



2Y2 Overlay and Parts List (doc. rev. 1.0a)

Resistors (note multiplier: R=0; k=1,000; M=1,000,000)

R	Value	@	4 Band Code 4 th band GOLD	Sh	5 Band Code 5 th band BROWN	Description
R1	47R 5%	P3	YEL VLT BLK	B		(-)ve voltage generator current limiter (*)
R2	3.3R 5%	U7	ORN ORN GOLD	B		1Watt Display current limit (from VBATT)
R3	22k 5%	W8	RED RED ORN	B	RED RED BLK RED	RS232 steering circuit, combines Y1A + Y1B
R4	22k 5%	W6	RED RED ORN	B	RED RED BLK RED	As for R3
R5	10k 5%	S8	BRN BLK ORN	4	BRN BLK BLK RED	V4 input res. from Y3-p10. main. (see notes)
R6	22k 5%	K9	RED RED ORN	7	RED RED BLK RED	SVout PWM filter res. to C27 and U8A-p3
R7	100R 5%	J8	BRN BLK BRN	7	BRN BLK BLK BLK	SVout short protection, U8A-p1 to Y3-p2 (*)
R8	22k 5%	M9	RED RED ORN	7	RED RED BLK RED	NBsim PWM filter res. to C28 and U8b-p5
R9	100R 5%	M9	BRN BLK BRN	7	BRN BLK BLK BLK	NBsim short protect., U8B-p7 to Y3-p3 (*)
R10	180k 1%	N8	See 1%	7	BRN GRY BLK ORN	WBlin diff. output, gain setting R to U6A-p2
R11	180k 1%	O8	See 1%	7	BRN Grey BLK ORN	WBlin diff. output, gain setting R to U6A-p3
R12	220k 1%	Q8	See 1%	7	RED RED BLK ORN	WBlin integrator feedback U6A-p2
R13	220k 1%	P8	See 1%	7	RED RED BLK ORN	WBlin diff. output, gain setting R to U6A-p3
R14	100R 5%	O8	BRN BLK BRN	7	BRN BLK BLK BLK	WBlin short protect., U6A-p1 to Y3-p4
R15	2.2k 5%	N4	RED RED RED	8	RED RED BLK BRN	TWI (I2C) pull-up on E2SD (U1-p28)
R16	2.2k 5%	N3	RED RED RED	8	RED RED BLK BRN	TWI (I2C) pull-up on E2CK (U1-p27)
R17	22k 5%	E9	RED RED ORN	8	RED RED BLK RED	BTN pull-up to +5V (across D9) to Y3-p1
R18	1.5k 5%	F8	BRN GRN RED	A	BRN GRN BLK BRN	AMB heater LED activity current limit res.
R19	150 5%	I9	BRN GRN BRN	A	BRN GRN BLK BLK	RED status LED current limit res. See notes!
R20	1.5k 5%	I8	BRN GRN RED	A	BRN GRN BLK BRN	GRN power LED current limit res. to VBATT
R21	15k 5%	R8	BRN GRN ORN	6	BRN GRN BLK RED	COIL (RPM) 1Watt current limit res. to VR1
R22	1.5k 5%	Q8	BRN GRN RED	6	BRN GRN BLK BRN	RPML0 current limit res. to U9-p9
R23	10k 5%	B3	BRN BLK ORN	4	BRN BLK BLK RED	USR1 Input res. to C34 and U3-p5 MUX (Y1)
R24	10k 5%	B2	BRN BLK ORN	4	BRN BLK BLK RED	USR2 Input res. to C34 and U3-p2 MUX (Y2)
R25	10k 5%	B1	BRN BLK ORN	4	BRN BLK BLK RED	USR3 Input res. to C34 and U3-p4 MUX (Y3)
R26	100k 5%	B6	BRN BLK YEL	4	BRN BLK BLK ORN	TC3 input pull down res. to R31
R27	100k 5%	B7	BRN BLK YEL	4	BRN BLK BLK ORN	TC2 input pull down res. to R30
R28	100k 5%	B8	BRN BLK YEL	4	BRN BLK BLK ORN	TC1 input pull down res. to R29
R29	1k 5%	B7	BRN BLK RED	4	BRN BLK BLK BRN	TC1 input current limit res. to U3-p12 (X0)
R30	1k 5%	B7	BRN BLK RED	4	BRN BLK BLK BRN	TC2 input current limit res. to U3-p12 (X1)
R31	1k 5%	B6	BRN BLK RED	4	BRN BLK BLK BRN	TC3 input current limit res. to U3-p12 (X2)
R32	100k 1%	K6	See 1%	5	BRN BLK BLK ORN	X101 TC amp gain setting R. to U8C-p8 (*)
R33	1k 1%	M6	See 1%	5	BRN BLK BLK BRN	X1, X101 TC amp gain setting res. (*)
R34	10k 1%	H8	See 1%	4	BRN BLK BLK RED	Heater voltage sense lo side res. to GND (*)
R35	30k 1%	I8	See 1%	4	ORN BLK BLK RED	Heater voltage sense high side res. to R36
R36	10k 5%	H8	BRN BLK ORN	4	BRN BLK BLK RED	H+SENSE current limit to U3-p1 MUX (*)

Display Option Resistors

R37	47R 5%	D3	YEL VLT BLK	E		LED current limit res. for (a) segment
R38	47R 5%	G3	YEL VLT BLK	E		LED current limit res. for (b) segment
R39	47R 5%	F3	YEL VLT BLK	E		LED current limit res. for (c) segment
R40	47R 5%	E3	YEL VLT BLK	E		LED current limit res. for (d) segment
R41	47R 5%	D3	YEL VLT BLK	E		LED current limit res. for (e) segment
R42	10k 5%	F0	BRN BLK ORN	E	BRN BLK BLK RED	pull-up for serial interface logic on U4/U7
R43						
R44	22k 5%	J1	RED RED ORN	E	RED RED BLK RED	pull-up for buttons PB1 & PB2 (optional)
R45	47R 5%	E3	YEL VLT BLK	E		LED current limit res. for (f) segment
R46	47R 5%	G3	YEL VLT BLK	E		LED current limit res. for (g) segment
R47	47R 5%	F3	YEL VLT BLK	E		LED current limit res. for (dp) segment

Resistor notes: Most resistors come in the kit as 1% because they cost the same as 5% resistors and having 1% and 5% resistors of the same value is confusing. The problem is that 1% resistors with 5 bands are hard to read (you first have to work out the orientation of the part before you can begin decoding them!). In the table above, where the description contains (*) the accuracy markings on the PCB are incorrect – ie 5% should be 1%, and vice versa. In all cases, a 1% resistor can replace a 5% resistor, but a resistor marked as 1% above should NEVER be replaced with a 5% resistor.

Capacitors (qualifiers: [μ , n, p]): 1 μ F = 1,000nF; 1nF = 1,000pF; eg: 3.3nF=3,300pF=0.0033 μ F)

Part	ID	@	Description	Sh	Notes
C1	100u	P1	100 μ F 25V Electro	2	Storage cap. from VBATT to U10 VREG. Min. 10uF 25V. (Note 6)
C2	104	R1	100nF Block Mono	2	Input filter cap. from VBATT to U10 VREG.
C3	104	R2	100nF Block Mono	2	Output filter cap. from U10 VREG to +5V
C4	100u	Q1	100 μ F 25V Electro	2	Output storage cap. from U10 VREG. Minimum 100uF 10V. (Note 6)
C5	x	n/a	<i>optn. logger module</i>	9	100nF - +3V3 output filter cap. from U601
C6	x	n/a	<i>optn. logger module</i>	9	100nF - +5V input filter cap. to U601
C7	x	n/a	<i>optn. logger module</i>	9	100nF - NE555 pulse extender for DDEN signal (logger activity LED)
C8	104	L8	100nF Block Mono	2	Thermocouple amp VCC filter cap.
C9	104	P4	100nF Block Mono	2	Lambda module VCC filter cap.
C10					
C11	104	V3	100nF Block Mono		VGND filter cap at Y5 from 90PCB (transition PCB)
C12	15	G5	15pF Ceramic Disc	1	Load caps for crystal (XTAL16)
C13	15	H5	15pF Ceramic Disc	1	as for C12
C14	104	H2	100nF Block Mono	1	+5V filter cap to CPU U1
C15	104	J3	100nF Block Mono	1	AREF filter cap to CPU U1
C16	104	K3	100nF Block Mono	1	Analog VCC filter cap to CPU U1
C17	105	Q3	1.0 μ F Block Mono	B	Negative voltage generator filter cap. to GND
C18	104	O3	100nF Block Mono	B	Filter cap. between VBATT and VNEG.
C19	104	S5	100nF Block Mono	B	Filter cap. for ST202/HIN202 voltage doubler/inverter
C20	104	S7	100nF Block Mono	B	As for C19
C21	104	U5	100nF Block Mono	B	As for C19
C22	104	S6	100nF Block Mono	B	As for C19
C23	104	U7	100nF Block Mono	B	As for C19
C24	104	O1	100nF Block Mono	A	U12 VREG output filter cap. to 5VOUT
C25	102	J8	1nF Ceramic Disc	4	V4 input filter cap. from R5 (via Y3-p10) to GND. (<i>see notes</i>)
C26	104	O2	100nF Block Mono	A	5VOUT (U12) input filter cap. to VBATT
C27	104	K8	100nF Block Mono	7	SVout PWM filter cap. from R6 to U8A-p3
C28	104	L8	100nF Block Mono	7	NBsim PWM filter cap. from R8 to U8B-p5
C29	332	N8	3.3nF Ceramic Disc	7	WBlin integrator cap. across U6A-p2 to R14, in par. With R12
C30	332	P8	3.3nF Ceramic Disc	7	WBlin DAC filter cap. from R11 to U6A-p3
C31	563	G7	56nF Green Poly	6	Large green cap! RPM high frequency cut-off from VR1
C32	102	B2	1nF Ceramic Disc	4	U1 CPU input filter cap. from R23 (via Y2-p6) to GND
C33	102	B2	1nF Ceramic Disc	4	U1 CPU input filter cap. from R24 (via Y2-p7) to GND
C34	102	B1	1nF Ceramic Disc	4	U3 MUX input filter cap. from R25 (via Y2-p8) to GND
C35	104	D6u	100nF Block Mono	4	UNDER (back of PCB) PB1 – +5V filter cap. for U3 MUX
C36	x	N7	<i>do NOT install</i>	5	Integrator capacitor on U8C – can cause problems, so not installed!
C37	102	H6	1nF Ceramic Disc	4	H+ input filter cap. from R35 (via Y5-p7) to GND
C38	104	F5u	100nF Block Mono	E	UNDER (back of PCB) U7 – VCC filter cap. for U7
C39					
C40	104	D0	100nF Block Mono	E	VCC filter cap. for U4
C602	x	n/a	<i>optn. logger module</i>	9	SMD 100nF, on logger module - VCC filter cap. for U606

Semiconductors and Other Parts

Part	@	Description	Sh	Notes
AMB	F9	Amber 5mm LED	A	Heater power indicator LED, also called LED3
BTN	D9	Tactile switch 90° press button	8	Main tactile push button (was called PBO on 2Y1) at side of case
D1	U0	1N5822A Schottky Diode	2	Power supply reverse protection - Note 7
D2	J0	1.5KE-33A Tranzorb® Diode	2	Power supply over-voltage spike suppression - Note 7
D3	S2	1N4007 Power Diode	2	VCC (+5V) regulator source short-circuit protection - Note 7
D4	V7	1N4148 Signal Diode	B	RS232 steering diode - Installed end-on, Note 7
D5	V5	1N4148	B	As for D4 - Installed end-on, Note 7
D6	M2	1N4007	A	5VOUT (additional) regulator source short-circuit protection - Note 7
D7	S8	1N4148	6	RPM external high voltage limit into Schmitt trigger to +5V
D8	S7	1N4148	6	RPM external high voltage limit into Schmitt trigger from GND
D9	E6	1N4148	8	External BTN protection for internal circuitry
L1	J4	100uH /330uH Inductor	1	Analog filter for AVCC from +5V (and C16) to U1-p20
F1	O0	3A Fuse	2	Goes between F1A & F1B, see note 2
F1A	M0	Fuse holder left	2	Fuse holder is made up of two identical parts, see note 2
F1B	R0	Fuse holder right	2	as for F1A
GRN	H9	Green 5mm LED	A	Power indicator LED, also called LED1
J1	N7	2mm 3-pin header + shunt	5	jumper block for x101 or x1 position (default shunt posn. x101)
J2	P9	2mm 2-pin header + shunt	7	WBlin jumper converts differential output to single ended if ON
RED	G9	RED 5mm LED	A	Status indicator LED, also called LED2. <i>Requires mod(s) to main PCB</i>
T1	C8	47k @ 25°C Thermistor	3	looks like a small multi-coloured capacitor
U1	I3	28-pin DIP socket + M168	1	Atmega-168-20 CPU, Note 3
U2	L3	8-pin DIP (<i>MC24256 not used</i>)	8	8-pin EEPROM device – <i>not supported with any public firmware</i>
U3	D7	16-pin DIP socket + 74HC4052	4	MUX, Note 3
U4	E0	16-pin DIP socket + 74HC595	E	<i>display kit option</i> - low-side driver for LED display option
U5	T6	16-pin DIP socket + ST202	B	RS232 driver + (-ve) rail generator. ST202, HIN202, etc. may be used
U6	P7	8-pin DIP socket + LM358	7	Op-Amp for WBlin (U6B not used), Note 3
U7	E5	16-pin DIP socket + TPIC6C595	E	<i>display kit option</i> – low-side (digit) driver for LED module
U8	K7	14-pin DIP socket + LMC6484	5, 7	TC amp + Svout & Nbsim filter – PCB says MC33204 (<i>it's incorrect!</i>)
U9	O5	14-pin DIP socket + 74HC14	7	Schmitt trigger, Note 3
U10	U1	LM7805 TO-220 5v regulator	2	Main (internal) +5V regulator - Note 1
U12	L1	LM7805 TO-220 5v regulator	A	External 5V regulator - Note 1
VR1	S9	10k Trimpot	6	RPM attenuator – Marked as 103
W1	G6	<i>(do not install)</i> wire link	4, 5	Option for cut down model where no U3 and only one Y4 user input.
W2	C8	<i>(do not install)</i> wire link	4, 5	Install this link only if the W1 link is installed.
W3	C8	<i>(do not install)</i> wire link	4, 5	Link requires special firmware – connects LOGBTN direct to MISO
X1	H4	16.000 MHz Crystal	1	CPU crystal, uses C12 & C13 load caps.
Y1A	U8	RJ45-style socket	B	Install on the side of case
Y1B	X6	RJ45-style socket	B	Install on the end of case
Y2	A8	8-way 5.08mm green	4	U1, U2, U3 and TC1, TC2, TC3 + GND, case-end input connector.
Y3	N9	10-way 3.51mm green	var.	Plug + socket, 3.51mm pitch, 10 way plug + socket
Y4	W1	2-pin Molex MiniFit®	2	Battery and GND socket - Note 9
Y5	Y3	8-pin circular panel mount	3	mounts to end plate, soldered to transition PCB then to main PCB.
Y6	T4	12-pin 2.54mm (0.1") header	3	12 pin part of 25 pin 0.1" header strip Y6 + Y7 (<i>see notes</i>)
Y7	M4	25-pin 2.54mm (0.1") header	3	13 pin part of 25 pin 0.1" header strip Y6 + Y7 (<i>see notes</i>)
Y8	M4	8-pin 2.54mm (0.1") header	8, 9	<i>supplied in the 1Mbyte on-board logger kit</i>
ISP	I6	6-pin 2.54mm (0.1") header	1	Not supplied in any kit (ISP = In-circuit S erial P rogramming)

Miscellaneous Parts

Qty	Part	Sh	Description
1	PCB	na	Main PCB
1	TE-SB	3	Small transition PCB
1	CASE	na	ABS plastic case with closing screws
1	ENDP1	4	endplate made from PCB laminate, holds Y2
1	ENDP2	2, 3	endplate made from PCB laminate, holds Y1B, Y4 & Y5
4	SCREW	na	M3 x 6mm screws
4	WASH	na	M3 spring washers
1	STICKER	na	Tech Edge 2Y Sticker
1	POWERKIT	2	Tech Edge Power Cable kit
1	SERIALKIT	D	Tech Edge Serial Cable kit

Note, the above is **NOT** a complete list of parts supplied in kits (*as of 25 Sept. 2012*).