JT–EASY ™ : JT–E100K

KIT ASSEMBLY GUIDE

Version 1.0

www.embeddedkits.com

Disclaimer

EMBEDDEDkits reserve the right to make changes without further notice to any products or devices herein to improve design, functionality or reliability. EMBEDDEDkits does not assume any liability arising out of use or application of the product(s), device(s), diagram(s), circuit(s), software listing(s) described herein; neither does it convey any license under its patent rights nor the rights of others. EMBEDDEDkits products or devices are not intended or authorized for use as components, or to be used for the design and development of medical devices, products or systems of any type. The same applies for any other application in which the failure of EMBEDDEDkits products or devices could create a situation where personal injury, death or property damage, directly or indirectly, may occur. Should a Buyer(s) purchase or use EMBEDDEDkits products or devices for any such unintended or unauthorized application, Buyer(s) shall indemnify and hold EMBEDDEDkits and its officers, employees, subsidiaries, affiliates, suppliers, and distributors, harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury, death or property damage associated with such unintended or unauthorized use, even if such claim(s) alleges that EMBEDDEDkits was negligent regarding the design, manufacture or testing of the product or device.

EMBEDDEDkits shall not be held liable from any damage, injury or ill effect resulting from the handling and use of Solder Paste, Solder Creams, or wire Solder used by the Kit purchaser or Kit builder to assemble the Kit or Product described in this Assembly Guide. The same shall apply to the use of EMBEDDEDkits manufactured and/or distributed Wire Solder, Solder Paste, or Solder Paste Dispensing Tools.

The information in this User's Guide or Assembly Guide has been carefully checked, and is believed to be correct. However, no responsibility is assumed for inaccuracies or typographical errors in both, text or graphic form.

WARRANTY INFORMATION

EMBEDDEDkits warrants that the Kit you receive shall contain all the components specified in the parts list, and that all components shall be free from defects for a period of 60 days from the date you receive the Kit. If, during such warranty period, (i) EMBEDDEDkits is notified promptly upon the discovery of any defective component(s), including a detailed description of such defect; (ii) the component(s) in question may be returned to EMBEDDEDkits, accompanied with a Return Material Authorization (RMA) number; and (iii) if EMBEDDEDkits examination of such component(s) reveals defects, not caused by accident, improper installation, misuse, alteration, repair, use, or construction contrary to any instructions issued by EMBEDDEDkits, EMBEDDEDkits shall repair or directly replace the defective component or replace it with a functionally equivalent component, at its sole option. EMBEDDEDkits shall return the repaired or replaced component(s) to the buyer free of charge, shipping prepaid.

Adding any components not listed in the assembly instructions, or making any modifications to the Kit will void this Warranty!

Table of Contents

Section 1

Overview

EMBEDDEDkits Kits Return Policy

Customer satisfaction is a top priority for us. However, because of the nature of our products, we cannot accept returns of partially (or completely) assembled kits. We will accept returns of in new−condition, unassembled kits within 15 days from the date you receive the Kit. The buyer is responsible for payment of shipping charges and a, 15% restocking fee. The returned Kit must be in a resalable new−condition, and must include all parts, manuals, and original packaging. If you decide to make a return, please contact our Customer Service Department customerservice@embeddedkits.com via email to obtain an RMA number. Returns without an RMA number, or not meeting the above requirements will not be accepted!

Missing Parts

We thoroughly check the content of each kit before shipment, so only on very rare occasions you will find missing parts. If you have determined that a component is missing, contact EMBEDDEDkits customer service department and we will send you the missing item free of charge. However before you do so, make sure that you have not misread the marking on any of the other components included in the Kit. We continually improve the design of our products, so make certain that an alternate component has not been substituted for the item you have determined missing. EMBEDDEDkits reserves the right to make components substitutions at any time, or as components availability dictates. In most cases, these changes will be noted in an addendum to the manual.

Damaged Parts During/After Assembly

Components or materials lost or damaged during/after assembly can be ordered from EMBEDDEDkits for a reasonable charge. Contact our sales department salesdept@embeddedkits.com with your request.

Factory repair of Kits

Fully completed kits may be returned to EMBEDDEDkits for troubleshooting or repair only. Factory trained technicians are available to evaluate or repair nonfunctioning kits for a service fee of $25.00 per hour (min. ½ hour evaluation charge) plus return shipping and handling charges. If the repair will require more than an hour, our technicians will contact you by telephone, for your approval before starting. To qualify for repair service, your Kit must be fully completed and unmodified. Contact our customer service department customerservice@embeddedkits.com for further details.

Section 2

Introduction

JT−E100K Assembly Guide

The purpose of this Assembly Guide is to provide the Kit builder step−by−step instructions for the construction and preliminary testing of EMBEDDEDkits JT−E100K.

Congratulations on your purchase of EMBEDDEDkits JT−EASY; JT−E100K. The JT−E100K is a reduced−features, lower cost version of the fully−assembled JT−E100A, available as a Kit. The Kit version is an ideal Hardware/Firmware learning platform for Engineering students, or Microcontrollers enthusiasts, that want a professional−grade MSP430 development tool at an affordable price.

JT−E100K can be used with EMBEDDEDkits M−Series MSP430F−based Modules, Texas Instruments Target Socket Modules, or other compatible evaluation boards. When combined with IAR Kickstart, or other compatible third−party emulation software, it can be used to erase and program the Target MSP430F Flash memory, or to debug the Target firmware.

For specific information on the operation of JT−E100K, consult EMBEDDEDkits JT−EASY User's Guide for Model JT−E100A and JT−E100K.

JT−E100K comes with surface−mount Integrated Circuits (ICs) U1 and U2 pre−installed. In some cases, depending on availability, U2 may be substituted with a similar or a functionally equivalent, through−hole package IC. Before shipment each JT−E100K is factory−tested with a special fixture, to verify proper operation of the pre−installed ICs.

Required Skill Level

Some experience with soldering heat sensitive components like Transistors and diodes, and general experience with soldering passive components.

Work Area

Kit construction requires a well−lighted, uncluttered work area where you can identify and organize all the components before assembly.

Minimum required tools and supplies

__ 25W to 50W Soldering Iron, or Soldering station
__ Soldering tip, conical l /32" DIA. (max), or screwdriver 1/16" wide (max)
__ Sponge for cleaning tip
__ Solder (0.025 DIA. Max) 60/40 or 63/37 rosin, or no−clean core flux
__ Long Nose Pliers
__ Diagonal Cutters
__ X−Acto knife blade, or similar object with sharp tip
__ Small tip screwdriver or Potentiometer Adjustment Tool

Additional suggested tools and supplies

__ Solder Sucker or Desoldering Braid
__ Desk lamp
__ Lead Bending Gauge
__ Metal tweezers
__ Magnifier 3x to 5x magnification
__ Pen Vacuum pick−up Tool

Recommended Test Equipment

__ Digital or Analog Multimeter with clip−on leads

Section 3

Getting Started

Read Before You Start

Experience shows that there are four common mistakes that kit builders make. Avoid the listed mistakes and your Kit will, in most cases, work on the first try.

Installing the wrong component

Always double−check each step. A 470 ohms and a 47K resistor may look almost the same, but they may act very differently in an electronic circuit! The same applies for capacitors. There is usually no difference is size from a 0.001uF capacitor and a 0.1uF monolithic capacitor, but their effect in a circuit can be very different.

Installing a component backward

Always double−check before soldering a polarized capacitor. The negative lead is usually marked on the capacitor's case, and must be connected to the ground point or negative point of the circuit. EMBEDDEDkits PC−Boards have a (+) marking near the capacitor outline, to indicate the correct insertion for a polarized capacitor positive (unmarked) lead. Check the orientation of diodes. The white band on the designated footprint denotes the Cathode, and should coincide with the band on the diode.

Faulty solder connections

Inspect your solder joints, and look out for solder bridges. A bad solder joint will look dull, and is usually caused by not applying enough heat to properly melt the solder.

Omitted or missing a components

Check to make sure that you have completed each step in the Kit assembly sequence.

Soldering Tips

Good heat distribution and frequent soldering iron tip cleaning, are a must for producing professional looking solder joints. Before you insert the component, inspect its leads or pins and corresponding pad(s) for surface residue. If you notice any residue, wipe it off with a cotton swab. Clean any oxidation or access solder from the soldering iron tip before soldering any leads. Allow the tip to contact both the component lead and pad for approximately one second before applying the solder. For best results, the solder should also contact both the lead and pad to allow it to melt evenly. Apply solder sparingly, just enough to melt around the component lead and to cover most of the pad. And remember, more solder does not make the electrical connection better, it just wastes solder and may result in solder shorts between pads.

Desoldering Tips

If you installed the wrong part and need to remove it, follow these simple instructions: 1) If possible grasp one of the component leads with a pair of needle−nose pliers. If this is not possible grasp the component, but do not apply too much force or you will damage it. 2) Apply heat to the pad on the solder side (bottom side) of the PC−board to allow the solder to melt, and gently pull the lead out of the pad. 3) Repeat step #1 and #2 for the other lead. 4) Use a solder sucker or braid to remove any remaining solder from the pad hole. In cases where there is a lot of solder on the pad, use a solder sucker of braid to remove most of the solder before you attempt step #1 to #3. 5) Insert the correct component and solder accordingly.

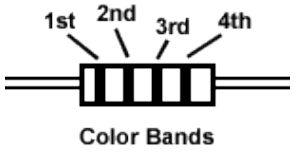
For Integrated Circuits (ICs) or multiple−pin components follow these steps: 1) Use a solder sucker or braid to remove as much solder as possible from each pad. 2) With your fingernails or needle−nose pliers, gently wiggle each lead to make sure that it is no longer held in place by any remaining solder. If it is, repeat step #1. 3) Once all the leads are free, gently pull on the component to remove it from the board. 4) Insert the correct component and solder accordingly.

Please note: Components that have been physically damaged or have overheated during the removal process should be replaced. They will probably no longer work as intended. And if so, you will have to repeat the removal process and run the risk of damaging the PC−board pads.

Reading Resistors value

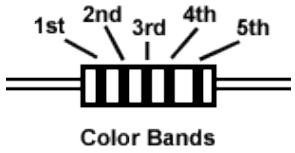
The resistance value of 5% and 10% resistors is encoded by (4) color bands located on the component body. Use the 4 Bands, Color Code Table to determine the resistor value.

Color Code Table, 4 Bands: 5% and 10% Tolerance

Resistor Bands	Color	1st Band 1st digit	2nd Band 2nd digit	3rd Band Multiplier	4th Band Tolerance
 **Example:** Orange−Orange−Orange−Gold Represents a 33K, 5% Resistor	Black Brown Red Orange Yellow Green Blue Violet Gray White Gold Silver	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	1 10 100 1K 10K 100K 1M 10M 100M 1000M	 5% 10%

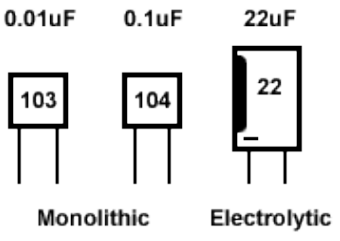
The resistance value of 0.5% and 1% resistors is encoded by (5) color bands located on the component body. Use the 5 Bands, Color Code Table to determine the resistor value.

Color Code Table, 5 Bands: 0.5% and 1% Tolerance

Resistor Bands	Color	1st Band 1st digit	2nd Band 2nd digit	3rd Band 3rd digit	4th Band Multiplier	5th Band Tolerance
 Color Bands **Example:** Yellow–Black–Red–Red–Brown Represents a 40.2K, 1% Resistor	Black Brown Red Orange Yellow Green Blue Violet Gray White Gold Silver	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	1 10 100 1K 10K 100K 1M 10M 100M 1000M	1% 0.5%

Reading Capacitors value

Capacitors are usually marked with a 3–digit number for capacitance value identification. With capacitors the first two digits represent the numeric value, and the third digit is the multiplier. Electrolytic capacitors are always marked in uF.



10pF = 100
100pF = 101
0.001uF = 102
0.01uF = 103
0.1uF = 104

Section 4

Getting Familiar With The Kit

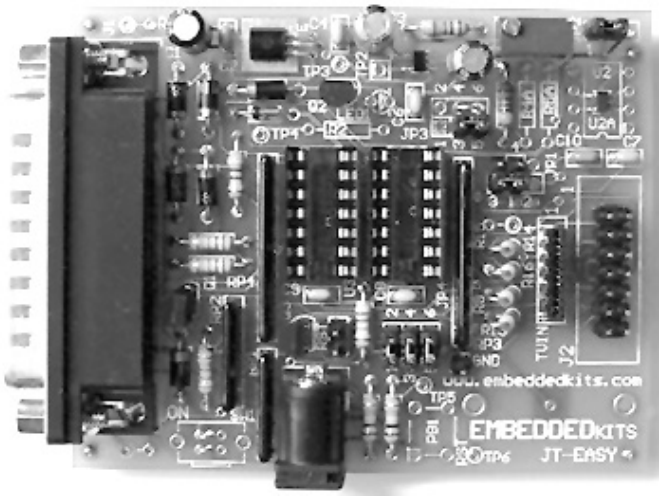


Figure 1. Completed JT–E100K Kit

Checking the Kit Content

Before you start building the Kit check the package content, identify each component, and put an (X) in the space provided in the components list. If any components are missing or appear to be damaged, refer to the warranty section of this Assembly Guide for replacement instructions. It is best to first group–together similar components like resistors, capacitors, diodes, and so on. It will make the actual identification easier.

NOTE

Handling electrostatic sensitive components:

This Kit uses Integrated Circuits (ICs) and other active components (Transistors) that may be damaged if subjected to electrostatic discharge. As a precaution, make sure that you touch a conductive (grounded) surface before handling such components. Doing so, should discharge your body of any potentially damaging electrostatic charge! This is especially important if your work–area is in a low–humidity environment. It is also recommended that you store such components in electrostatic safe bags (as shipped from the factory) until needed.

The JT−E100K Components List

X	DESIGNATOR	QTY	DESCRIPTION	Notes
__	U1	1	TPS76901, Voltage Regulator, SOT−23−5	*
__	U2A	1	OPA347NA, OP−Amp (or equivalent), SOT−23−5	*
__	U3, U4	2	CD74HC125E Buffer (or equivalent), DIP−14	
__	Q1	1	Transistor, 2N5962, NPN, TO−92	
__	Q2	1	Transistor, FJN3304RBU, NPN, w/47K/47K, TO−92	***
__	Q3, Q4	2	Transistor, 2N3904, NPN, TO−92	
__	D1, D3	2	Diode, 1N4001, DO−35	
__	D2	1	Zener Diode, BZX55C5V6, 5.6V, 5%, DO−35	
__	D4, D4A, D5, D5A	4	Diode, 1N5817, DO−35	
__	R5	1	Potentiometer, 100K, multi−turn	
__	RP1, RP2	2	Resistor Pack, 100K, Bussed, 6 Pins	
__	RP3	1	Resistor Pack, 330 ohms, Isolated, 10 Pins	
__	RP4	1	Resistor Pack, 33K, Isolated, 10 Pins	
__	R3	1	Resistor, 78.7K, 1%, 1/4W, Violet−Gray−Violet−Red−Brown	
__	R4	1	Resistor, 40.2K, 1%, 1/4W, Yellow−Black−Red−Red−Brown	
__	R6, R7, R12,	3	Resistor, 22K, 5%, 1/4W, Red−Red−Orange−Gold	
__	R1	1	Resistor, 470, 5%, 1/4W, Yellow−Violet−Brown−Gold	
__	R8, R13, R14	3	Resistor, 33K, 5%, 1/4W, Orange−Orange−Orange−Gold	
__	R9	1	Resistor, 100, 5%, 1/4W, Brown−Black−Brown−Gold	
__	R10, R11	2	Resistor, 100K, 5%, 1/4W, Brown−Black−Yellow−Gold	
__	R16	1	Resistor, 330, 5%, 1/4W, Orange−Orange−Brown−Gold	
__	C1	1	Capacitor, 22uF, Electrolytic	
__	C2, C4, C6, C7 C8, C9, C10	7	Capacitor, 0.1uF, Monolithic	
__	C3	1	Capacitor, 3.3uF, Electrolytic	
__	C5	1	Capacitor, 10uF, Low ESR Electrolytic	
__	J1	1	Connector, D−SUB, 25P−M, PCB Mount	
__	J2	1	Header, 14−Pins	
__	J3	1	Connector, 10pin FFC/FPC−type	
__	PJACK	1	Power Jack, PC Mount, 2.1mm	
__	JP2, JP3, RST	3	Jumper Header, single−row, 2 Pins	
__	JP1	1	Jumper Header, double−row, 4 Pins	
__	JP4	1	Jumper Header, double−row, 6 Pins	
__	GND	1	Test Point, single−pin header	
__	For U3 and U4	2	IC Socket, 14 Pins	
__	For JP1/2/3/4	6	Jumper, Shorting Block	
__	For PCB feet	4	Stand−off	**
__		1	PC−board (PCB)	
__		1	Cable, 25−wires, Parallel Port	
__		1	Cable, 10−wires, FFC−type	
__		1	User's Guide (Quick−Start, printed version)	

(*) Factory pre−installed component (**) Factory pre−fastened component (***) Transistor marked R3304

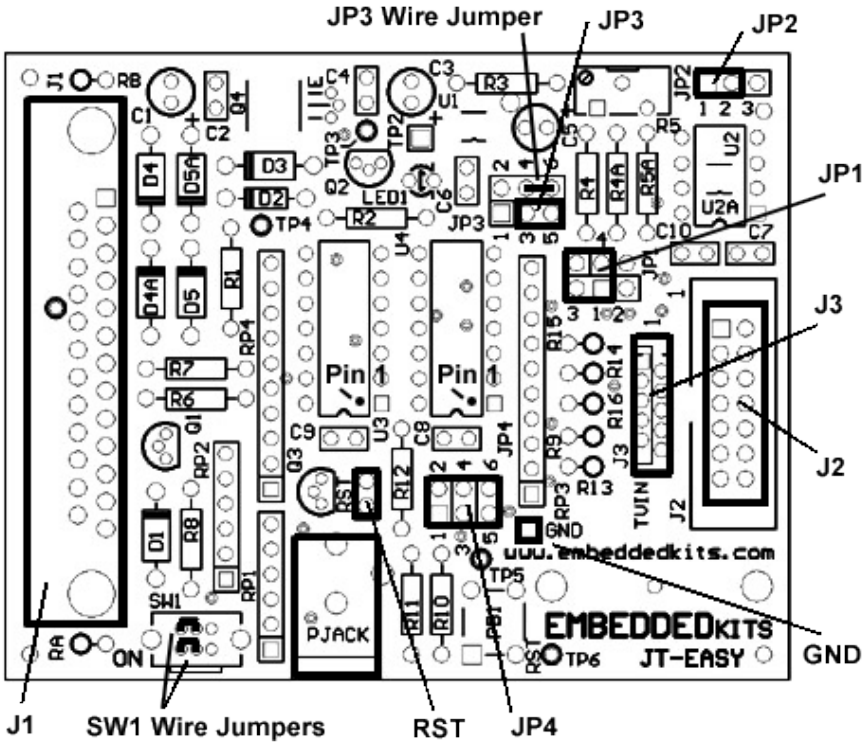


Figure 2. PC−board Components Placement

Before you proceed, take a few minutes to familiarize yourself with the layout of the PC−board. As a general rule, for multiple−pin (more than 2) components, EMBBEDDEDkits uses a square pad and/or a square marking on the component footprint, to denote pin #1. The location of where each component is to be installed and corresponding designator, is clearly marked on the PC−board. In the case of diodes, the band within the component footprint denotes the Cathode lead. Vertical mounted Transistors must de installed as shown in their corresponding footprint. The outline of polarized capacitors are marked with a (+) to denote the positive lead of the capacitor. Resistor packs usually have a dot or line to indicate pin #1. This marking should coincide with the square pad/square marking on the component footprint. Pin #1 marking on connectors should also coincide with the square pad and pin #1 marking on the component footprint.

NOTE

You should only install the components listed in the Step−By−Step Assembly Instructions. The following components are not used (and are not supplied) with this Kit: Resistors RA, RB, R2, R4A, R5A and R15, Slide Switch SW1, Push Button Switch PB1, and LED1. Installing unspecified components will void EMBEDDEDkits Warranty!

Section 5

JT−E100K Assembly Instructions

Step−By−Step Assembly Instructions

Before you start to assemble this Kit please read the EMBEDDEDkits Warranty. In addition, please read through the step−by−step assembly instructions to determine if your skill level is sufficient to build this Kit. Once you have started construction, the Kit cannot be returned for a refund!

NOTE

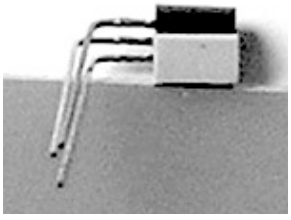
After you complete each step check your work. Your solder joints should be free of excess solder, and should appear shiny. Solder bridges between pads or solder splashes should be removed before proceeding to the next step. To prevent PC−board solder−side obstructions, trim the component leads after you are done soldering each component. Trim the leads flush with, or slightly above the PC−board surface, but make sure not to scratch/damage any nearby traces.

__ 1. The (4) stand−offs (feet) come pre−fastened to the PC−board. The stand−offs are located on the bottom side of the PC−Board (at each corner). To permanently secure them in place apply a small amount of solder only on the component side of the PC−board.

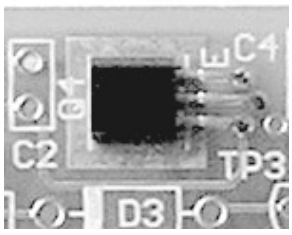
Installing Transistor Q4

NOTE

Observe the “Handling electrostatic sensitive components” precaution when installing this component.



Transistor Q4



Transistor Q4 installed

__ 2. Locate Transistor Q4 (2N3904). This transistor has pre−bent leads, and a small, sticky Heat Sink Pad attached to its plastic case, as shown. With the tip of a pair of tweezers (an x−acto knife

blade or sharp object can also be used) carefully separate the white plastic backing from the sticky heat sink pad. This can be done by gently inserting a sharp object just under the white plastic backing. Make sure not to separate the sticky pad from the transistor case.

__ 3. Insert Transistor Q4 with its bent leads pointing down into the designated footprint. Guide the transistor so that its plastic body rests between the two parallel lines of the part outline. Apply slight pressure to the transistor and PC−board with your thumb and index finger, to allow the sticky pad to make full contact with the PC−board foil Heat Sink. Solder and trim all the leads.

Installing the Connectors, Jumper Headers and Power Jack

NOTE

Unless otherwise noted, all components bottom (lower) side should rest on the PC−board top surface after insertion and during soldering.

__ 4. Locate connector J1. This component is a D−Sub 25−pin, right angle connector. Guide and insert the connector into the designated footprint, and allow its (2) retaining forks to snap into place. Make sure that all the leads are inserted into the PC−Board.

__ 5. Apply a small amount of solder on each side of the (2) retaining forks. Do not fill the entire mounting pads with solder! All you need to do is to secure the connector in place.

__ 6. Solder J1 connector leads. It is not necessary to trim J1 leads.

NOTE

When installing a Test Point, Header, Connector or Power Jack without retaining clips, use the following general instructions to solder it in place: 1) Insert the component into the designated footprint. 2) Use your index finger of one hand to hold the component in place, and turn the PC−board over. 3) With the other hand grab the soldering iron and melt and retain a small amount of solder on its tip. 4) Select a lead that is not in direct contact with your finger and temporarily solder it, to hold the component in place. Pay attention to what you are doing to prevent possible burns! 5) Rest the PC−Board on your work−table, and solder the remaining leads. 6) If necessary, re−solder the first lead. For these components it is not necessary to trim the leads after soldering.

__ 7. Locate connector J3. This is a 10−pin, dual row Flat Flex Cable (FFC) vertical connector. Before insertion, orient the connector pin #1 marking with J3 footprint pin #1 marking. Solder as outlined in the general instructions. Do not apply excess heat to the leads, or you may damage the connector!

__ 8. Locate the Ground Test Point, and insert it into footprint marked GND. The GND Test Point is a single, square−pin header. Use the general instructions to solder it, but in this case use tweezers to hold it in place. Use/melt additional solder to make a good solder connection.

__ 9. Locate Jumper Header JP1. This is a dual−row, 4−pin header. Insert in the designated footprint, starting from pad marked “3”. Only 4 pads of JP1 (1, 3, 4) and one unmarked pad are used for this header, see Fig. 2. Solder as outlined in the general instructions.

__ 10. Locate Jumper Header JP2. This is a single−row, 2−pin header. Insert in the designated footprint, starting from pad marked “1”. Only 2 pads (1 and 2) of JP2 footprint are used for this

header, see Fig. 2. Solder as outlined in the general instructions.

__ 11. Locate Jumper Header JP3. This is a single−row, 2−pin header. Insert in the designated footprint, starting from pad marked “5”. Only 2 pads of JP3 (5 and 3) are used for this header, see Fig. 2. Solder as outlined in the general instructions.

__ 12. Locate Jumper Header JP4. This is a dual−row, 6−pin header. Insert in the designated footprint. All of the footprint pads are used for this component, see Fig. 2. Solder as outlined in the general instructions.

__ 13. Locate Jumper Header RST. This is a single−row, 2−pin header. Insert in the designated footprint. All of the footprint pads are used for this component, see Fig. 2. Solder as outlined in the general instructions.

NOTE

Before you continue, double check to make sure that all the Jumper Headers have been properly installed, and that only the specified pads are being used, as described in steps 9 to 13.

__ 14. Locate Header J2. This is a dual−row, 14−pin header. Insert it into the designated footprint, and solder as outlined in the general instructions.

__ 15. Locate Power Jack, PJACK. This is a 3−pin power jack used to plug−in the optional AC−Adapter. Insert it into the designated footprint, and solder as outlined in the general instructions.

Installing the Diodes

NOTE

From now on for brevity (unless otherwise noted) the term “Install” encompasses the following steps: 1) inserting the component into the designated PC−board footprint, 2) slightly bending two or more of the component leads to hold it in place, 3) turning the PC−board over, 4) soldering and trimming the component leads, and 5) checking for proper solder connections, solder bridges and/or solder splashes.

__ 16. Locate Diodes D1 and D3 (all 1N4001). Prepare each diode for installation by bending each lead at 90−degrees, spaced at approx 0.35” apart.

__ 17. Insert each diode into their designated footprint and slightly bend each lead to hold the component in place. For more effective heating, pre−trim leads to approx 1/8” before soldering. After soldering, trim each lead accordingly.

__ 18. Locate Diodes D4, D4A, D5 and D5A (all 1N5817, or alternate 1N5818). Prepare each diode for installation by bending each lead at 90−degrees, spaced at approx 0.35” apart.

__ 19. Insert each diode into their designated footprint and slightly bend each lead to hold the component in place. For more effective heating, pre−trim leads to approx 1/8” before soldering. After soldering, trim each lead accordingly.

__ 20. Locate Zener Diode D2 (BZX55C5V6). Prepare D2 for installation by bending each lead at

90−degrees, spaced at approx 0.32” apart. And install D2.

Installing the Capacitors

__ 21. Locate and install C1 (22uF, Electrolytic) Capacitor.

__ 22. Locate and install C2 (0.1uF, Monolithic) Capacitor.

__ 23. Locate and install C3 (3.3uF, Electrolytic) Capacitor.

__ 24. Locate and install C4 (0.1uF, Monolithic) Capacitor.

__ 25. Locate and install C5 (10uF, Low ESR Electrolytic) Capacitor.

__ 26. Locate and install C6 (0.1uF, Monolithic) Capacitor.

__ 27. Locate and install C7 (0.1uF, Monolithic) Capacitor.

__ 28. Locate and install C8 (0.1uF, Monolithic) Capacitor.

__ 29. Locate and install C9 (0.1uF, Monolithic) Capacitor.

__ 30. Locate and install C10 (0.1uF, Monolithic) Capacitor.

Installing the Resistor Packs

NOTE

Before soldering, make sure that the Resistor Pack pin #1 marking coincides with the designated footprint pin #1 marking. Slightly bend a couple of Resistor Pack leads to hold it in place, before turning the PC−board over. For Resistor Packs, the last number in the manufacturer part number sequence is the multiplier (the number of zeros to add after the 2 digit value).

__ 31. Locate and install RP1 (100K, Bussed: 6A104G or equivalent) Resistor Pack, 6 Pins.

__ 32. Locate and install RP2 (100K, Bussed: 6A104G or equivalent) Resistor Pack, 6 Pins.

__ 33. Locate and install RP3 (330 ohms, Isolated: 10B331G or equivalent) Resistor Pack, 10 Pins.

__ 34. Locate and install RP4 (33K, Isolated: 10B333G or equivalent) Resistor Pack, 10 Pins.

Installing the horizontal mounted Resistors

NOTE

Prepare each resistor for installation by bending each lead at 90−degrees, spaced at approx 0.4” apart.

Save a couple of trimmed resistor leads. They will be used in later steps to make Wire Jumpers.

__ 35. Locate and install R1 (470 ohms, 5%, Yellow–Violet–Brown–Gold) Resistor.

__ 36. Locate and install R3 (78.7K, 1%, Violet–Gray–Violet–Red–Brown) Resistor.

__ 37. Locate and install R4 (40.2K, 1%, Yellow–Black–Red–Red–Brown) Resistor.

__ 38. Locate and install R5 (100K, multi–turn) vertical Potentiometer.

__ 39. Locate and install R6 (22K, 5%, Red–Red–Orange–Gold) Resistor.

__ 40. Locate and install R7 (22K, 5%, Red–Red–Orange–Gold) Resistor.

__ 41. Locate and install R8 (33K, 5%, Orange–Orange–Orange–Gold) Resistor.

__ 42. Locate and install R10 (100K, 5%, Brown–Black–Yellow–Gold) Resistor.

__ 43. Locate and install R11 (100K, 5%, Brown–Black–Yellow–Gold) Resistor.

__ 44. Locate and install R12 (22K, 5%, Red–Red–Orange–Gold) Resistor.

Preparing and installing the vertical mounted Resistors

NOTE

To form the vertical mounted resistors you can use a 1/16" thick spacer, the PC–board, or just your fingers. If a spacer is used it should measure at least 1" x 1", and it should be flat. For brevity, only the word spacer will be used in the lead bending instructions.

Vertical Resistor detail

Lead Bending Instructions:

1) Position the top or bottom end of the resistor body slightly below the edge of the spacer. The resistor lead should protrude above the spacer's edge. 2) With one hand, firmly hold the resistor and spacer with your thumb and index finger. 3) With the other hand bend (approx 180 degrees) the protruding lead over the spacer's edge.

If you don't want to use a spacer, use your fingers. But do not start the bend too close to the resistor body, or you may internally fracture the lead connection.

Install the vertical mounted resistors in the following sequence: R13, R9, R16 and R14. Start from

R13 footprint. R15 is not used with this Kit. The resistor straight lead should be inserted into the pad enclosed by the white circle.

__ 45. Locate, prepare, and install R13 (33K, 5%, Orange−Orange−Orange−Gold) Resistor.

__ 46. Locate, prepare, and install R9 (100 ohms, 5%, Brown−Black−Brown−Gold) Resistor.

__ 47. Locate, prepare, and install R16 (330 ohms, 5%, Orange−Orange−Brown−Gold) Resistor.

__ 48. Locate, prepare, and install R14 (33K, 5%, Orange−Orange−Orange−Gold) Resistor.

Preparing and installing Transistors Q1, Q2 and Q3

NOTE

Observe the "Handling electrostatic sensitive components" precaution when installing these components.

Transistor lead bending and insertion instructions:

1) With your thumb and index finger hold the transistor by its plastic case, so that the flat side is facing you. The transistor leads should protrude downward. 2) With your other hand, use your thumb fingernail to bend the middle lead slightly backward.

Insert the Transistor in the appropriate footprint. The Transistor plastic case (bottom side) should be approx 1/8" above the surface of the PC−board. Do not force the Transistor any lower, or you may internally fracture the middle lead connection.

__ 49. Locate, prepare, and install Q1 (2N5962) Transistor.

__ 50. Locate, prepare, and install Q2 (FJN3304RBU) Transistor (marked R3304). Q2 has two internal 47K resistors, so the resistors shown on the schematic are for reference only.

__ 51. Locate, prepare, and install Q3 (2N3904) Transistor.

Installing the ICs Sockets and ICs

NOTE

Slightly bend a couple of the IC Socket pins to hold it in place, before turning the PC−board over.

__ 52. Locate a 14−pin IC Socket and install in U3 footprint. Orient the socket so that its pin #1 coincides with U3 footprint pin #1.

__ 53. Locate a 14−pin IC Socket and install in U4 footprint. Orient the socket so that its pin #1 coincides with U4 footprint pin #1.

NOTE

Observe the "Handling electrostatic sensitive components" precaution when installing these components.

Preparing the ICs before insertion:

You may have to bend the IC pins inward before insertion into the IC Socket. To do so, follow these instructions: 1) Rest the IC on its side on a flat surface. 2) Grasp the IC plastic body at both ends, and gently bend it forward. 3) Flip the IC on its other side and repeat step #2. This process should be done gradually, and may have to be repeated until all the IC pins can be inserted into the IC Socket.

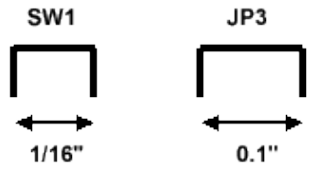
__ 54. Locate, prepare, and insert U3 (CD74HC125E or equivalent) IC. Make sure to orient U3 so that its pin #1 coincides with the designated socket pin #1.

__ 55. Locate, prepare, and insert U4 (CD74HC125E or equivalent) IC. Make sure to orient U4 so that its pin #1 coincides with the designated socket pin #1.

Preparing and Installing the Wire Jumpers

NOTE

Use a couple of the resistor leads that you have previously trimmed to form the (3) wire jumpers. Follow the listed instructions to form the wire jumpers.



Wire Jumpers

Forming the SW1 wire jumpers

Take one of the trimmed leads, and with a pair of needle–nose pliers form the jumper shown. Make two of these jumpers.

__ 56. Insert one of the SW1 jumpers in the upper row of SW1 footprint. Use the two left–most pads. A white line is located directly above the two pads. Slightly bend the jumper leads to hold it in place.

__ 57. Insert the remaining SW1 jumper in the lower row of SW1 footprint. Use the two left–most pads. A white line is located directly above the two pads. Slightly bend the jumper leads to hold it in place.

__ 58. Turn the PC–board over and solder and trim both jumpers accordingly.

Forming the JP3 wire jumper

Take one of the trimmed leads, and with a pair of needle−nose pliers form the jumper shown.

__ 59. Insert JP3 wire jumper into JP3 footprint pads, 4 and 6. Slightly bend the jumper leads to hold it in place.

__ 60. Turn the PC−board over and solder and trim accordingly.

Installing the Operation Selection Jumpers

The JT−E100K operation mode is configured via installation of, or removal of “Jumpers” (shorting blocks) from Jumper Header JP1, JP2, JP3 and JP4.

NOTE

JPn: a−b, denotes installation of jumper onto Jumper Header (n), pins (a) and (b).

Default setting of JT−E100K Jumpers:

__ 61. Install JP1: 1−3.

__ 62. Install JP2: 1−2.

__ 63. Install JP3: 3−5.

__ 64. Install JP4: 1−2, 3−4, and 5−6.

Section 6

JT−E100K Quick−Test

Preliminary testing of your finished kit can be done by connecting it to a host PC, or by using the optional EMBEDDEDkits, AC−Adapter (Part # JTE−9VP). If you are using a PC you must have the IAR Kickstart, or compatible software installed. If you are using the AC−Adapter you do not need to make any cable connections to the host PC or Module.

Required equipment and tools:

__ Digital or Analog Voltmeter with clip−on leads
__ Small tip screwdriver or Potentiometer Adjustment Tool
__ Parallel Port Cable (Part # 25P−PPC)
__ FFC/FCP, JTAG Interface Cable (Part # FFC−10), when using EMBEDDEDkits M−Series Module
__ 14P−IDC, JTAG Interface Cable (Part # 14P−IDC), when using TI, Target Socket Module

__ EMBEDDEDkits M−Series Module
OR
__ TI, Target Socket Module, with and MSP430 Flash Microcontroller Installed

Quick−test using a host PC

For this test, you need to be familiar with the operation of IAR Kickstart (specifically the C−SPY debugger).

__ Connect the male end of the Parallel Port Cable to the host PC. Connect the other end of the cable to JT−E100K, J1 connector.

__ Connect the appropriate JTAG Interface cable to the module you intend to use and to one of the JT−E100K, JTAG connector (J2 or J3).

__ Clip−on the ground lead of the voltmeter to Test Point (GND). Leave the other lead unconnected for now.

__ Turn ON the PC, and start the IAR Kickstart software.

__ From IAR Kickstart load an appropriate MSP430 test program and start the C−SPY debugger. This will turn on the JT−E100K voltage regulator.

Testing the voltage regulator

__ Turn Potentiometer R5 fully counter−clock−wise. This is a multi−turn pot so it may take several turns before you reach the potentiometer zero−resistance point.

__ Connect and hold the voltmeter (set to DC voltage reading) positive lead to Test Point TP2. The

voltmeter should display a value of 2V +/− 5%.

__ Turn the Potentiometer clock−wise. The voltmeter reading should increase as you are turning R5. Stop when you reach a value of approx 3.0V. This is usually the maximum value that the voltage regulator can supply when the JT−E100K is powered from a host PC. This completes this test.

Testing the JTAG drivers voltage supply

__ Leave the potentiometer in the same position as completed in the previous step. Connect and hold the voltmeter (set to DC voltage reading) positive lead to Test Point TP5 (located near the PB1 footprint). The voltmeter should display the value measured in the previous step, +/− 5%. This completes the quick−test.

Quick−test using the EMBEDDEDkits AC−Adapter

Testing the voltage regulator

__ Turn Potentiometer R5 fully counter−clock−wise. This is a multi−turn pot so it may take several turns before you reach the potentiometer zero−resistance point.

__ Insert the AC−Adapter Plug into the JT−E100K power−in jack “PJAK”, and plug the AC−Adapter into a 120VAC, 60Hz outlet.

__ Connect and hold the voltmeter (set to DC voltage reading) positive lead to Test Point TP2. The voltmeter should display a value of 3.6V +/− 5%.

__ With the voltmeter positive lead still connected, remove jumper JP3: 3−5. The voltmeter (set to DC voltage reading) should now display a value of 2V +/− 5%.

__ Turn the Potentiometer clock−wise. The voltmeter reading should increase as you are turning R5. Stop when you reach the potentiometer upper limit. The voltmeter should now display a value of 3.6V +/− 5%.

__ Re−install jumper JP3: 3−5. This completes this test.

Testing the JTAG drivers voltage supply

__ Leave the potentiometer in the same position as completed in the previous step. Connect and hold the voltmeter (set to DC voltage reading) positive lead to Test Point TP5 (located near the PB1 footprint). The voltmeter should display the value measured in the previous step, +/− 5%. This completes the quick−test.

For additional operation details and Jumper settings, consult EMBEDDEDkits, JT−EASY: Model JT−E100A and JT−E100K User’s Guide.

