

# Ensemble RXTX 01\_Power Supply

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## Power Supply Introduction

### General

This stage provides the simple power supply for 12 and 5 volt busses.

Note that there are actually four power busses:

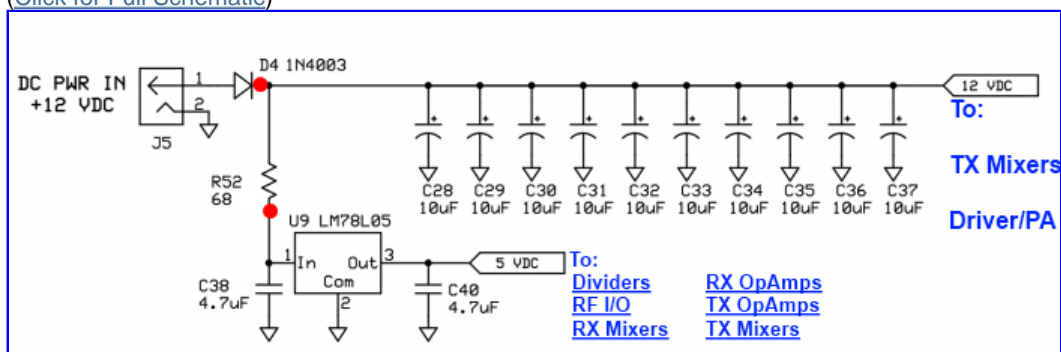
1. The 12 Volt bus - for transmit
2. The 5 volt bus on the "regular" ground plane (this stage) - for powering the lcs installed in the stages following the [Local Oscillator stage](#)
3. The "USB 5 Volt" bus - on its own, galvanically isolated "USB ground", for powering the Local Oscillator and the microcontroller. The PC provides the 5V dc via the USB cable. The USB jack is installed in the [next stage](#).
4. The 3.3V bus - used in the local oscillator stage and working against the "USB ground". (installed in the [next stage](#))

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

## 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)

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










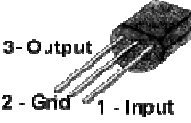
(above schematic has clickable areas that can be used for navigation)

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

## Power Supply Bill of Materials

## Stage Bill of Materials

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

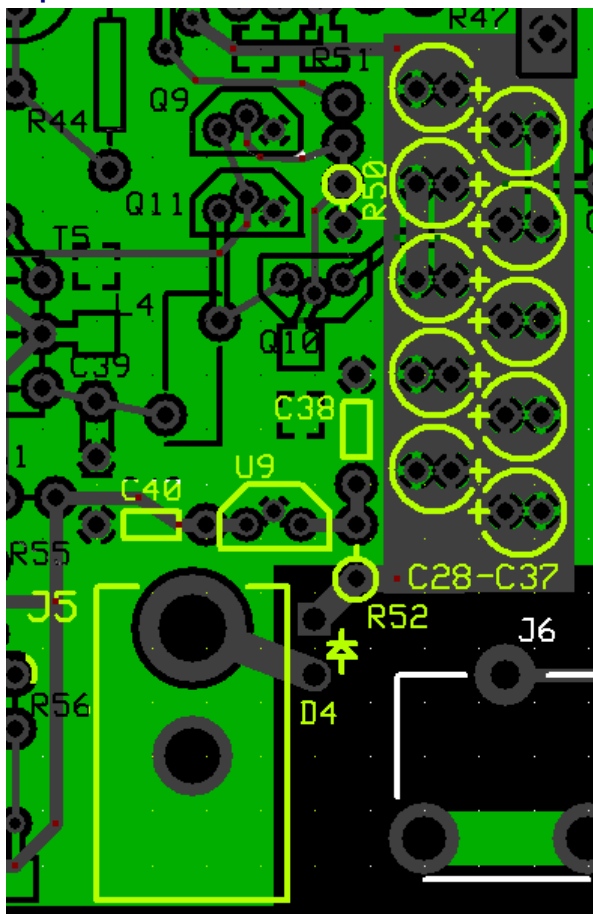
Check	Count	Component	Marking	Category
<input type="checkbox"/>	1	22.1 k 1/4W 1%	r-r-brn-r-br 	1/4W
<input type="checkbox"/>	1	68 1/4W 5%	bl-gry-blk-gld 	1/4W
<input type="checkbox"/>	1	<a href="#">1N4003</a>	1N4003 	Axial
<input type="checkbox"/>	2	<a href="#">4.7 uF 10% 16V X7R RAD</a>	475 	Ceramic
<input type="checkbox"/>	10	10uF/16 VDC		Electrolytic
<input type="checkbox"/>	1	DC Power Jack PCB Mount (rt-angle)		Jack-RA
<input type="checkbox"/>	1	DC Power Plug 5.5/2.1mm Pos Ctr		Plug
<input type="checkbox"/>	1	<a href="#">LM78L05 voltage regulator</a>	LM78L05 	TO-92

## Power Supply Summary Build Notes

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

## Power Supply Detailed Build Notes

### Top of the Board



















#### Install Topside Components



Mount the 2 4.7 uF ceramics first and watch out for C38: the silkscreen could lead you to believe it is horizontally oriented when it actually is vertically oriented (N-S) on the board.

Pay careful attention to the polarity of the electrolytic capacitors. The positive lead is usually the longer lead; the negative lead is on the side with the grey stripe and a minus sign.

The diode's polarity is also critical. Mount it such that the cathode end of the diode (with the stripe on it) is a hairpin lead into the square hole.

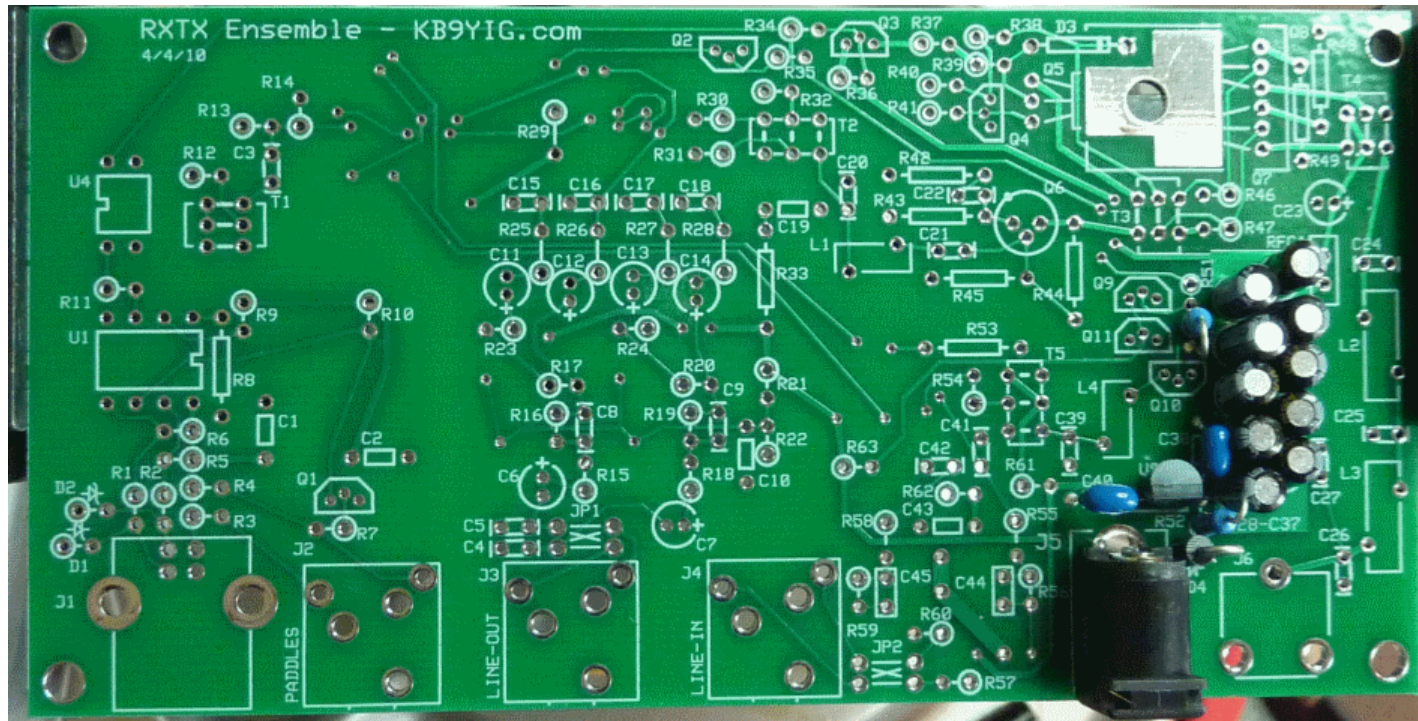
Resistor R50, while not part of the power supply circuit, is installed in this stage so as to provide a convenient (regular) ground point at its hairpin lead for the tests at the end of this stage and subsequent stages.

Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	P1	DC Power Plug 5.5/2.1mm Pos Ctr		Plug		
<input type="checkbox"/>	D4	<a href="#">1N4003</a>	1N4003 	Axial		Mouint hairin style (barrel in round hole, hairpin lead in square hole)
<input type="checkbox"/>	C38	<a href="#">4.7 uF 10% 16V X7R RAD</a>	475 	Ceramic	vert	
<input type="checkbox"/>	C40	<a href="#">4.7 uF 10% 16V X7R RAD</a>	475 	Ceramic	horiz	
<input type="checkbox"/>	R52	68 1/4W 5%	bl-gry-blk-gld 	1/4W	N-S	(some kits may have 1/6W - this version is still OK)
<input type="checkbox"/>	U09	<a href="#">LM78L05 voltage regulator</a>	LM78L05 3- Output 2 - Grid 1 - Input 	TO-92		Take <a href="#">ESD precautions</a>
<input type="checkbox"/>	C28	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C29	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C30	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C31	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C32	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C33	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C34	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C35	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C36	10uF/16 VDC		Electrolytic		
<input type="checkbox"/>	C37	10uF/16 VDC		Electrolytic		

<input type="checkbox"/>	R50	22.1 k 1/4W 1%	r-r-brn-r-br 	1/4W	N-S	Installed and used as (regular) ground reference.
<input type="checkbox"/>	J5	DC Power Jack PCB Mount (rt- angle)		Jack-RA		

## Power Supply Completed Stage

### Top of the Board



## Power Supply Testing

### Current draw

#### Test Setup

Before applying power for the first time, test the resistance across the 12V power rail (positive lead at the point marked for the non-hairpin end of R52; negative lead on a convenient ground (see diagram below)). You should see a very high resistance (over 50 k ohms) and it should climb (as the electrolytic capacitors charge up with the ohmmeter's voltage). Ultimately, you should see an extremely high (or infinite) resistance.

Once you have successfully passed the resistance test, put your mA meter in series with the input voltage positive line and measure the current draw of the power supply.

**Test Measurements**

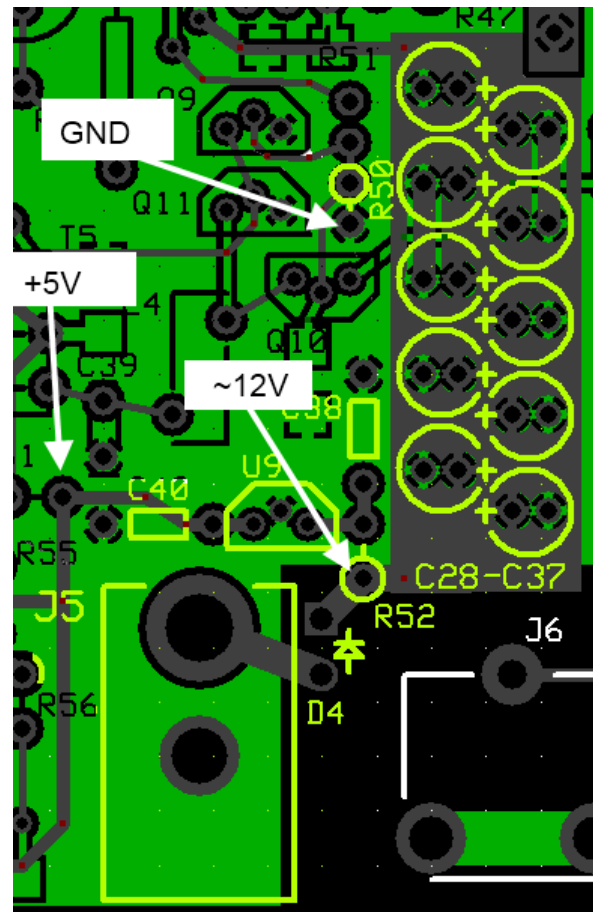
Testpoint	Units	Nominal Value	Author's	Yours
Current draw	mA	< 8	4.5	

**Voltage Tests****Test Setup**

Power up the board with a 12V supply (no limiting resistor) and measure the voltage at the test points indicated.

(Author's measurements below were taken using power from a gel cel whose voltage measured 12.9V)

Voltage measurements are WRT regular ground. For this test you can use the "hairpin" of R50 as a convenient regular ground test point.

**Test Measurements**

Testpoint	Units	Nominal Value	Author's	Yours
Hairpin lead (hole) of R61 (wrt ground)	V dc	5 (+/- 2%)	4.94	

Hairpin lead of D4 (wrt ground) - (with 12.9 V gelcell)	V dc	12	12.3	
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