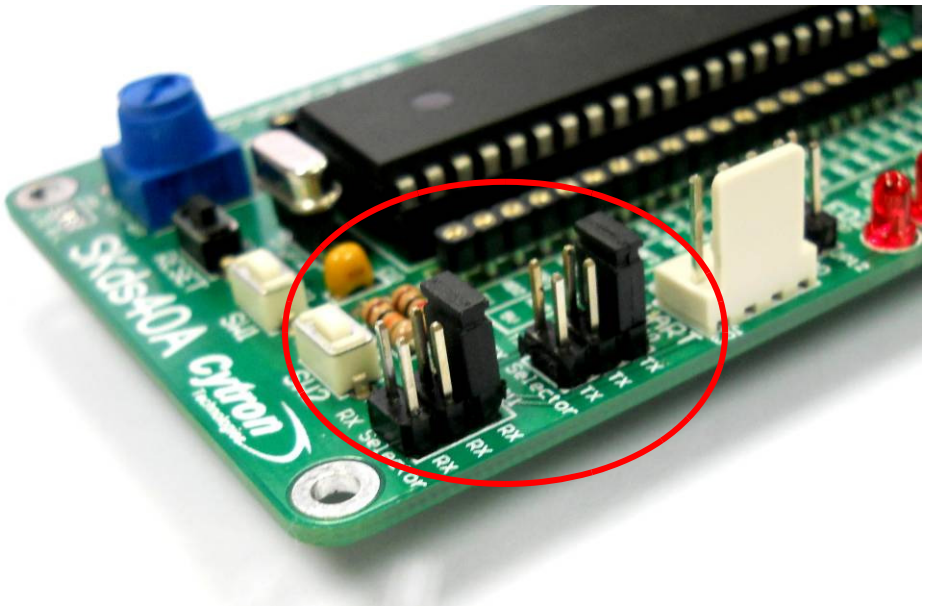


- Connect to other microcontroller using cable connector. Ensure the connection between SKds40A and microcontroller is correct. Rx pin of SKds40A must connected to Tx pin of microcontroller and Tx pin of SKds40A must connected to Rx pin of microcontroller.

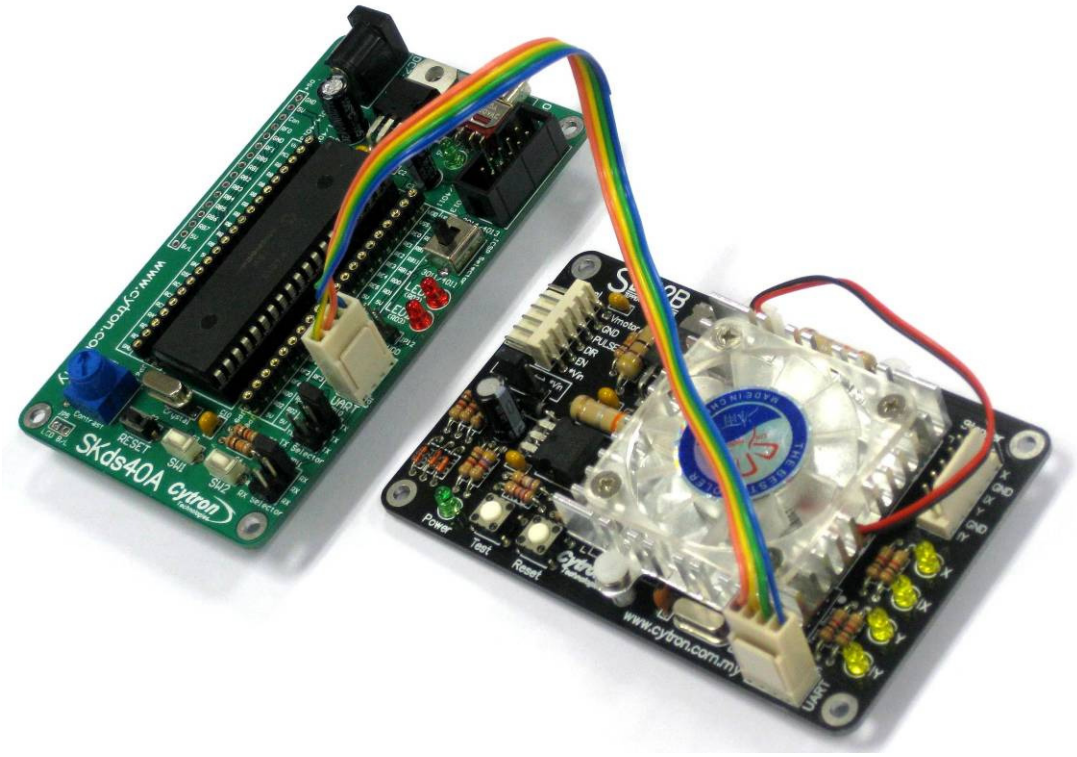



- Set Tx and Rx pin used at Tx (JP10) and Rx (JP11) selector.

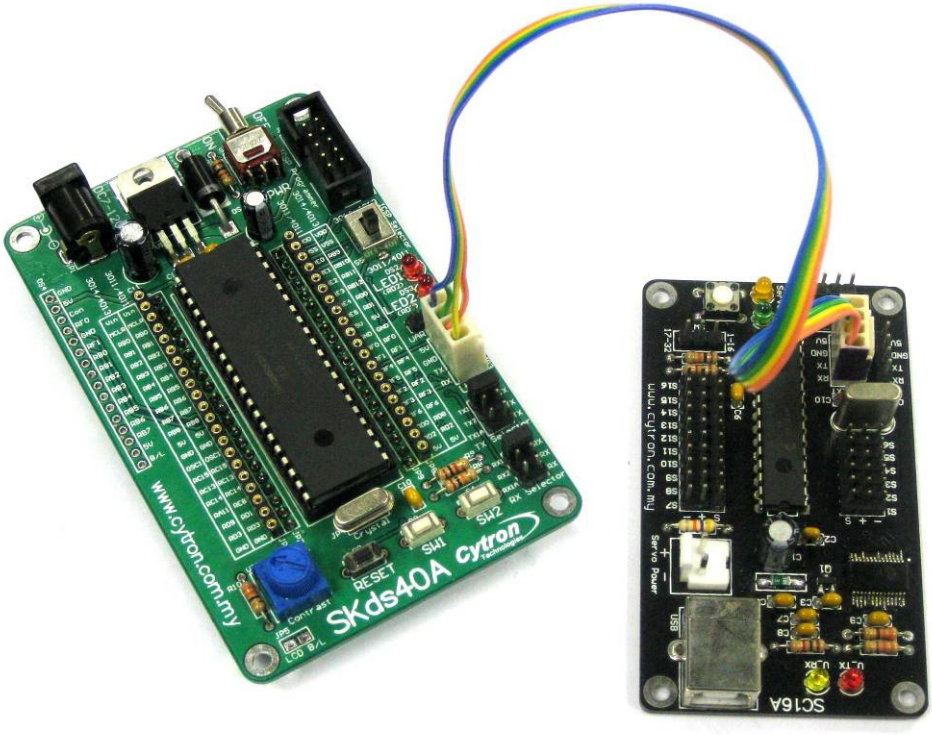


Below is shown some examples connection of SKds40A to microcontroller using UART.

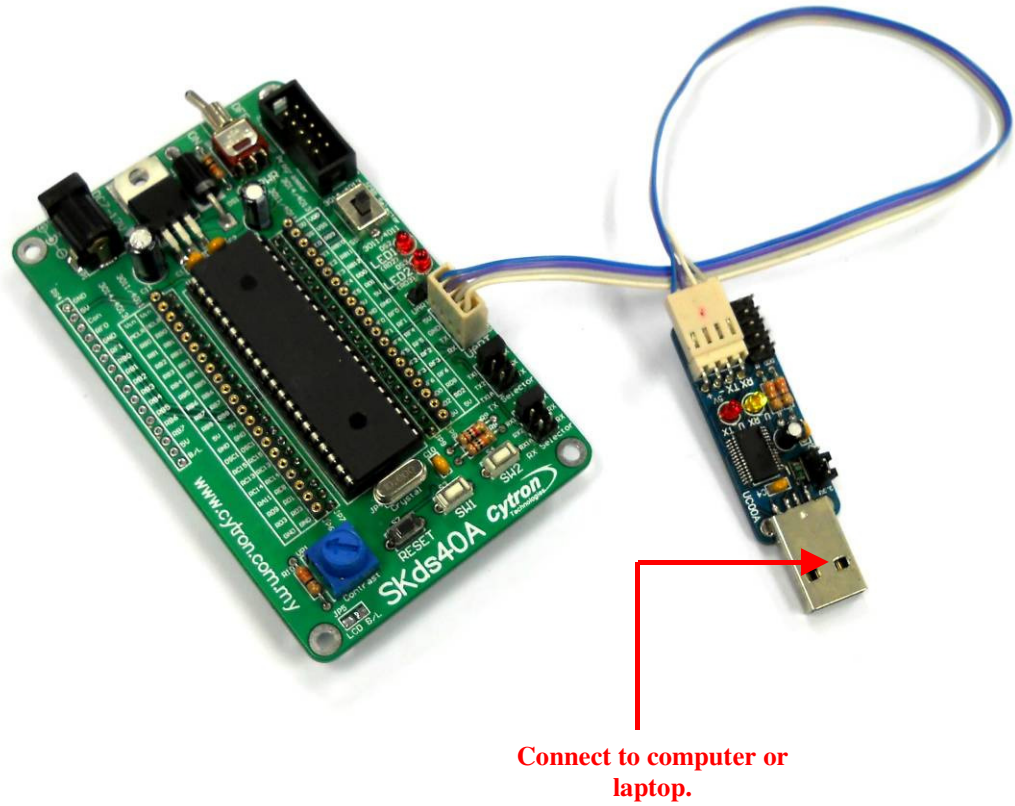



**(a) SKds40A to SD02B using UART**




(b) SKds40A to SC16A using UART

- Connect to computer/laptop using UC00A (communication between SKds40A and PC). Please refer UC00A User's Manual for UC00A usage.



## 7.0 GETTING STARTED

SKds40A is ready to be plug and use. SKds40A is ready be used to start the electronics interface. Cytron Technologies has provided 2 sample source codes, for dsPIC30F4011 and dsPIC30F4013. The sample source code includes LED blinking, LCD message display and UART communication through UC00A to computer's HyperTerminal. Sample source code can be downloaded from Cytron's website under SKds40A product page. Please refer UIC00A/B User's Manual to load hex code into PIC of SKds40A. This getting started will show SKds40A with dsPIC30F4013 sample source code.

### 7.1 SKds40A and dsPIC30F4013 Sample Code

1. LCD is not included in SKds40A packing list. Buy it separately if user wants to display massage on LCD. Please refer section 6.3 for interface SKds40A with LCD Display.

2. For UART communication, 2510-04 connector is require to be soldered at JP3. 2510-04 connector is not included in SKds40A packing list. Get it separately if UART communication is necessary.

3. If LCD and UART is not soldered or not used, the sample source code will only show LED blinking on LED1 and LED2.

4. Plug in 40 pin dsPIC MCU. There are 4 models of dsPIC can be used with SKds40A. This example will used dsPIC30F4013.

5. Set ICSP Selector to 3014/4013.

6. Power the SKds40A with DC adapter. Connect UIC00A/B to ICSP programmer. Switch on toggle switch. Please refer section 6.1

7. Load hex code (SKds40A+4013.hex) into dsPIC30F4013 using UIC00A/B. Please refer UIC00A/UIC00B User's Manual.

8. LED1 will blink followed by LED2, and both LEDs will blink. LCD will further display next instruction to demo UART1 and UART2.

9. Connect UC00A to SKds40A and Computer and setup HyperTerminal. Follow instruction displayed on SKds40A's LCD.

## 7. WARRANTY

- Product warranty is valid for 6 months.
- Warranty only applies to manufacturing defect.
- Damage caused by mis-use is not covered under warranty.
- Warranty does not cover freight cost for both ways.

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