

Ensemble RXTX 02_USB Power Supply

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USB Power Supply Introduction

General

This stage installs the power supplies for the USB section of the board. This section is galvanically isolated from the rest of the board, with its own ground plane (the "USB ground". Voltages measured in this stage are measured with respect to (WRT) this ground and NOT the "regular ground" of the rest of the board. To paraphrase a famous city's motto, "What happens in USB stays in USB!"

This stage installs the USB connection (with its 5 V bus) and the (very tiny) 3.3V regulator which translates the USB 5 volts to 3.3V for the Si570 and the microcontroller of the [next stage](#)..

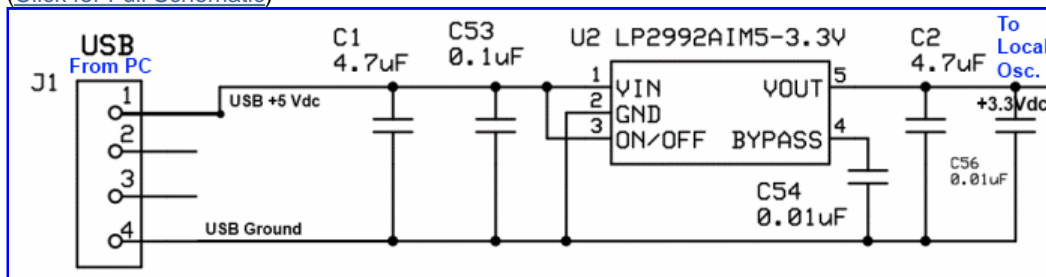
This stage will present the most difficult SMT soldering challenge to the builder; that voltage regulator is, indeed, tiny! The builder should undertake this stage BEFORE that third cup of coffee and take great pains to avoid launching the little chip off into space (never to be retrieved!)

[\(go directly to build notes\)](#)

USB Power Supply Schematic

(Resistor testpoints (hairpin, top, or left-hand lead), as physically installed on the board, are marked in the schematic with red dots)

[\(Click for Full Schematic\)](#)



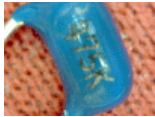




(above schematic has clickable areas that can be used for navigation)

[\(go directly to build notes\)](#)

USB Power Supply Bill of Materials

Stage Bill of Materials

(resistor images and color codes courtesy of [Wilfried, DL5SWB's R-Color Code program](#))

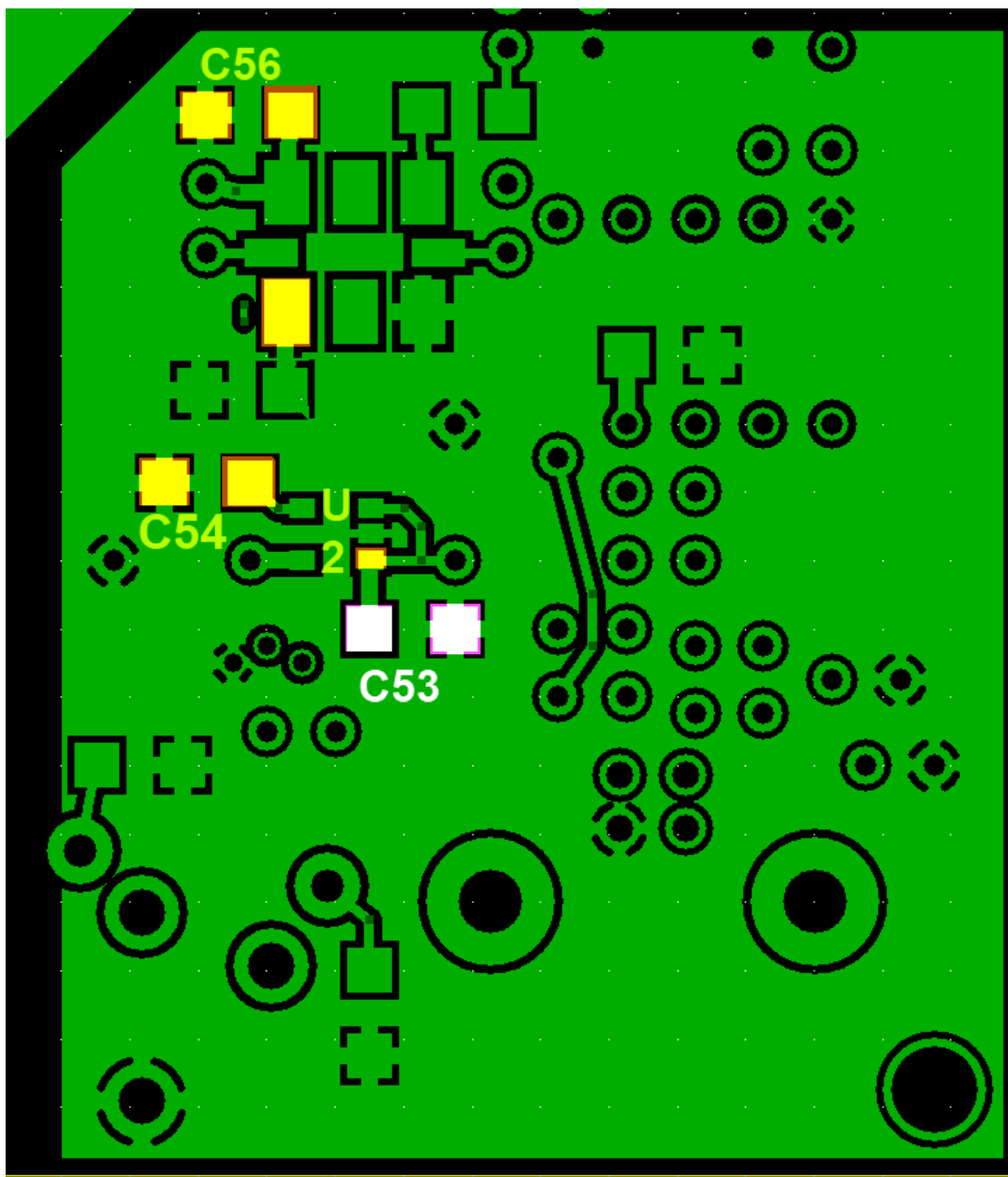
Check	Count	Component	Marking	Category
<input type="checkbox"/>	2	4.7 uF 10% 16V X7R RAD	 475	Ceramic
<input type="checkbox"/>	1	USB-B pcb jack (rt-angle)		Jack-RA
<input type="checkbox"/>	2	0.01 uF	(smt) 	SMT 1206
<input type="checkbox"/>	1	0.1 uF	(smt) black stripe 	SMT 1206
<input type="checkbox"/>	1	LP2992AIM5-3.3V regulator	 LFEA	SOT-23-5

USB Power Supply Summary Build Notes

- Install Topside Capacitors
- Install SMT Components
- Install Topside Connector
- [Test the Stage](#)

USB Power Supply Detailed Build Notes

Bottom of the Board



Install SMT Components

*It is advisable to install the two topside capacitors **BEFORE** installing the voltage regulator, since the holes for those capacitors are dangerously close to the pads for the regulator.*

The 3.3 V voltage regulator is a very tiny component and you must take great care in soldering it. Solder bridges are the usual suspects if this stage fails the voltage test. Pin 2 is USB ground and pins 1 and 3 (on either side) are USB 5 V!.

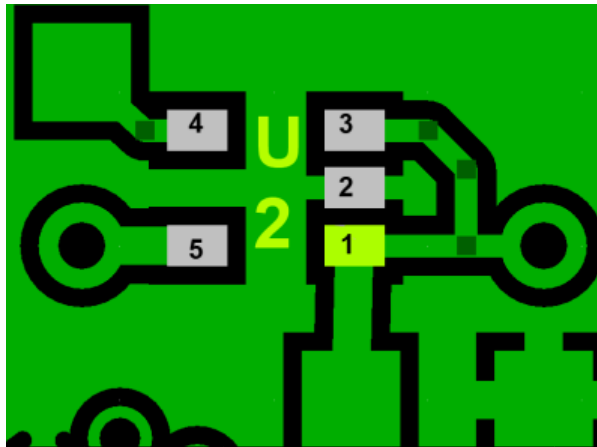
If this is your first attempt at soldering SMT components, please review the materials on the [home page for this kit](#).

The IC (U2) should come in the kit folded into a little "pocket" made from folding over and stapling the bottom portion of the IC bag.

Note, also, that there are two types of SMT capacitors with this kit: 0.01 uF and 0.1 uF. Throughout these notes you will find these documented as follows:

Capacitance	Carrier Strip	Color on Board Bottom
0.1 uF (100 nF)	Black Striped	White
0.01 uF (10 nF)	Clear	Yellow

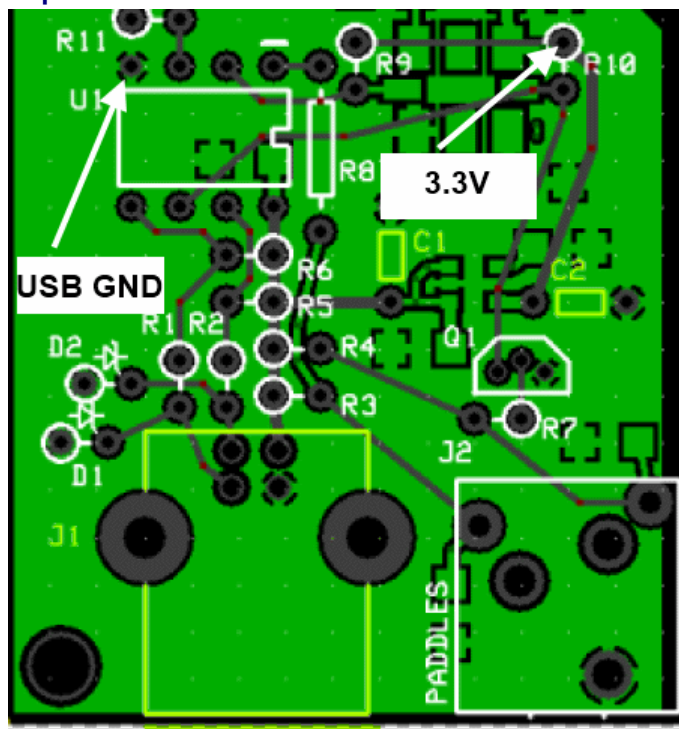
:



Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	U02	LP2992AIM5-3.3V regulator	LFEA 	SOT-23-5		Take ESD precautions
<input type="checkbox"/>	C54	0.01 uF	(smt) 	SMT 1206		

<input type="checkbox"/>	C56	0.01 uF	(smt)	SMT 1206		
<input type="checkbox"/>	C53	0.1 uF	(smt) black stripe	SMT 1206		

Top of the Board



Install Topside Capacitors


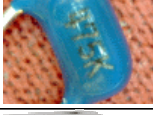

It is advisable to install the two topside capacitors **BEFORE** installing the voltage regulator, since the holes for those capacitors are dangerously close to the pads for the regulator.

The 3.3V regulator is, indeed, very tiny. It is found in a rolled up and stapled bottom portion of an antistatic bag. You have to look very closely to find it. You do not want to do, as the author did, inadvertently toss the chip out with the little rolled up bag!

Due to some problems with recent lots of Si570 devices, Tony has had to pre-mount the Si570s and test them in circuit before sending the kit out. The circuit boards sent out with the Si570 already mounted have a cut in the trace between the 3.3 volt regulator output and the Si570. This is so that the 3.3 volt supply may be verified to be regulating properly before subjecting the Si570 to an over voltage condition. The cut needs to

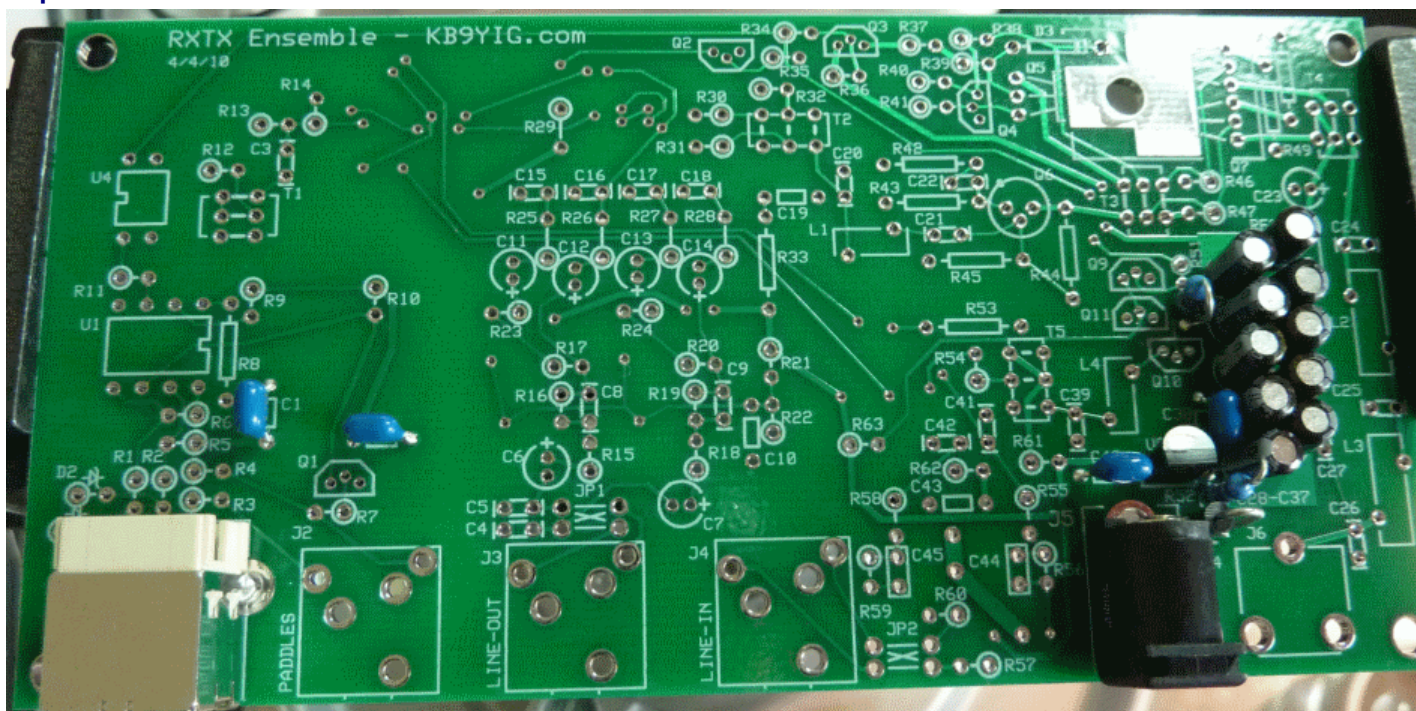
be bridged by scraping the ends of the trace each side of the cut and then soldering in a short wire to bridge the cut!

Install Topside Connector

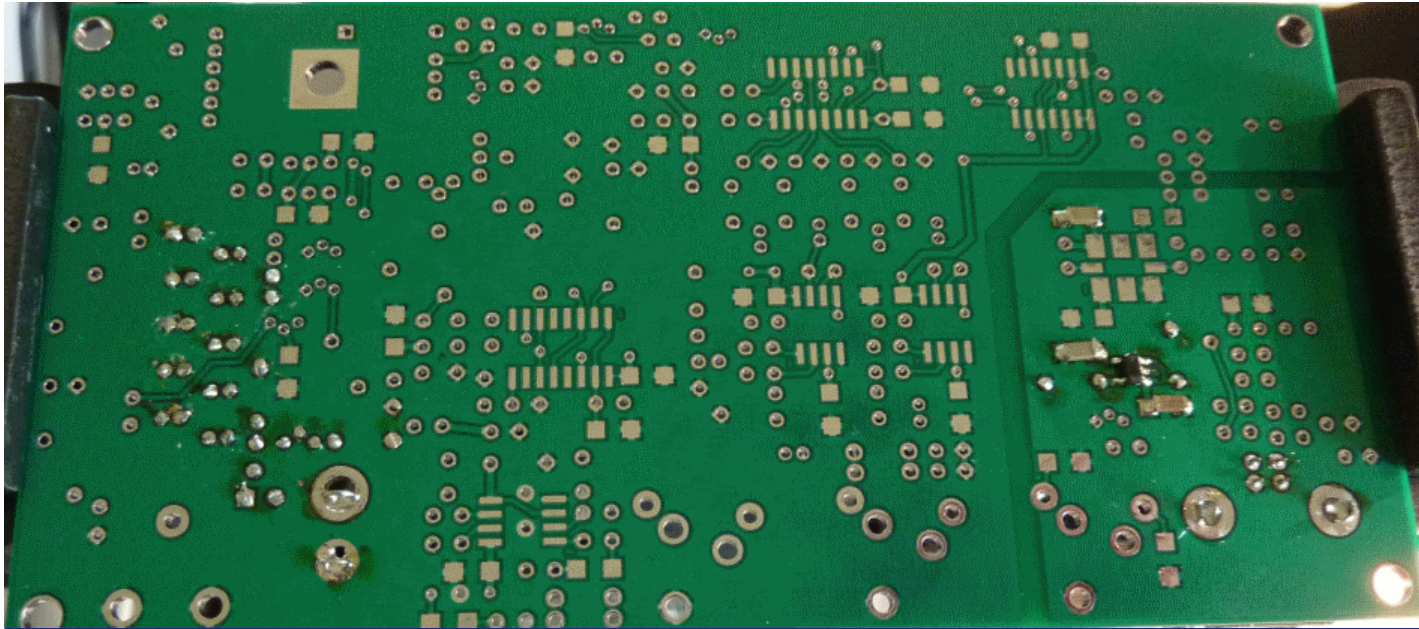
Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	C01	4.7 uF 10% 16V X7R RAD	 475	Ceramic		
<input type="checkbox"/>	C02	4.7 uF 10% 16V X7R RAD	 475	Ceramic		
<input type="checkbox"/>	J1	USB-B pcb jack (rt-angle)		Jack-RA		

USB Power Supply Completed Stage

Top of the Board



Bottom of the Board



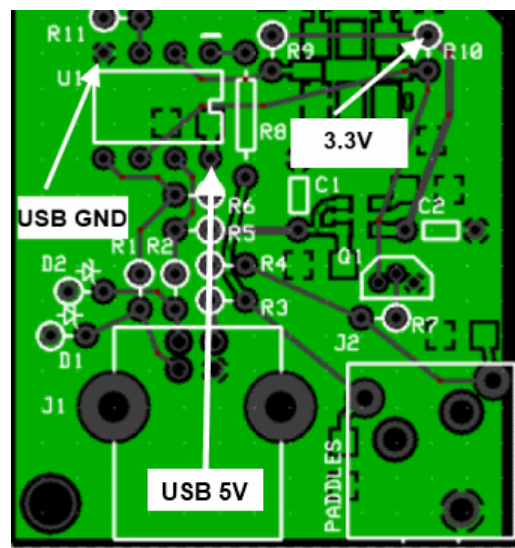
USB Power Supply Testing

Voltage Test

Test Setup

Please note that this voltage is against the galvanically isolated "USB ground". Measurements must be with respect to that ground plane. Conversely, you should see no voltage is measuring with respect to the normal (analog) ground on the rest of the board.

For testing, use pin 4 of U1 for a ground



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
Top lead (hole) of R10 (with respect to USB ground)	Vdc	3.3	3.29	
Lower right pin (hole) of U1	Vdc	5	5.08	

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