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PIC16F877A Development Board

The PIC16F877A Development Board is a compact platform for developing and testing PIC16F877A applications. It features 5V regulated power, ICSP programming, GPIO breakout pins, reset circuit, user LED, user switch, and onboard RS232 communication.



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1. Product Overview

The PIC16F877A Development Board is designed as a convenient platform for developing, programming and testing embedded applications using the Microchip PIC16F877A microcontroller. The board provides regulated 5 V power, ICSP programming access, GPIO breakout headers, a user LED, a user switch and an onboard RS232 interface.

2. Key Features

- PIC16F877A microcontroller in a 40-pin socket
- 20 MHz crystal oscillator
- 8-12 VAC power input
- On-board bridge rectifier and 5 V regulator (LM7805)
- ON/OFF power switch
- ICSP programming interface for [PICkit2](#) / PICkit3
- User LED with jumper selection
- User push button with jumper selection
- On-board RS232-to-UART interface using MAX232
- DB9 serial connector
- Breakout headers for PIC GPIO pins
- Breakout points for input voltage, GND and regulated 5 V

3. Board Specifications

Parameter	Specification
Microcontroller	PIC16F877A
Oscillator	20 MHz crystal
Power input	8-12 VAC
Logic supply	5 V regulated
Regulator	LM7805
Programming interface	ICSP
Programmer	PICkit2 or PICkit3
Serial interface	RS232 / UART
RS232 transceiver	MAX232
Serial connector	DB9
User LED	Green LED, Jumper selectable (JP3)
User switch	Push button, Jumper selectable (JP2)
Board Dimension	12.5 x 6.38 x 2.5 cm



4. Board Layout and Connectors

The board photograph shows the PIC16F877A at the center, GPIO breakout headers around the microcontroller, the power section on the left, and the RS232/ICSP section on the right.



Reference	Function
J1	DC-style power connector shown on the board.
Power switch	ON/OFF switch for board power.
JP1	PIC ICSP programming connector. MCLR, VDD, GND, PGD, PGC and PGM.
JP2	User switch selection. JP2 connects the user switch to RD3 of PORTD.
JP3	User LED selection. JP3 connects the user LED to RD4 of PORTD.
JP4	Serial interface enable. JP4 enables serial communication.
COM1	DB9 connector for the RS232 interface.
GPIO headers	Breakout headers provide access to PIC I/O pins and power connections.

5. PIC16F877A GPIO Breakout

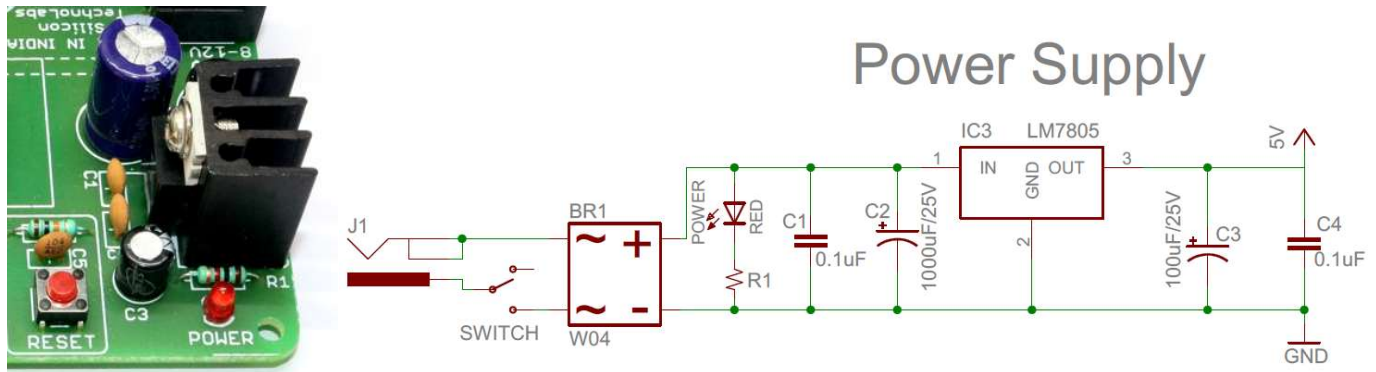
Port	Signals shown in board
PORTA	RA0/AN0, RA1/AN1, RA2/AN2/VREF-, A3/AN3/VREF+, RA4/T0CKI/C1OUT, RA5/AN4/SS/C2OUT
PORTE	RE0/RD/AN5, RE1/WR/AN6, RE2/CS/AN7
PORTB	RB0/INT, RB1, RB2, RB3/PGM, RB4, RB5, RB6/PGC, RB7/PGD
PORTC	RC0/T1OSO/T1CKI, RC1/T1OSI/CCP2, RC2/CCP1, RC3/SCK/SCL, RC4/SDI/SDA, RC5/SDO, RC6/TX/CK, RC7/RX/DT
PORTD	RD0/PSP0, RD1/PSP1, RD2/PSP2, RD3/PSP3, RD4/PSP4, RD5/PSP5, RD6/PSP6, RD7/PSP7

Note: RB6 as PGC, RB7 as PGD and RB3 as PGM, which are relevant to ICSP/programming functions.



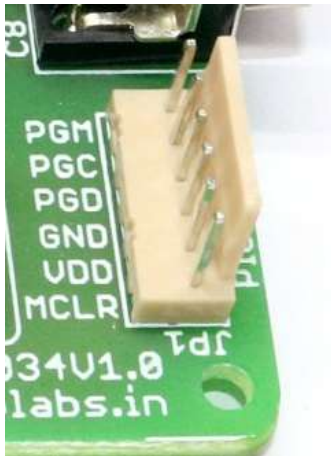
6. Power Supply

The board specifies an 8-12 VAC input. LM7805 regulator to generate the 5 V rail.



7. PIC Programming via ICSP

The PIC16F877A can be programmed through the on-board ICSP connector using a [PICkit2](#) or PICkit3 programmer.



7.1 Programming connection

1. Switch OFF the development board before making or changing the programmer connection.
2. Connect the [PICkit2](#) or PICkit3 to the board's ICSP connector (JP1).
3. Match the programmer signals with the board silkscreen: MCLR, VDD, GND, PGD, PGC and PGM.
4. Connect the programmer to the development computer.
5. Power the development board using the specified power input.
6. Open the [PICkit2](#) software and select the PIC16F877A device.
7. Build the application and generate the HEX file.
8. Program the device and verify the programming result.

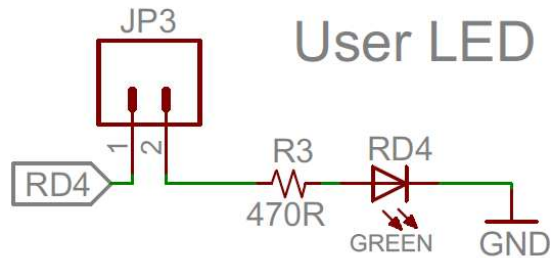
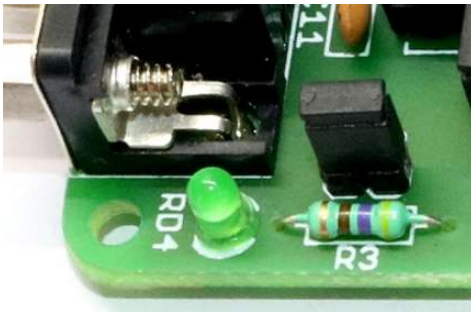
Important: The exact PICkit power configuration and software settings depend on the programmer and software version. Follow the PICkit documentation and do not apply an incompatible external voltage.



8. User LED and User Switch

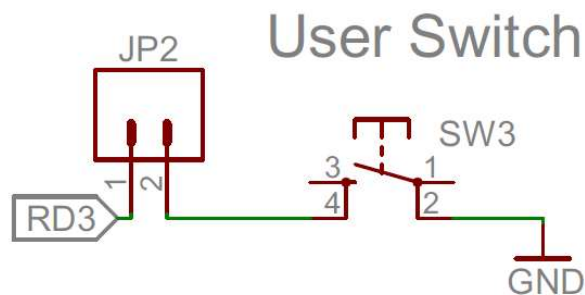
7.1 User LED

The green user LED connected through a 470 Ω resistor. JP3 is used to connect the LED to RD4 of PORTD.



7.2 User switch

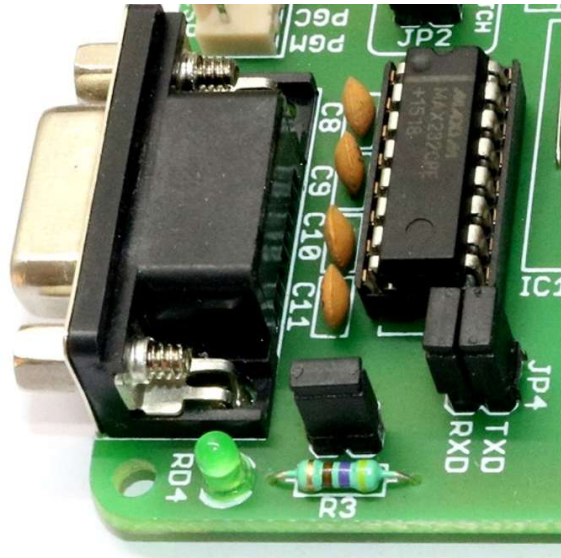
The board includes a user push button. The JP2 connects the user switch to RD3 of PORTD.





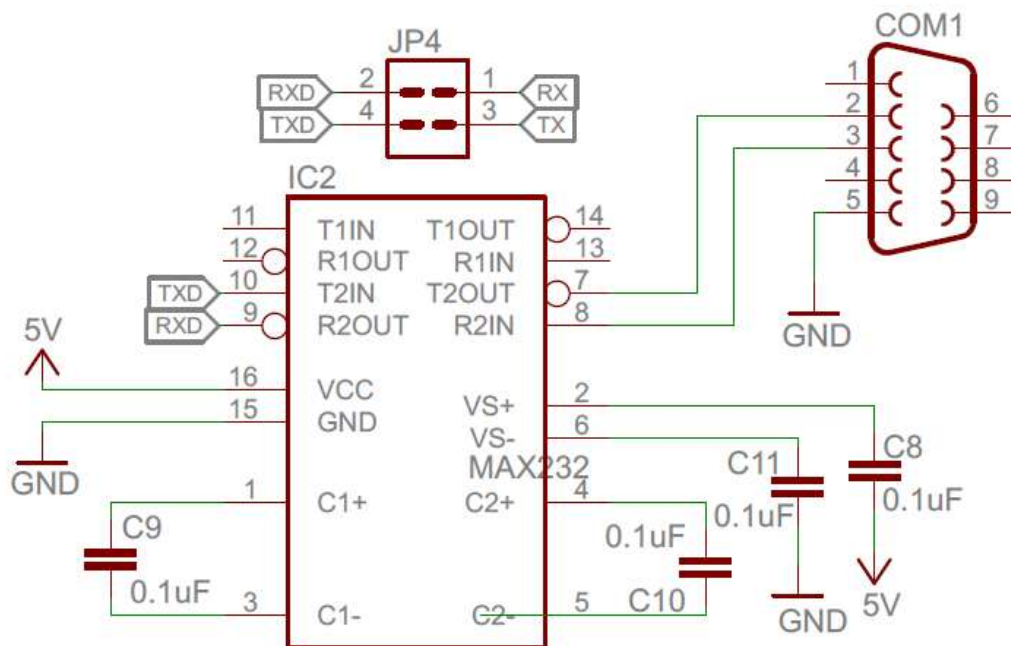
9. RS232 Serial Interface

The board includes an onboard MAX232 interface for RS232 communication. A DB9 connector is provided for the external serial connection. JP4 is provided to enable serial communication.



The PIC16F877A UART signals shown in the schematic are RC6/TX/CK and RC7/RX/DT. These are routed through the MAX232 interface to the RS232 connector.

Serial RS232 Interface





10. Basic LED Blink Example

For PIC16F877A + MPLAB XC8, here is a complete program including configuration bits:

```
#include <xc.h>
#define _XTAL_FREQ 20000000
// Configuration Bits
#pragma config FOSC = HS    // High Speed Crystal
#pragma config WDTE = OFF   // Watchdog Timer OFF
#pragma config PWRTE = ON   // Power-up Timer ON
#pragma config BOREN = ON   // Brown-out Reset ON
#pragma config LVP = OFF    // Low Voltage Programming OFF
#pragma config CPD = OFF    // Data EEPROM Code Protection OFF
#pragma config WRT = OFF    // Flash Program Memory Write Protection OFF
#pragma config CP = OFF     // Flash Program Memory Code Protection OFF
void main(void)
{
    TRISDbits.TRISD4 = 0;    // RD4 as output
    PORTDbits.RD4 = 0;      // LED initially OFF
    while(1)
    {
        PORTDbits.RD4 = 1;  // LED ON
        __delay_ms(500);
        PORTDbits.RD4 = 0;  // LED OFF
        __delay_ms(500);
    }
}
```

11. Troubleshooting

Problem	Recommended checks
Board does not power ON	Check the power source, polarity/connection, power switch and 5 V rail.
PICkit cannot detect the PIC	Check the ICSP wiring, MCLR/VDD/GND/PGD/PGC connections and programmer settings.
User LED does not work	Check JP3, RD4 configuration, LED polarity and firmware output configuration.
User switch does not work	Check JP2 and configure RD3 correctly in firmware.
RS232 communication does not work	Check JP4, TX/RX configuration, baud rate, serial cable and terminal settings.
External peripheral does not work	Check the available 5 V, GND and input-voltage breakout connections and ensure the peripheral's voltage/current requirements are compatible.



12. Support

For technical support, product information, documentation, and assistance with the PIC16F877A Development Board, please contact:

Silicon TechnoLabs

Website: <https://silicontechnolabs.in/>

Email: info@silicontechnolabs.in

For product documentation and additional resources, please visit our website.



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