

USB I2C Interface (BETA) 01_Build Stage

[Home](#) [Bill of Materials \(BOM\)](#) [Build Stage](#) [External Connections](#) [Interface to Rig\(s\)](#) [Comments](#)
[Acronyms](#) [Revisions as of 10/25/2009](#) [WB5RVZ Main Website](#)

Search: Search selected SDR sites

Build Stage Introduction

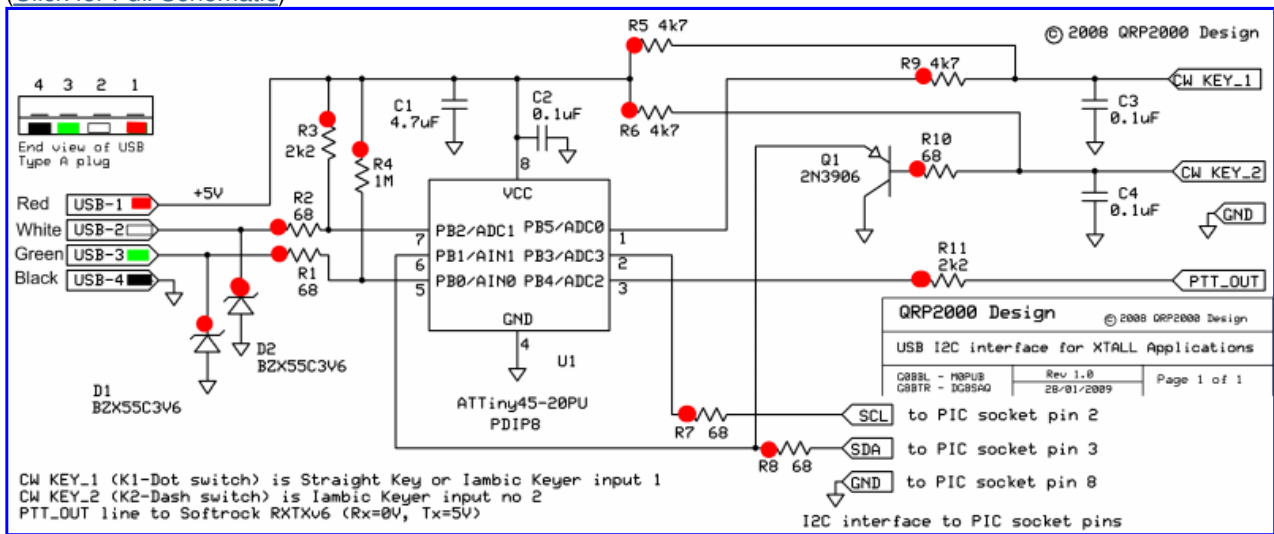
General

This kit will actually be built in a single stage, followed by a stage for setting up the interconnections to the rig(s) of choice.

Build Stage 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)

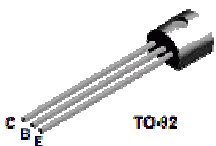


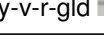
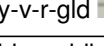


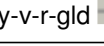

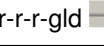


Build Stage Bill of Materials

Stage Bill of Materials

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

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
<input type="checkbox"/>	D1	BZX55C3V6 zener	BZX55C	Axial	flat-horiz		Build Stage
<input type="checkbox"/>	D2	BZX55C3V6 zener	BZX55C	Axial	flat-horiz		Build Stage
<input type="checkbox"/>	R04	1 M 1/6W 5%	brn-blk-grn-gld	1/6W	flat-horiz		Build Stage
<input type="checkbox"/>	C02	0.1 uF	(smt) black stripe	SMT 1206			Build Stage
<input type="checkbox"/>	C01	4.7 uF 10%		Ceramic			Build Stage
<input type="checkbox"/>	R01	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz		Build Stage
<input type="checkbox"/>	SO1	8 pin dip socket		socket			Build Stage
<input type="checkbox"/>	C03	0.1 uF	(smt) black stripe	SMT 1206			Build Stage
<input type="checkbox"/>	R03	2.2 k 1/6W 5%	r-r-r-gld	1/6W	flat-horiz		Build Stage

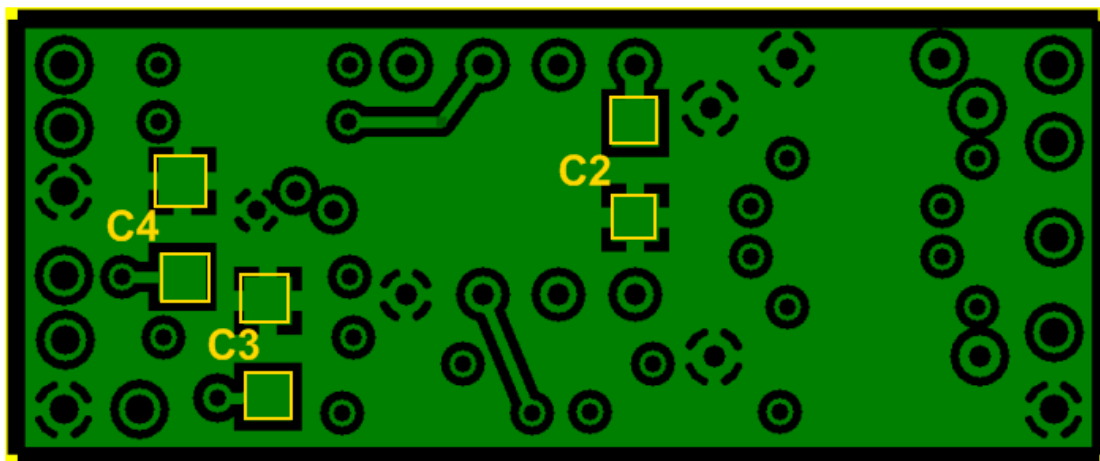
<input type="checkbox"/>	Q1	2N3906 PNP transistor	2N3906 	TO-92		Build Stage
<input type="checkbox"/>	C04	0.1 uF	(smt) black stripe 	SMT 1206		Build Stage
<input type="checkbox"/>	R02	68 1/6W 5%	bl-gry-blk-gld 	1/6W	flat-horiz	Build Stage
<input type="checkbox"/>	R05	4.7 k 1/4 W 5%	y-v-r-gld 	1/4W	flat-horiz	Build Stage
<input type="checkbox"/>	R06	4.7 k 1/4 W 5%	y-v-r-gld 	1/4W	flat-horiz	Build Stage
<input type="checkbox"/>	R07	68 1/6W 5%	bl-gry-blk-gld 	1/6W	flat-horiz	Build Stage
<input type="checkbox"/>	R08	68 1/6W 5%	bl-gry-blk-gld 	1/6W	flat-horiz	Build Stage
<input type="checkbox"/>	R09	4.7 k 1/4 W 5%	y-v-r-gld 	1/4W	flat-horiz	Build Stage
<input type="checkbox"/>	R10	68 1/6W 5%	bl-gry-blk-gld 	1/6W	flat-horiz	Build Stage
<input type="checkbox"/>	R11	2.2 k 1/6W 5%	r-r-r-gld 	1/6W	flat-horiz	Build Stage

Build Stage Summary Build Notes

- Mount SMT Caps
- Mount the Diodes
- Mount R1 and R3
- Mount R2 and R4
- Mount remaining resistors
- Mount C01, SO1, and Q1
-
- [Test the Stage](#)

Build Stage Detailed Build Notes


Bottom of the Board





Mount SMT Caps

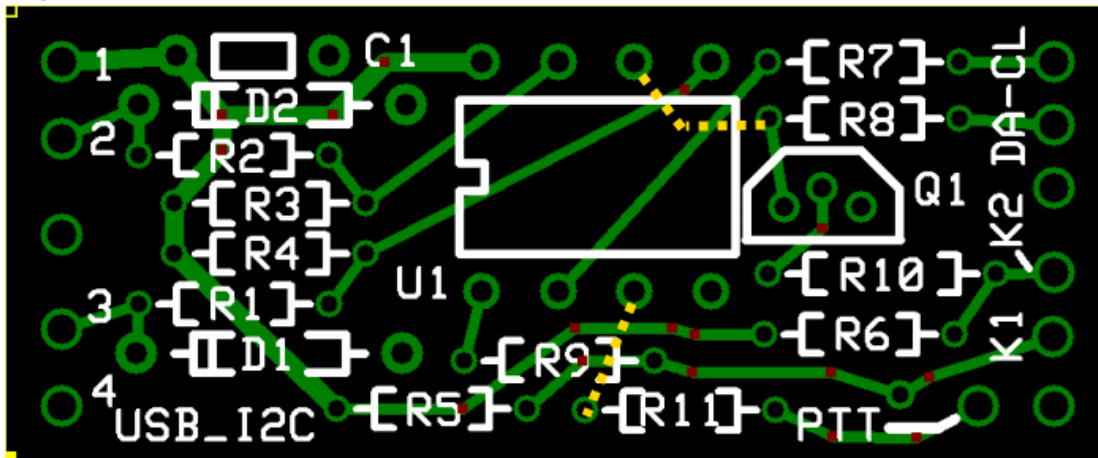
Mount SMT caps C02-C04 to the bottom side. Take care not to "launch" one off into space - you'll never find it. Tony has packed one extra in the kit, just for that contingency.

The image above shows the bottom-side location of the mounting pads for each of the 3 capacitors (highlighted in yellow)

Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	C02	0.1 uF	(smt) black stripe 	SMT 1206		

<input type="checkbox"/>	C03	0.1 uF	(smt) black stripe 	SMT 1206		
<input type="checkbox"/>	C04	0.1 uF	(smt) black stripe 	SMT 1206		

Top of the Board

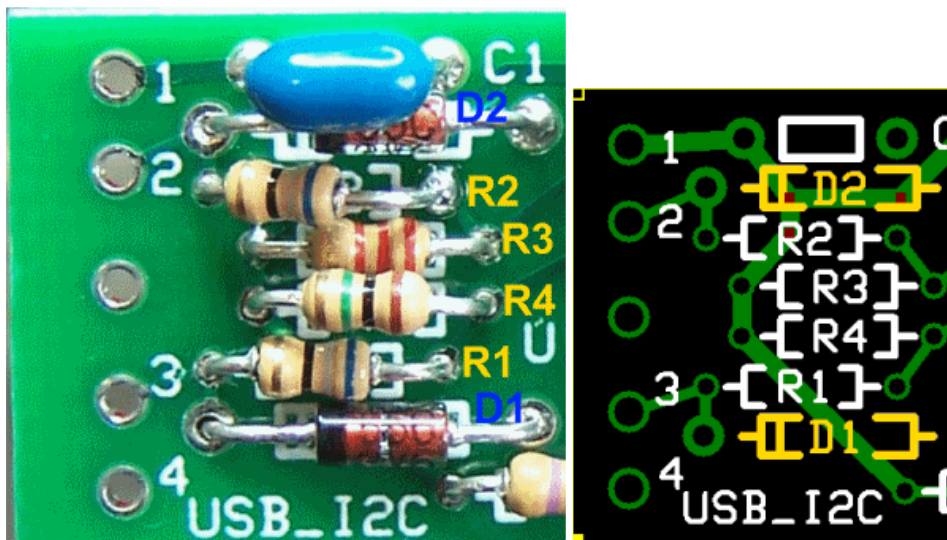


Mount the Diodes

The two zeners are to protect the PC USB port, not the AVR chip, as that runs off a 5V supply. They are there with R1 and R3 to limit the USB signals to the PC to nominal level of 3.6v maximum.

Look very carefully at the photo of the top of the board. Depicted as faint yellow dashed lines are two traces from the bottom of the board which, together with the traces at the top, cover all the circuit traces. These are provided visually here should you have a need to trace signals on the board.

Space is quite constrained in the area of the diodes and resistors R1-R4. Components will have to be mounted in a sort of vertically "stacked" fashion in order to fit all of them in. See the photo below:



Mount D1 and D2, flush to the board. Banded end toward the left-hand edge of the board

Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	D1	BZX55C3V6 zener	BZX55C	Axial	flat-horiz	
<input type="checkbox"/>	D2	BZX55C3V6 zener	BZX55C	Axial	flat-horiz	

Mount R1 and R3

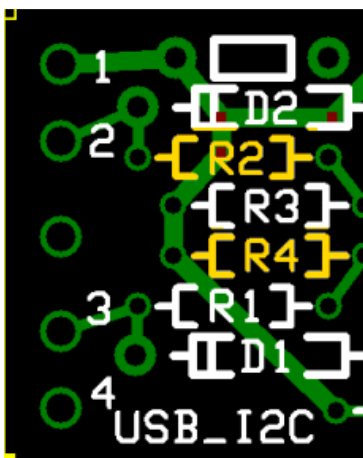
Mount R1 and R3 flush to the board



Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	R01	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz	
<input type="checkbox"/>	R03	2.2 k 1/6W 5%	r-r-r-gld	1/6W	flat-horiz	

Mount R2 and R4

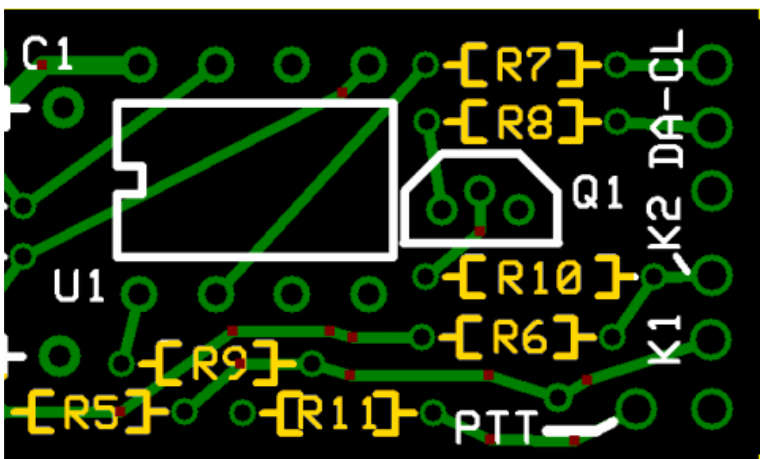
Mount R2 and R4, raised slightly above the board, to provide separation between resistor bodies.



Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	R04	1 M 1/6W 5%	brn-blk-grn-gld	1/6W	flat-horiz	
<input type="checkbox"/>	R02	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz	

Mount remaining resistors

Mount remaining resistors flush to the board

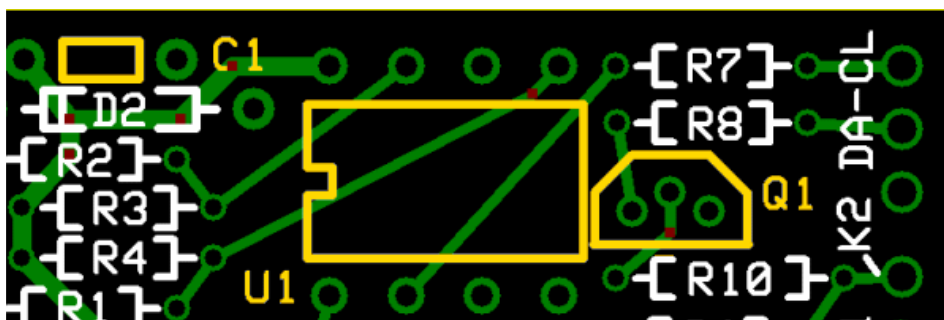



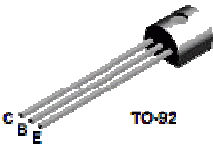
Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	R05	4.7 k 1/4 W 5%	y-v-r-gld	1/4W	flat-horiz	

<input type="checkbox"/>	R06	4.7 k 1/4 W 5%	y-v-r-gld	1/4W	flat-horiz	
<input type="checkbox"/>	R07	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz	
<input type="checkbox"/>	R08	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz	
<input type="checkbox"/>	R09	4.7 k 1/4 W 5%	y-v-r-gld	1/4W	flat-horiz	
<input type="checkbox"/>	R10	68 1/6W 5%	bl-gry-blk-gld	1/6W	flat-horiz	
<input type="checkbox"/>	R11	2.2 k 1/6W 5%	r-r-r-gld	1/6W	flat-horiz	

Mount C01, SO1, and Q1

Mount the ceramic cap, the socket for U1, and the 2n3906 transistor

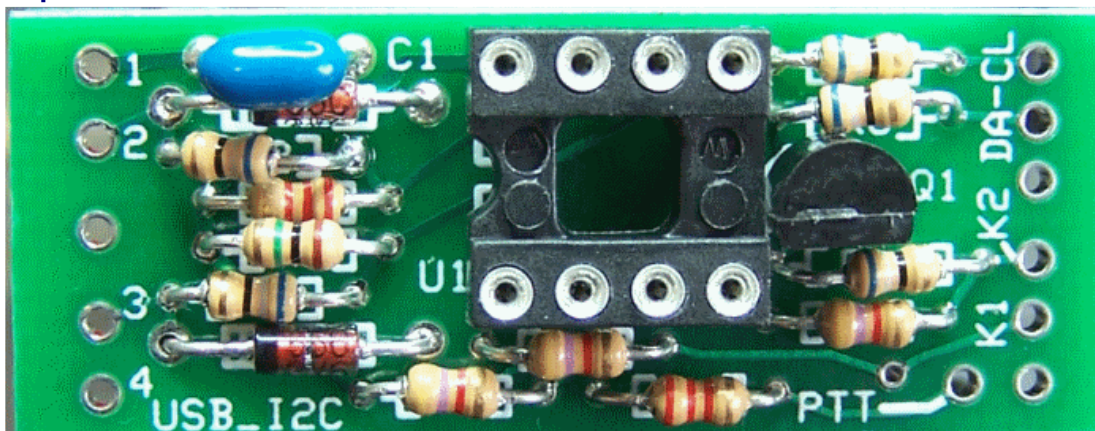


Check	Designation	Component	Marking	Category	Orientation	Notes
<input type="checkbox"/>	C01	4.7 uF 10%	475 	Ceramic		
<input type="checkbox"/>	SO1	8 pin dip socket		socket		
<input type="checkbox"/>	Q1	2N3906 PNP transistor	2N3906 	TO-92		

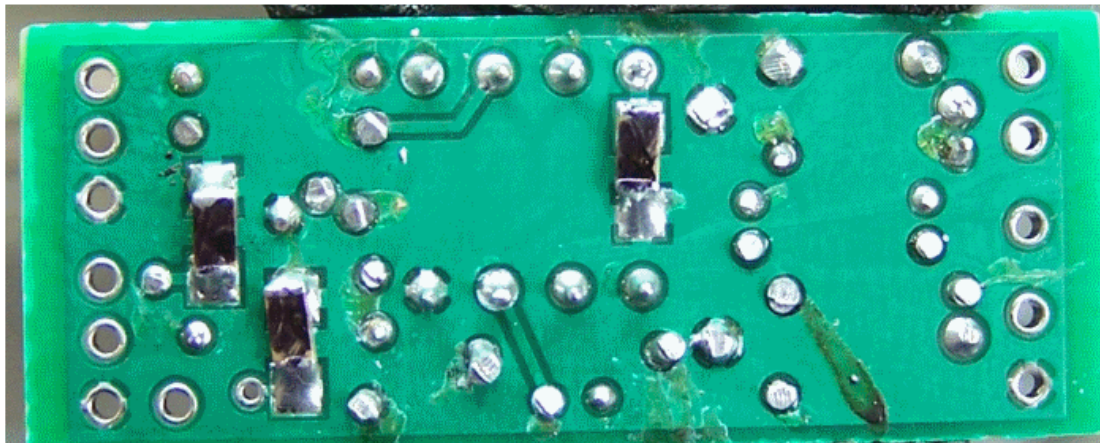
End of stage

Build Stage Completed Stage

Top of the Board



Bottom of the Board



Build Stage Testing

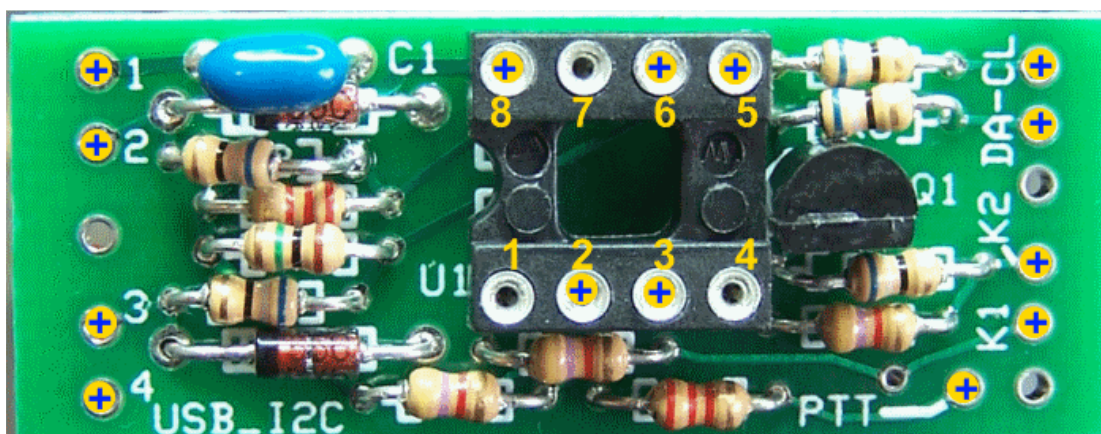
Resistance Tests

Test Setup

Perform this test with the ATTINY (U1) UNPLUGGED from SO1

- Measure resistances between the test points indicated in the table below
- Note: the resistance measurements should be within plus or minus 5% of the nominal value

In the next stage, we will connect the USB cable and apply power, via the USB port, to the board, with, and without U1 installed, measuring the voltages.



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
U1-3 to PTT	k ohm	2.2	2.18	
U1-2 to CL	ohm	68	67	
U1-6 to DA	ohm	68	67	
USB-1 to K1	k ohm	4.7	4.6	
USB-1 to K2	k ohm	4.7	4.6	
USB-1 to U1-8	ohm	0	0	
USB-2 to U1-7	ohm	68	66.8	
USB-2 to USB-1	k ohm	2.268	2.27	
USB-3 to U1-5	ohm	68	66.8	
USB-3 to USB-1	k ohm	950 - 1,050	968	
USB-4 to U1-6	M ohm	off the scale	off the scale	

[Home](#)
[Bill of Materials \(BOM\)](#)
[Build Stage](#)
[External Connections](#)
[Interface to Rig\(s\)](#)
[Comments](#)
[Acronyms](#)
[Revisions as of 10/25/2009](#)
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