Pinger Component Selection Reference

Notes:

Assembly for Internet monitor does not require K1, K2 and related components

Assembly for DC router reset and monitor does not require K2 and related components. Use the router's power supply only it is less than 25 VDC. If the router is AC or > 25V you have to use K2 control and power the board with a separate DC power supply (8 – 12 VDC preferred).

Assembly to control an AC router or both a DC router and an external AC or DC device (less than 10A) requires K2 and related components. P2 is used for a "normally closed" configuration (i.e. the circuit is open to reset). P3 is used for a "normally open" configuration (i.e. ring a bell when the circuit is being reset). The carrying capacity of these are 10A MAX.

Note that voltages > 40V are considered dangerous and could kill you.

Component Selection

The optional LCD display is not supported in the software so you don't need the related components.

Note all resistors are1/4 or 1/8 watt, 5%.

C1, C2	22uF, 25V	Voltage selected by maximum design input voltage. C2 is required by the 7805 voltage regulator. Tantalum is suggested but this is good enough because it is pre-regulating the WeMos board +5 input
CON1, CON2	Barrel Jack	This is a 2.0mm ID, 5.5mm OD Barrel jack which is typical for most (but not all) routers. If your router uses a different jack, try source the same one or buy the mating end (which looks like a make but is really female and adapt your router's power cord. Remember: the inside of a barrel jack is the positive side.
D1	1N914B	Protection diode suggested for 7805. Low current due to low decoupling capacitor. Pretty much any diode will do since there is very little current flowing through it when it is in use. 1N914s and 1N4148s are common and cheap.
D2	1N5817	This Schottky protects the 7805 if the WeMos device is powered by USB (i.e. during debugging. Actual power regulation for the 3.3V on the WeMos is done on the WeMos board.

D3, D4	1N914B	This is a “flyback diode” which protects Q2 and Q4 when the relay coil is switched off. The Emitter/Collector breakdown voltage is quite low and this saves the transistor when the relay is switched of and generates a negative voltage spike.
K1, K2	10A SPDT Relay	This relay was selected on the basis of price and availability. Pretty much any SPDT relay will do provided it has a 5V DC coil with a similar (79mA) coil current and can carry the current required for the application.
LED1, LED2		Cheap red LEDs used as indicators.
P2, P3	Wire Conn.	These are 10A rated 300V 2 position connectors for 16 - 20 AWG wire. The 10A rating was chosen to match or exceed the relay.
P1A, P1B		Just stick headers for the optional LCD display. I used 2 8 pin devices instead of a 16 pinner so there would be fewer parts to order
U1A, U1B		Cheap stick headers used to make Wemos D1 mini a DIP package
Q1 - Q4	2N3904	I used 2N3904 NPN transistors because they are cheap and available. Pretty much any NPN transistor such as a 2N2222 will do but watch because the pin assignments differ.
R1, R4	3K3	Current limit for LED1 to about 1 mA. Calculation is 5V -((LED VFD) 1.8V + (VCE sat 2N3904) 0.2V = 3 V. 3V/3K3 = 0.9mA
R2, R5	100K	Base current limit for Q1. Q1 has gain > 100 so less than 3K3 * 100 is fine
R3, R6	1K	Base current limit for Q2 relay coil. Coil current is < 80 mA, gain is > 100, so > 0.8mA into base saturates. 5V-0.7 = 4.3V/(1K + 3K3) = 1 mA
U1	7805	ESP8266 requires about 400 mA peak. Need to power relay, etc., so I chose a 1A regulator.

Pinger V1.0 Parts Order List

Qty	Value	Part Number	Description	Digikey Link
4	1N914B	1N914B	DIODE GEN PURP 100V 200MA DO35	1N914B-ND
4	2N3904	2N3904BU	TRANS NPN 40V 0.2A TO-92	2N3904FS-ND
2	22uF	ECA-1EM470	CAP ALUM 47UF 20% 25V RADIAL	P5151-ND
2	CP-102AH-ND	CP-102AH-ND	CONN PWR JACK 2.0X5.5MM HIGH CUR	CP-102AH-ND
2	G5LE-14 DC5	G5LE-14 DC5	RELAY GEN PURPOSE SPDT 10A 5V	Z1011-ND
2	160-1853	LTL2R3KRD-EM	LED RED DIFF 5MM ROUND T/H	160-1853-ND
2	A123821-ND	1-2834014-2	2POS 5.0MM DES CONN	A123821-ND
2	CONN_01X8	961108-6404-AR	CONN HEADER VERT SGL 8POS GOLD	3M9452-ND
2	3K3		1/8W 5% CF	CF18JT3K30CT-ND
2	100K		1/8W 5% CF	CF18JT100KCT-ND
2	1K		1/8W 5% CF	CF18JT1K00CT-ND
1	1N5817	1N5817-T	DIODE SCHOTTKY 20V 1A DO41	1N5817DICT-ND
1	MC7805CTGOS-ND	MC7805CTG	IC REG LDO 5V 1A TO220AB	MC7805CTGOS-ND
1	D1 mini	WeMos D1 mini	WeMos D1 mini	www.wemos.cc

Pinger V1.0 Parts List			
Ref Des	**Value**	**Part Number**	**Description**
C1	22uF	ECA-1EM470	CAP ALUM 47UF 20% 25V RADIAL
C2	22uF	ECA-1EM470	CAP ALUM 47UF 20% 25V RADIAL
CON1	CP-102AH-ND	CP-102AH-ND	CONN PWR JACK 2.0X5.5MM HIGH CUR
CON2	CP-102AH-ND	CP-102AH-ND	CONN PWR JACK 2.0X5.5MM HIGH CUR
D1	1N914B	1N914B	DIODE GEN PURP 100V 200MA DO35
D2	1N5817	1N5817-T	DIODE SCHOTTKY 20V 1A DO41
D3	1N914B	1N914B	DIODE GEN PURP 100V 200MA DO35
D4	1N914B	1N914B	DIODE GEN PURP 100V 200MA DO35
K1	G5LE-14 DC5	G5LE-14 DC5	RELAY GEN PURPOSE SPDT 10A 5V
K2	G5LE-14 DC5	G5LE-14 DC5	RELAY GEN PURPOSE SPDT 10A 5V
LED1	160-1853	LTL2R3KRD-EM	LED RED DIFF 5MM ROUND T/H
LED2	160-1853	LTL2R3KRD-EM	LED RED DIFF 5MM ROUND T/H
P2	A123821-ND	1-2834014-2	2POS 5.0MM DES CONN
P3	A123821-ND	1-2834014-2	2POS 5.0MM DES CONN
U1A	CONN_01X8	961108-6404-AR	CONN HEADER VERT SGL 8POS GOLD
U1B	CONN_01X8	961108-6404-AR	CONN HEADER VERT SGL 8POS GOLD
Q1	2N3904	2N3904BU	TRANS NPN 40V 0.2A TO-92
Q2	2N3904	2N3904BU	TRANS NPN 40V 0.2A TO-92
Q3	2N3904	2N3904BU	TRANS NPN 40V 0.2A TO-92
Q4	2N3904	2N3904BU	TRANS NPN 40V 0.2A TO-92
R1	3K3		1/8W 5% CF
R2	100K		1/8W 5% CF
R3	1K		1/8W 5% CF
R4	3K3		1/8W 5% CF
R5	100K		1/8W 5% CF
R6	1K		1/8W 5% CF
U1	7805	MC7805CTG	IC REG LDO 5V 1A TO220AB
U2			WeMos_D1_mini