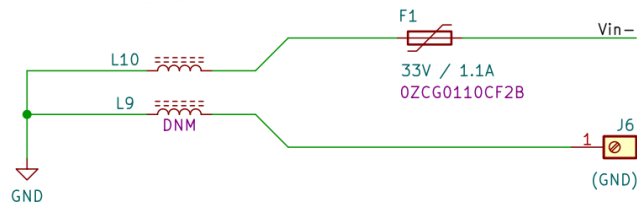


ESP32 Current Shunt V2 – Design Notes

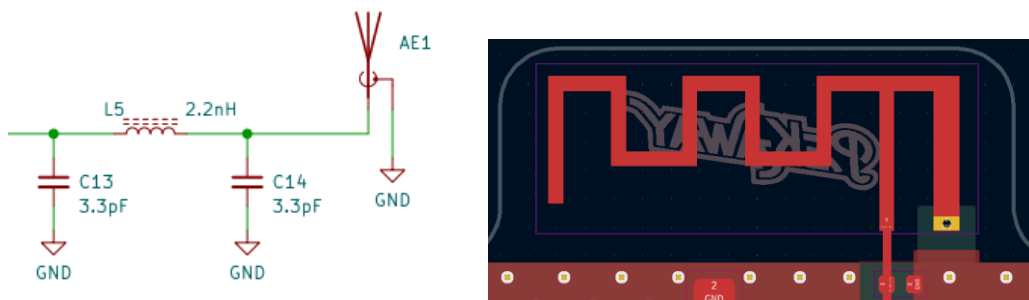
1. Shunt Configuration



To select between low-side shunt and high-side shunt configuration, L10 and L9 can be soldered respectively. With L10 (default), the circuit would use Vin- as ground for power supply (and current measurement). F1 would provide safety in that case. If L9 is soldered, Vin- only acts as current measurement input for INA226. External ground connection is required via J6, to power the circuit. This would enable the circuit to be connected on the high-side of the load circuit without issues.

Warning: Connecting both L9 and L10 simultaneously along with ground input at J6 would lead to short circuits or other complications, and should not be done.

2. Antenna



All the parameters and component values are replicated from the last version as provided in the source files. However, it seems suspicious.

The antenna design seems to be from an application note by TI named “SWRA117D”. Although the design in terms of dimensions is perfect, the routing suggestion in the application note suggests an overlap of ground plane with the pads (currently there is a small gap). The feed line doesn’t even have impedance control (it may have been calculated though).

Moreover, the value of the matching components also seems arbitrary. There is a mismatch in the old schematics and the old BOM in the value of the inductor (L5 in new schematics). It should be 2.2 nano-Henry, BOM says 2.2 micro-Henry. The parts (including the capacitors) don’t even have a RF rating, they are just generic capacitors and inductors.

But as discussed, the performance of the antenna is not affected at all. For this reason, the new version’s BOM also has the same exact parts as previously used and the PCB layout parameters (track width, ground clearance, PCB stack-up etc.) has been precisely replicated. It is recommended to use the same parameters for manufacturing the PCB as last version.

3. In case the circuit has any troubles with ESD tests, one thing can be tested is to replace ground ferrite beads (L10 / L9 and L8) with 0 Ohm resistors (or shorts). This could ease the dissipation of transients into ground (through TVS diodes).