CAMPTECH II CIRCUITS INC.

PCB Footprint Checklist Senior Hardware Engineers Use to Prevent Assembly Failures

Pre-Release Footprint Audit That Ensures Assembly Success

This checklist covers what your EDA tools do not check - the 70% of footprint decisions that cause assembly failures, rework, and field returns. 50+ verification points. Numeric tolerances.
Nine failure modes with pass/fail criteria.
If a footprint passes, it is released. If it does not, it is not.

TIER 1: Non-Negotiable Assembly Risk Controls

If any item in this section fails, the footprint is not released.

1. Datasheet and Source Control

- ☐ Latest manufacturer datasheet used
- ☐ Datasheet revision recorded
- ☐ Mechanical drawing verified
- ☐ Lifecycle status confirmed

2. Pad Geometry Accuracy

- ☐ Pad dimensions verified
- ☐ Toe extension ≥ 0.2 mm
- ☐ Pad symmetry ≤ 0.025 mm mismatch
- ☐ Pin 1 clearly marked
- ☐ No acute pad angles

3. Paste Volume Control

- ☐ Paste apertures manually defined
- ☐ Paste area ratio ≥ 0.66 standard, ≥ 0.50 fine pitch
- ☐ Reduced paste on large/exposed pads
- ☐ Segmented apertures where required

4. Thermal Balance

- ☐ Copper balanced within 2 mm of pads
- ☐ No plane imbalance
- ☐ Thieving pads used if required

5. Solder Mask Strategy

- [ ] NSMD or SMD documented
- [ ] Mask openings verified
- [ ] No mask slivers
- [ ] Silk clearance ≥ 0.1 mm

6. 3D and Mechanical

- [ ] 3D model aligned
- [ ] Height recorded
- [ ] Courtyard defined
- [ ] No enclosure overlap

TIER 2: Context-Dependent Controls

7. Fine Pitch (≤ 0.5 mm)

- [ ] Smooth pad exits
- [ ] Via spacing ≥ 0.25 mm
- [ ] Teardrops or home-plate used

8. QFN Exposed Pads

- [ ] Pad size verified
- [ ] Paste segmentation documented
- [ ] Coverage scaled by size

9. BGA Pads and Escapes

- [ ] Via-in-pad rules defined
- [ ] Fill and capping specified
- [ ] Escape routing planned

10. High-Speed / RF

- [ ] Impedance requirements noted
- [ ] Differential symmetry maintained
- [ ] Ground stitching defined

LIBRARY GOVERNANCE

11. Footprint Reuse

- ☐ Second sources verified

12. Naming and Metadata

- ☐ Naming convention followed
- ☐ Datasheet, MSL, IPC class recorded

13. Deviations

- ☐ IPC deviations documented

14. Review

- ☐ Independent dimension check
- ☐ Peer review complete

PRE-RELEASE FAILURE MODE AUDIT

Each failure mode requires both verification points to pass.

Tombstoning

- ☐ Pad symmetry ≤ 0.025 mm
- ☐ Thermal balance verified

QFN Float / Voiding

- ☐ Exposed pad segmented per guidelines
- ☐ Paste coverage reduced appropriately

Head-in-Pillow (BGA)

- ☐ Pad size matches ball diameter per IPC
- ☐ Paste volume appropriate for ball size

Bridging

- ☐ Paste apertures reduced for fine pitch
- ☐ Pad spacing adequate for pitch

Weak Solder Fillet

- [ ] Toe extension ≥ 0.2 mm
- [ ] Paste area ratio ≥ 0.66

Open Joint

- [ ] Paste area ratio adequate
- [ ] Via-in-pad filled and capped if present

Assembly Inspection Failure

- [ ] Polarity marks visible after placement
- [ ] Solder fillets inspectable

Second-Source Breakage

- [ ] Alternate packages checked for mismatch
- [ ] Dimensional differences documented

Mechanical Interference

- [ ] 3D model clears adjacent components
- [ ] Enclosure clearance verified