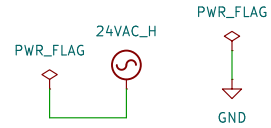


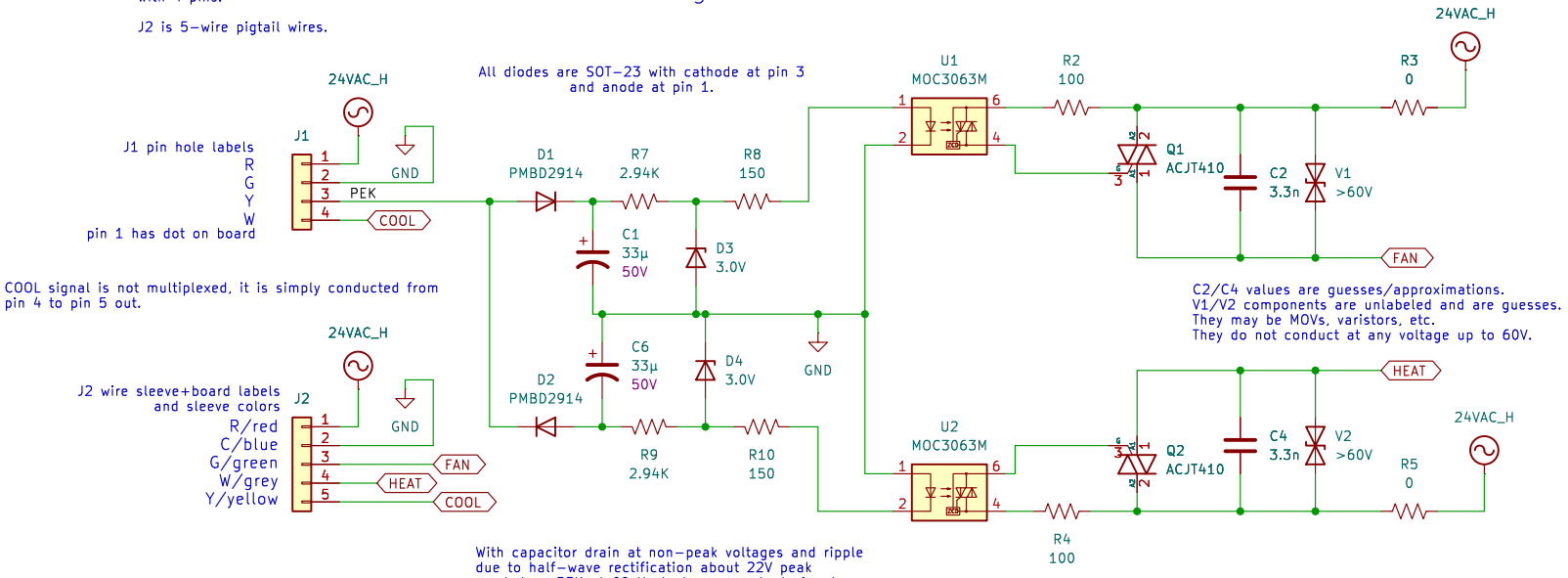
GND is AC neutral

Home HVAC signaling is 24VAC$_{rms}$ (unregulated) ladder logic.

On PEK line, a positive half-wave rectified AC signal of sufficient magnitude turns on U1 which will supply AC from J2 pin 1 to J2 pin 3 at next zero crossing. A negative half-wave rectified signal will do the same at J2 pin 4 from J2 pin 1. Applying a full AC signal will turn both on at the same time.

J1 is push-in spring contact wire connector with 4 pins.

J2 is 5-wire pigtail wires.



With capacitor drain at non-peak voltages and ripple due to half-wave rectification about 22V peak needed on PEK at 60 Hz to turn on output signal full duty cycle (5mA at MOC emitter).

As PEK is likely derived from the AC source with a diode 22.7V peak would be needed on AC source before recification.

Approximate max current on U1 emitter is about 12mA. This is if D3 cathode rises to 3.06V (spec).

Representative doorbell transformer checked is about 19.2V$_{rms}$ or 54V pk-to-pk.

Turn on current (I_{FT}) of U1 emitter is 5mA.

At 6mA:
pin 2 of U1 is at 0V (ref)
pin 1 of U1 is at 1.5V (max MOC3063M spec)
drop across R8 is 900mV (IR)
cathode of D3 is at 2.40V (sum)
drop across R8 is 14.94V (IR)
cathode of D1 is at 17.34V (sum)
drop across D1 is 855mV (spec max at 10mA)
anode of D1 is at 18.89V (sum)

So PEK must go to at least 18.89V peak to turn on U1 and FAN.

Ripple at 6mA on C1 is 3.03V @ 60Hz (6mA drain 1/60th sec).

So PEK must be at +21.92VAC peak, 15.5VAC$_{rms}$ @ 60Hz with positive half wave rectification to turn on U1 and FAN and have them remain on through the AC cycle. Same value with negative half wave rectification to turn on U2 and HEAT.

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Title: EcoBee power extender kit 175-00011 rev D

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