

8 PCB DESIGN MISTAKES THAT KILL WIRELESS PERFORMANCE



MISTAKE #1 Poor antenna placement

- ✓ Place antenna at the edge of the board, clear of metal.
- ✓ Orient antenna so radiation pattern can escape the enclosure.
- ✓ Consider enclosure and antenna placement together from the start.
- ✓ Avoid having the user's hand or metal surfaces block the antenna.

MISTAKE #2 Ignoring antenna keep-out zones

- ✓ Respect keep-out zones shown in antenna datasheets.
- ✓ Avoid copper pours, vias, or traces in restricted zones.
- ✓ Keep components away from antenna keep-out area.
- ✓ Follow module vendor's recommended layout exactly.

MISTAKE #3 No controlled impedance routing for RF traces

- ✓ Design RF traces for 50W controlled impedance.
- ✓ Account for PCB stackup: trace width, dielectric thickness, copper weight.
- ✓ Use manufacturer guidelines or impedance calculators before fabrication.

MISTAKE #4 Wrong ground plane design near the antenna

- ✓ Maintain continuous ground plane with stitching vias around RF section.
- ✓ Avoid gaps or fragmented ground near antenna.
- ✓ Treat ground plane as part of the antenna system.
- ✓ When in doubt, copy vendor's reference ground layout.

MISTAKE #5 Skipping matching network components

- ✓ Always include PI network footprints (capacitors + inductor).
- ✓ Leave space even if not populated immediately.
- ✓ Retune matching network when enclosure, PCB stackup, or antenna position changes.

MISTAKE #6 Not providing an RF access point

- ✓ Add UFL connector or coax pad for testing.
- ✓ Use test connector to isolate problems between antenna, layout, and environment.
- ✓ Enable return loss and output power measurements with analyzers.

MISTAKE #7 Noise coupling into the RF section

- ✓ Keep RF section isolated from noisy circuits like regulators and high-speed buses.
- ✓ Filter supply rails feeding RF section.
- ✓ Use shielding if needed to block interference.
- ✓ Avoid running noisy traces under antenna feed lines.

MISTAKE #8 Using the wrong enclosure material

- ✓ Use plastic enclosures with lower dielectric constants where possible.
- ✓ For metal enclosures, best option: use external antenna.
- ✓ Alternative: create an RF window (large plastic section in front of antenna).
- ✓ If needed, use perforations/slits but expect reduced performance.
- ✓ Always ground the metal enclosure to reduce interference.

For Entrepreneurs and Startups:

Develop and launch your electronic product **FASTER** without costly mistakes!

Doing it alone is slow and risky. Small missteps now can become big problems later. Skip the mistakes and launch faster.

→ Frustrated things aren't moving as fast as you want?

Feeling unsure what to do next? ←

Meet your guide: John Teel



Hey there, I'm a former microchip design engineer at Texas Instruments and founder of a hardware startup that sold products in hundreds of retail stores. My chip designs are in devices from Apple, Intel, and more.

Now, my full-time focus is helping people like you bring new electronic products to life, without wasting time, money, or risking everything.

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