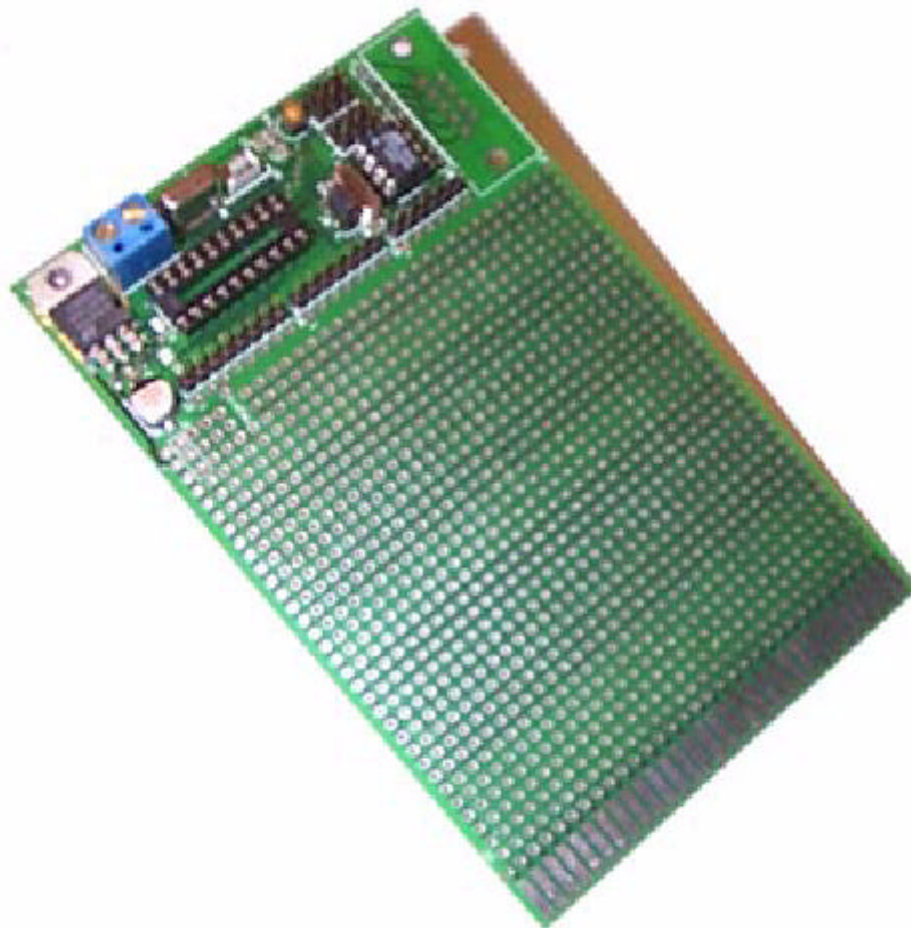


AT90SMINIPB Project Board



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Electronics

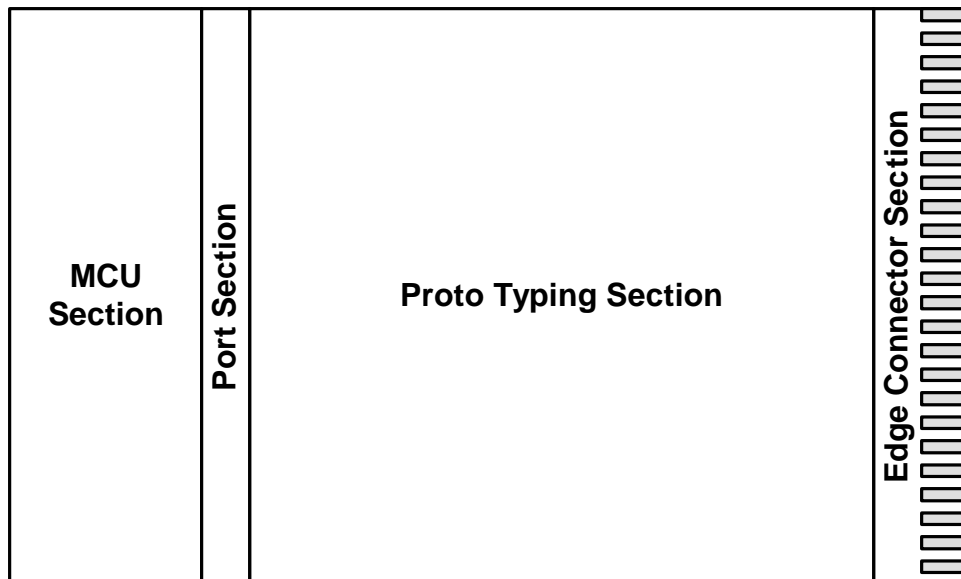
AT90SMINIPB AVR 8 bit RISC Microcontroller Project Board

This is the project board many AVR enthusiasts have been looking for. It will allow hobbyist and professionals to build their application fast whether it is soldered or wire wrapped. Compatible with most of the 8 pin and 20 pin devices from Atmel 8-bit RISC architecture microcontrollers, the user can develop applications with up to two totally independent microcontrollers. Sockets allow for different options such as AT90S1200 or AT90S2313 as 20 pin devices and ATtiny11, ATtiny12, ATtiny15, AT90S2323 and AT90S2343 as 8 pin devices.

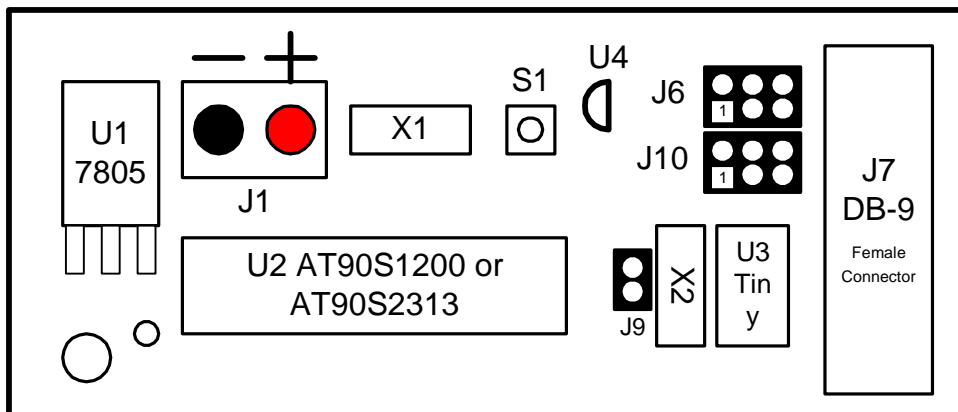
The board comes ready to use with all the necessary support components such as crystals working as external oscillators, a voltage monitor for Brown Out Detection, independent ISP ports for in circuit programmability, 5V voltage regulator good up to 1 Amp, reset button, header male connectors for all available ports (PORT B and PORTD on the 20 pin devices and PORT B on the 8 pin devices) and the layout of a serial port female DB9 connector in case interface to the PC through the RS232 port is desired (NOTE: User must supply line level converter for RS232 communications).

A huge prototyping area with bus connections will make concepts come to reality in a snap. To add flexibility to future designs, the bottom edge of the AT90SMINIPB is a male edge connector perfect for adding these prototype boards to a backplane such, as the Project Board Mother Board (PBMB).

The AT90SMINIPB board is divided into four main sections: Microcontroller Unit Section, Port Section, Prototyping section and the Edge Connector Section.



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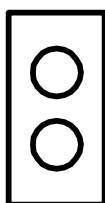
MCU Section:

This portion of the board contains the necessary circuitry to properly connect two ATMEL AVR microcontrollers. U2 is a socket accepting a 20 pin device such as the AT90S2313 or AT90S1200 while U3 accepts any 8 pin device such as the AT90S2323, AT90S2343, ATTiny11, ATTiny12 or ATTiny15.

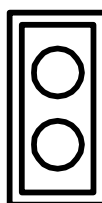
Power Connector: A two circuit high current terminal block is used to power the board with a source ranging from 6 to 24V. Pin 1 is V+ while pin 2 is V- (ground return). An LM7805 voltage regulator regulates the input voltage into a good VCC = 5V source that powers the devices for up to 1 Amp rated current. **WARNING:** Connecting the power backwards will result in board damage.

Reset Manager: Some AVR microcontrollers do not have brown out detectors. To allow proper functioning, the AT90SMINIPB includes an MC34064 voltage monitor. U4 will make sure the reset line remains high unless insufficient power is being administered to the board. The S1 button will pull down the reset line generating a reset.

Reset Line on 8 pin devices: Some 8 pin devices use pin 1 as a reset line or as a general purpose I/O. To add the flexibility of using the pin in any fashion, Jumper J9 is provided. If shorted, the reset line is available. If open, the pin 1 on the eight pin device work as a general purpose I/O.



J9 with the unpopulated Jumper. U3 pin 1 is used as a general purpose I/O pin.



J9 with the populated Jumper. U3 pin 1 is used as a reset line.

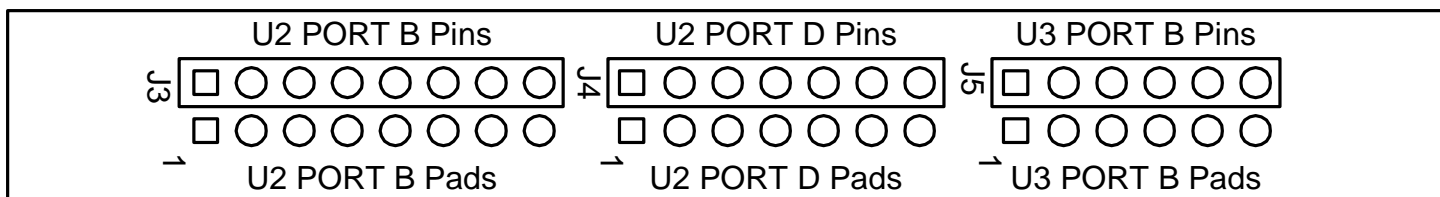
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Microcontroller Section: (Cont.)

ISP Programming: An individual ISP connector is provided so that the firmware code can be downloaded into the respective microcontroller. J6 is the ISP connector for the 20 pin device U2 while J10 is the ISP connector for the 8 pin device U3. Simply connect your ATAVRISP programmer to the respective connector, with the red stripe pointing towards pin 1, and the device is ready to be programmed. If ISP related pins in the target board (AT90SMINIPB with a prototyped application) have been connected to a load, make sure this load does not work against the programming signals.

Serial Communication Port: Some projects require serial communication from the RS232 port found on conventional PC's. A female DB9 connector is provided so that the user can add serial communication capability. Have in mind that it is still the responsibility of the user to add RS232 line drivers in case the data comes from an RS232 compliant port. For TTL serial data, no line driver is needed.

Oscillators: A crystal is provided to work as system oscillator for each microcontroller. X1 serves as the Oscillator for the 20 pin device. X2 works as the Oscillator for the 8 pin device. Since some 8 pin devices can not work with an external oscillator, the crystal circuitry for this clock is not included. However, the layout pads are available in case this feature is to be installed. Simply solder a crystal with its two 0805 capacitors.



Port Section:

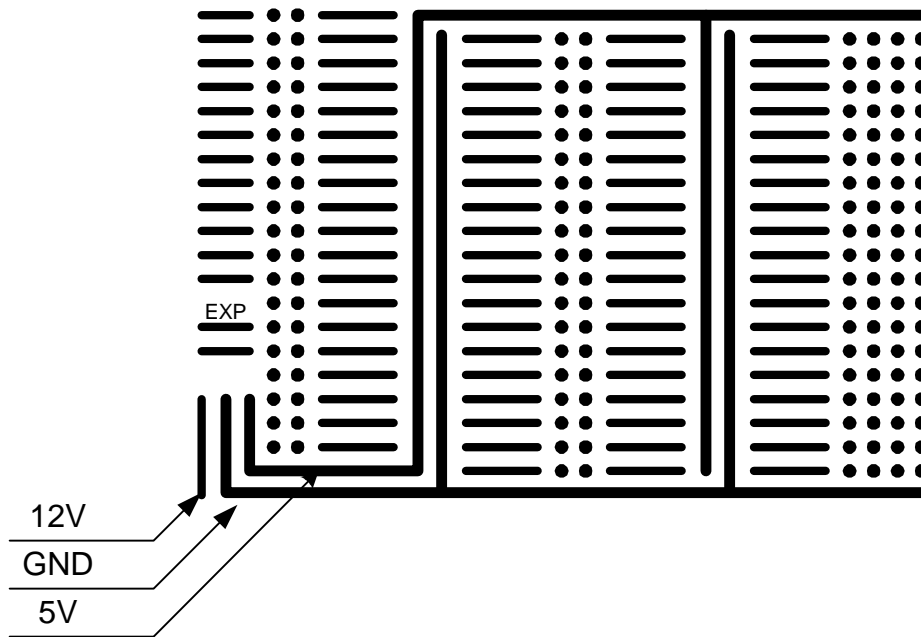
To ease the peripheral connection to the microcontrollers, all ports have been extended to a header pin slot as well as to a pad sector. The header connector allow for other connectors to be plugged directly into the board and also helps to do wire wrapping style of prototyping. The pads will allow to solder a connection from the port into another area such as the prototyping or edge connector sections.

J3 corresponds to PORT B on the 20 pin device, J4 to PORT D on the 20 pin device and J5 to PORT B on the 8 pin device. Each port has pin #1 as a square pad. Per example, pin 1 on PORT B would correspond to PORT B Pin 0 or PB0.

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Prototyping Section:

Some space is allocated to add the extra circuitry that will make up the target system, in the form of a pad grid. There are close to a 1000 pads carefully arranged in the mentioned area. A power bus runs through the prototype grid allowing easy access to VCC and GND lines. The grid was designed to allow components such as through hole DIP IC's, resistors, capacitors, transistors, etc.



Prototype Diagram: Not exact amount of pads shown

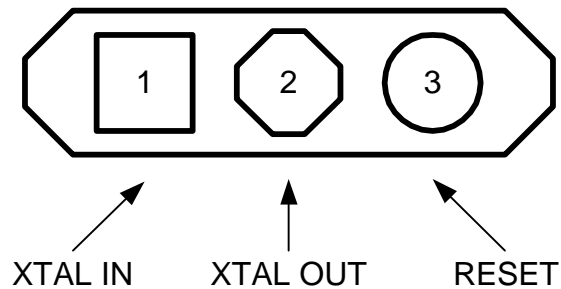
The prototyping area has been designed with power distribution in mind. One small segment contains the voltage in (same voltage being connected at J1). Ground and VCC follows. The idea with these copper strips is to allow the user add extra 7805 voltage regulators in case more amperage is needed. Also it adds the capability to use input voltage to power up prototypes circuitry.

Expansion Sub-Section:

Marked by EXP, an extra set of pads will allow the user to interface directly to the reset, XTAL IN and XTAL OUT lines. The idea is to allow projects to deal with the reset signal at the same time the external oscillator on the 20 pin device can be used to synchronization purposes. XTAL IN is the rectangular pad (pad 1), XTAL OUT is the octagonal pad (pad 2), and reset is the circular pad (pad 3).

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Expansion Section: (Cont.)

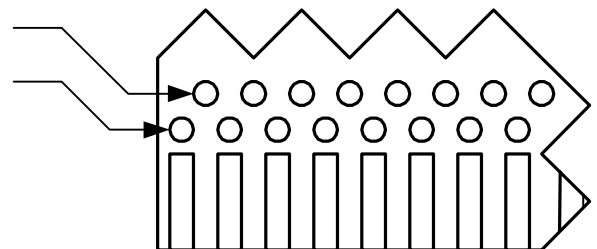


Edge Connector Section:

Expandability is not a problem with the AT90SMINIPB thanks to the edge connector on the bottom edge of the board. Up to 62 different signals can be brought into or from the board by means of standard 62 pin, 100 mil from pin to pin edge connector. Avayan Electronics' MBPB-3 is a good example of a 3 edge connector mother board that will supply power, communication and control signals between three edge connector based boards.

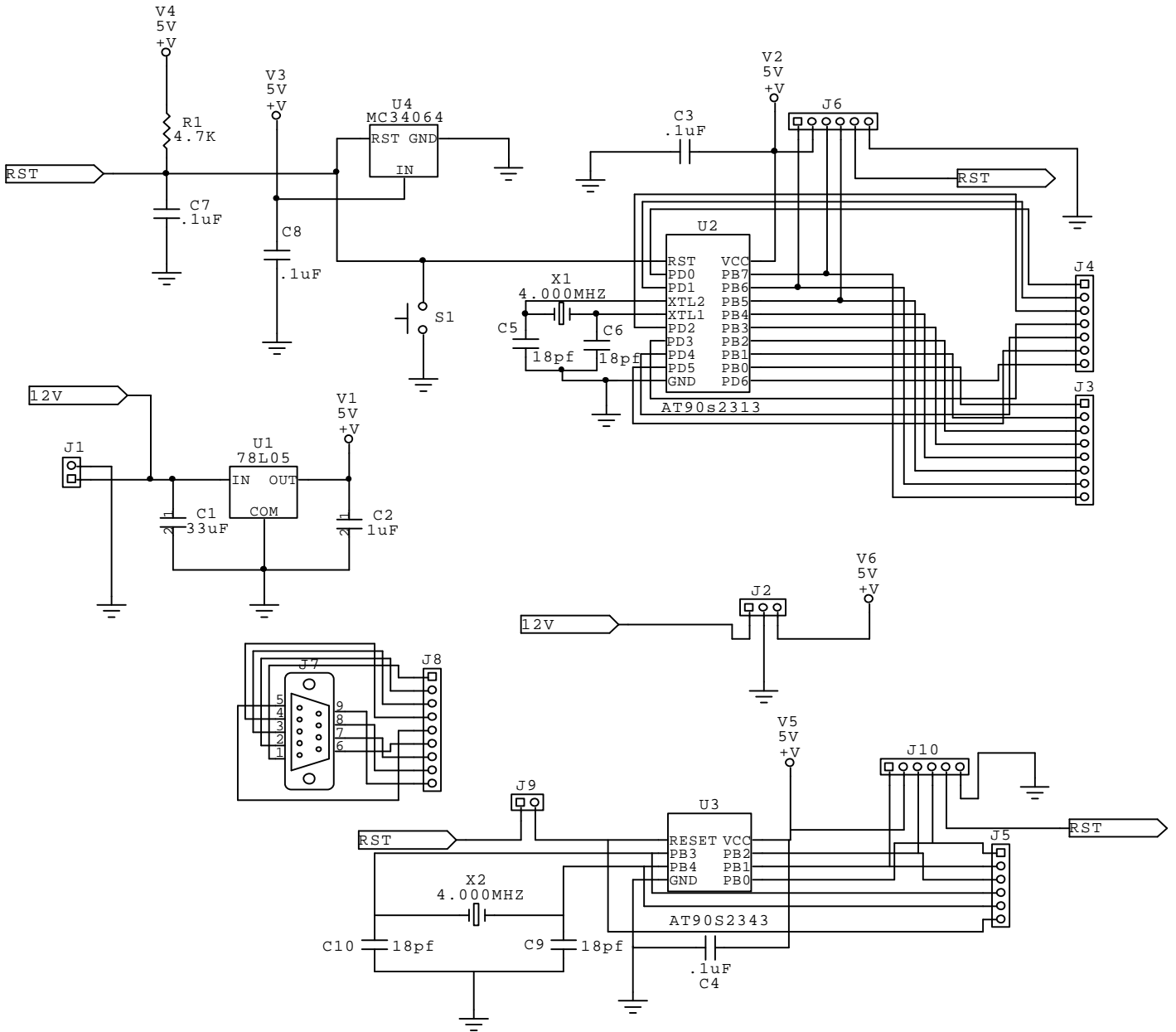
Each tab on the edge connector, is connected to a pad. The user must connect input and output signals from this set of pads into any other pad located at the prototype section or the port section.

These pads connect to the bottom side edge pads
These pads connect to the top side edge pads



AT90SMINIPB AVR 8 bit RISC Microcontroller Project Board

AT90SMINIPB Schematic:



AT90SMINIPB AVR 8 bit RISC Microcontroller Project Board

Bill Of Materials (BOM):

Item	Count	Label-Value	PACKAGE	Designation
1	1	33uF	SM_SizeD_VSSerie	C1
2	1	1uF	SM_SizeB_VSSerie	C2
3	4	.1uF	805	C3,C4,C7,C8
4	4	18pf	805	C5,C6,C9,C10
5	1	CONN	Terminal Block 2 Pos	J1
6	1	CONN	SIP2	J9
7	1	CONN	SIP3	J2
8	1	CONN	SIP8	J3
9	1	CONN	SIP7	J4
10	1	CONN	SIP6	J5
11	2	CONN	IDC6	J6,J10
12	1	CONN	DB9/F	J7
13	1	CONN	SIP9	J8
14	1	4.7K	805	R1
15	1	Switch	LTS_Pan_2C	S1
16	1	78L05	TO-220	U1
17	1	AT90S2313	DIP20	U2
18	1	MC34064	TO-92B	U4
19	1	4.000MHZ	HC49	X1
20	1	DIP8 Socket	DIP8	SK1
21	1	DIP20 Socket	DIP20	SK2

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Assembly Instructions:

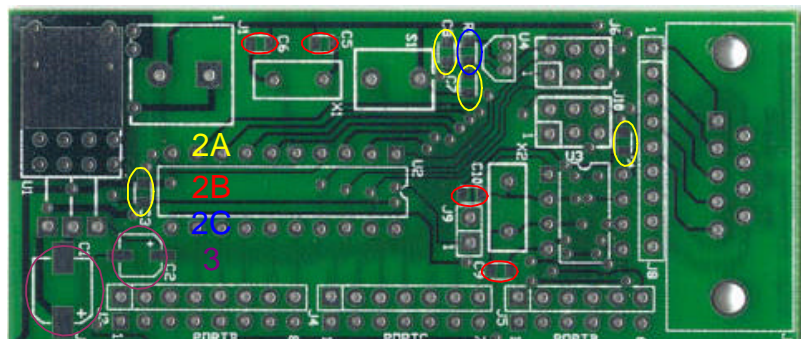
Thank you for purchasing an Avayan Electronics' Evaluation/Project Board. We hope the tools satisfy you into making easy developing ideas. Please follow the next instructions when assembling your kit:

What you will need:

1. Soldering iron with fine point. 30W recommended.
2. Tweezers.
3. Solder tin
4. (Optional) Board Vise

1. Make sure your kit contains all the components as specified by the BOM sheet.
2. The kit is better assembled if the first components to be assembled are the surface mount ones. Start by soldering all 0805 components. Because these are rather small, a picture has been drawn to better show where each is located.

SOLDERING HINT: To best solder 0805 components, apply a tin drop on one of the 0805 pads. Place the component while handling it with a pair of tweezers at the same time that the solder pad is being heated. Once the solder pad has dried, apply solder to the other side of the component.



- a. Assemble .1 uf caps on C3, C4, C7 and C8 locations
 - b. Assemble 18 pf caps on C5, C9. If the ATtiny part on the Evaluation board will run using external clock, solder C9 and C10 as well. If the ATtiny part will run using the internal clock, do not populate C9 and C10
 - c. Solder the 4.7K resistor on R1
3. Once the 0805 components have been soldered, you can solder the electrolytic caps C1 and C2. Follow the hint shown above for easiest placement.

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Assembly Instructions (Cont.):

4. It is time to solder all thru hole components.

SOLDERING HINT: Place all thru hole components first and then from the board bottom, solder one of the component pins. Once every component has at least a soldered pin you can turn the board into the other side making it easier to solder the remaining pins (extremely helpful when soldering more than two pin parts). If it is hard to position the board in such a way that both bottom and top are accessible at the same time, solder each component as you go through the following steps.

- a. Position the two circuit Terminal Block (blue plastic connector) into J1.
- b. Position the two circuit header connector (SIP2) on J9
- c. If you desire to have access to the 12V, 5V and Ground plane through test stakes, place the three circuit header connector on J2. This connector space is actually designed to add an optional 7805 voltage regulator in case the 5V plane needs more than 1A current.
- d. Position the eight circuit header connector (SIP8) into J3 (PortB)
- e. Position the seven circuit header connector (SIP7) into J4 (PortD)
- f. Position the six circuit header connector (SIP6) into J5 (Tiny's PortB)
- g. Position the two six circuit dual row header connector into J6 and J10 (ISP Ports)
- h. Position the DB9 female connector on J7 as well as the 9 circuit header connector (SIP9) on J8 to gain access to serial ports.
- i. Position the switch on S1. You may need to trim the leads before inserting the pin into the holes.
- j. Position the LM7805 voltage regulator into U1. Bend the leads so that the regulator back lies at the heat sink square pad. At the end of the assembly it would be a good idea to solder the back of the regulator on this pad to improve heat dissipation. Have patience as soldering such a large pad takes time.
- k. Position the Reset Manager MC34064 on U4. Notice that the oval shape must correspond to that on the silk screen or else the part will be reverse polarized.
- l. Position the 4.00 MHz (or any other desired for your particular project) on X1.
- m. Position the two sockets, 8 pin on U3 and 20 pin on U2.

Final Assembly:

Once all the components have been soldered into the board, it is time to place the microcontrollers. An AT90S2313 is provided. Place it on the U2 20 pin socket. Any other variant such as the AT90S1200 can also be placed on U2. If desired, place the ATTiny part of your predilection. The board is ready to be used as specified by this datasheet (Make sure you apply +12V to pin 1 on J1). Use J6 to ISP the 20 pin device and J10 to ISP the 8 pin device. Enjoy!!!