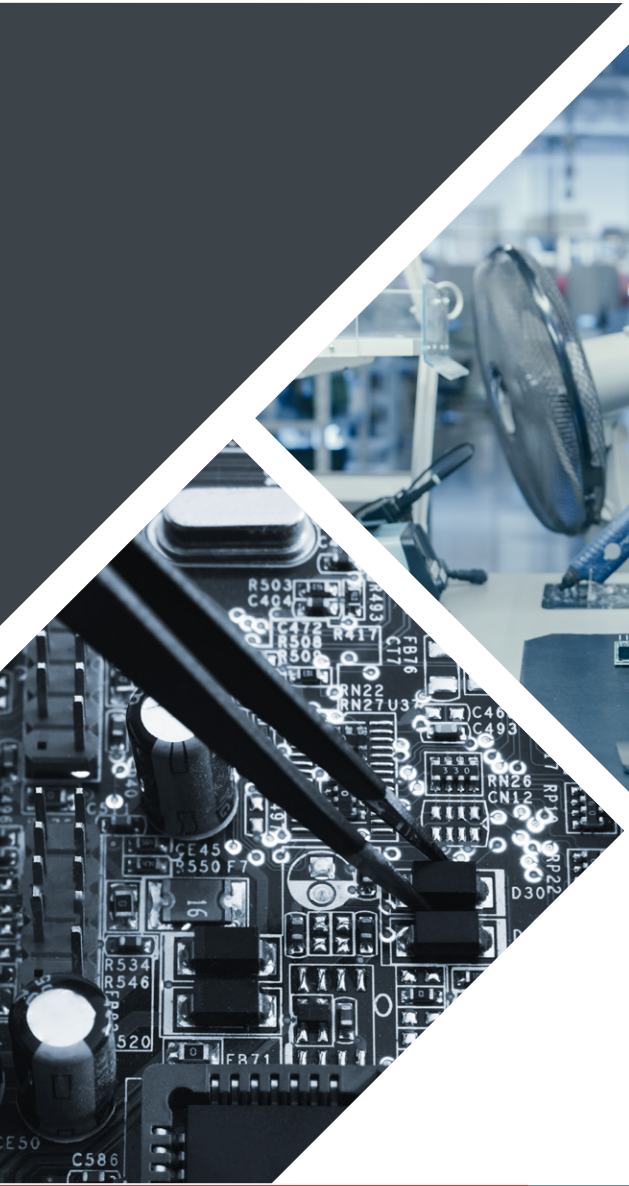
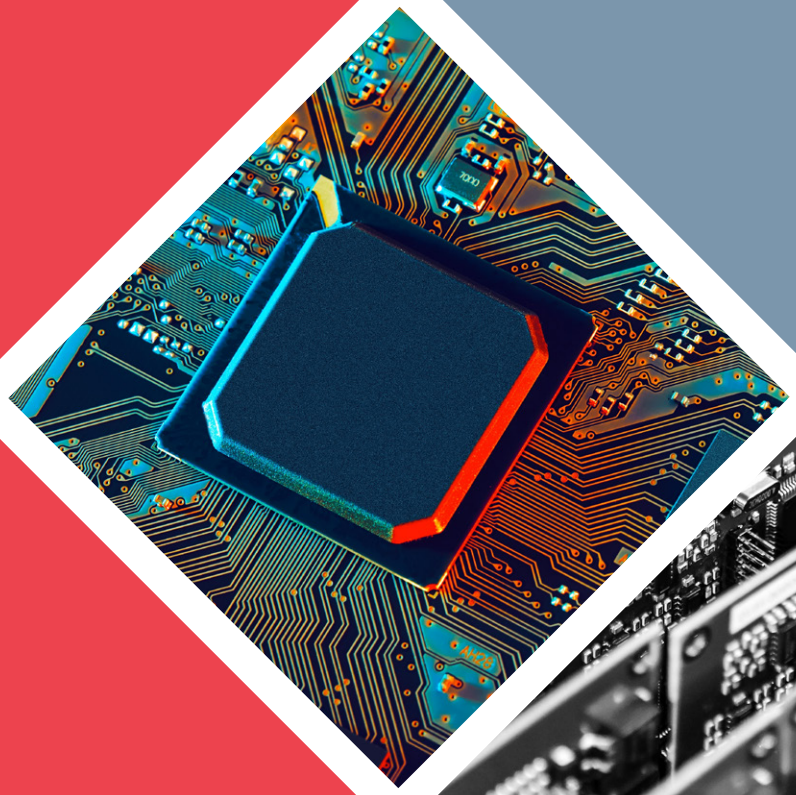
MACROFAB CAPABILITIES





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CAPABILITIES OVERVIEW

WORLD-CLASS PCBA PRODUCTION CAPABILITIES, BUILT IN NORTH AMERICA.

ISO 9001:2015 · IATF 16949:2016 CERTIFIED COMPANY · AS9100D CERTIFIED ISO 9001 · ISO 13485:2016

MacroFab capabilities include fine-pitch BGA, HDI, and QFN assembly. See below for an overview of our fabrication and assembly specifications. MacroFab's manufacturing cloud offers up to IPC class 3 production and ISO9001:2015, ISO/IATF 16949, AS9100, and ISO13485 certifications. Our platform automatically converts your information from Eagle, Altium, PADS, KiCAD, DipTrace, OrCAD and Allegro, and offers complete workspace integration with Altimade.

Sourcing

- Real-time stock visibility with integrated components suppliers
- Turnkey service, inventory, and consignment supported
- Alternative sourcing and lifecycle management

Fabrication

- 2-36 layers
- Blind, buried, micro-drilled vias
- HDI, castellations, controlled impedance
- Flip-chip capable
- Encapsulating (Epoxy potting)
- 14.9in x 14.9 in max board area

Assembly

- Through-hole, SMD, hybrid, modules, box builds
- Full product assembly
- We support double-sided assembly
- Cable and wire harness
- 01005 10 mil x 05 mil
- We follow all IPC-A-610 ESD safety procedures

Testing

- Quality testing to meet your requirements
- Functional testing
- Burn-in
- Flying probe
- RF spectrum testing

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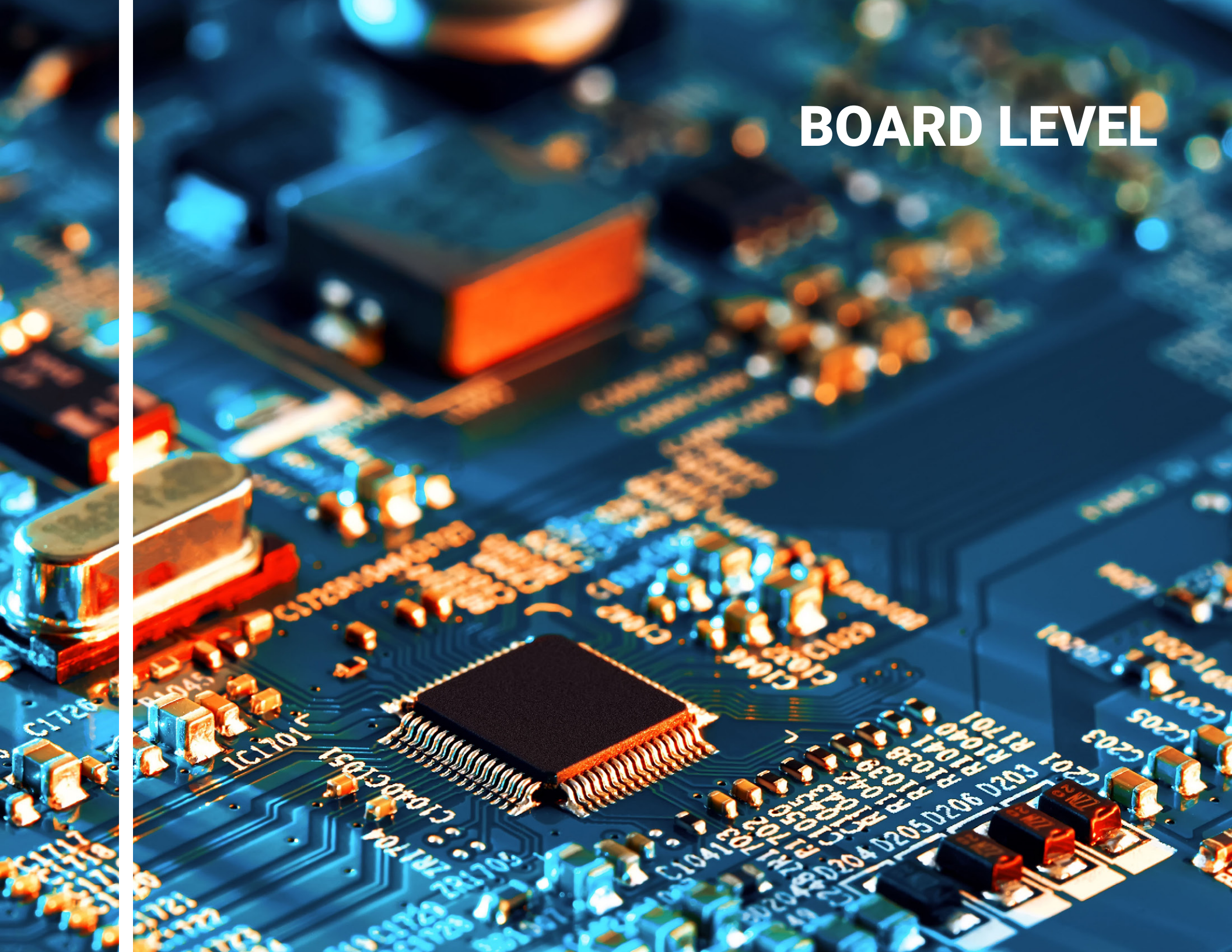

BOARD LEVEL

BOARD LEVEL

CAPABILITIES

Surface Finish

- ENIG (standard)
- ENIPIG
- Lead-free HASL
- EHG

Copper to Board Edge Clearance

- 10mil min (0.15mm) - Standard mfg
- 3mil min (0.07mm) - Extended mfg

Layer Count

- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 18
- 20
- 22
- 24
- 32
- 36

Fabrication Processes

- Hard gold–supported
- Edge fingers–supported
- Beveled edges
- Castellations

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BOARD LEVEL

CAPABILITIES

Dielectric Material Families

- FR4-TG1785 (standard)
- Rogers 4003C
- Rogers 4350B
- Rogers 4450B
- Rigid-Flex
- Aluminum
- Other: requires custom quote

Controlled Impedance Layers

- Supported

Board Area

- Max dimensions: 14.9" x 14.9" (378.46mm x 378.46mm)
- Minimum billable area: 1 square inch ($25.4mm^2$)
- Custom quote required for larger boards

Board Thickness

- 0.062" (1.6mm) standard
- 0.008"-0.248" (0.2mm-6.3mm) custom
- PCB thickness increments at 0.0004" (0.1016mm)
- Board thickness tolerance:
  - T < 1.0mm: ±15%
  - 1.0<T<1.6mm: ±10%
  - T>1.6mm: ±10%

Quality Assurance

- Unless otherwise requested, all assemblies are built to meet IPC-A-610H Class 2 Acceptance criteria
- Visual inspection on all boards
- X-Ray used for manufacturing validation
- AOI only over a certain quantity (25 or more)

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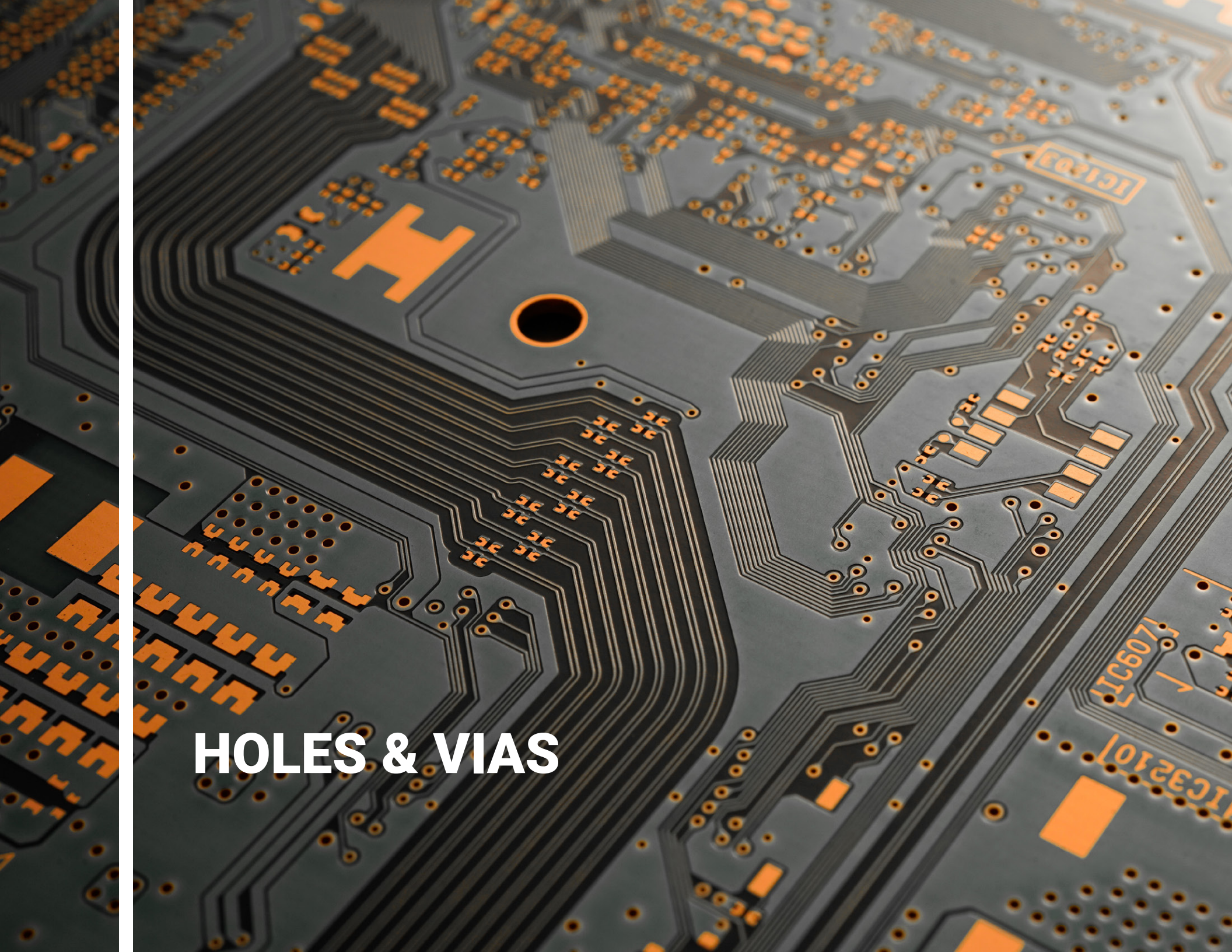

HOLES & VIAS

HOLES AND VIAS

CAPABILITIES

Drill and Mill	Mechanical Drill Diameter	Laser Drill Diameter	Via Options Supported
• Internal rout radius- 0.8mm • External rout radius- 1.0mm • Laser drill- 4mil-8mil	• 10mil min (Standard Drill) • 4mil min (Extended Drill)	• 10mil min (Standard Drill) • 4mil min (Extended Drill)	• Blind and buried vias • Back drilled vias • Micro drill vias • Epoxy filled and capped vias

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HOLES AND VIAS

CAPABILITIES

Via Fill	Mechanical Through Via Aspect Ratio	Laser Blind Via Aspect Ratio
• Non-conductive Epoxy • Conductive epoxy • Copper	• 10 max (standard drill) • 16 max (extended drill)	• Supported as per our minimal drill size in DRC

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COPPER

COPPER

CAPABILITIES

Minimum Annular Ring Width	Drill to Trace Clearance	Drill to Plane Clearance
• 4mil (1oz copper, standard mfg)	• 5mil	• 5mil
• 6mil (2oz copper, standard mfg)		
• 3mil (1oz copper, extended mfg)		

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COPPER

CAPABILITIES

0.25 oz Copper Trace and Space

- Requires custom quote

0.5 oz Copper Trace and Space

- Requires custom quote

1 oz Copper Trace and Space

- 3mil min (extended mfg)
- 5mil min (standard mfg)

2 oz Copper Trace and Space

- 6mil (standard mfg)
- No extended mfg

3 oz Copper Trace and Space

- Requires custom quote

4 oz Copper Trace and Space

- Requires custom quote

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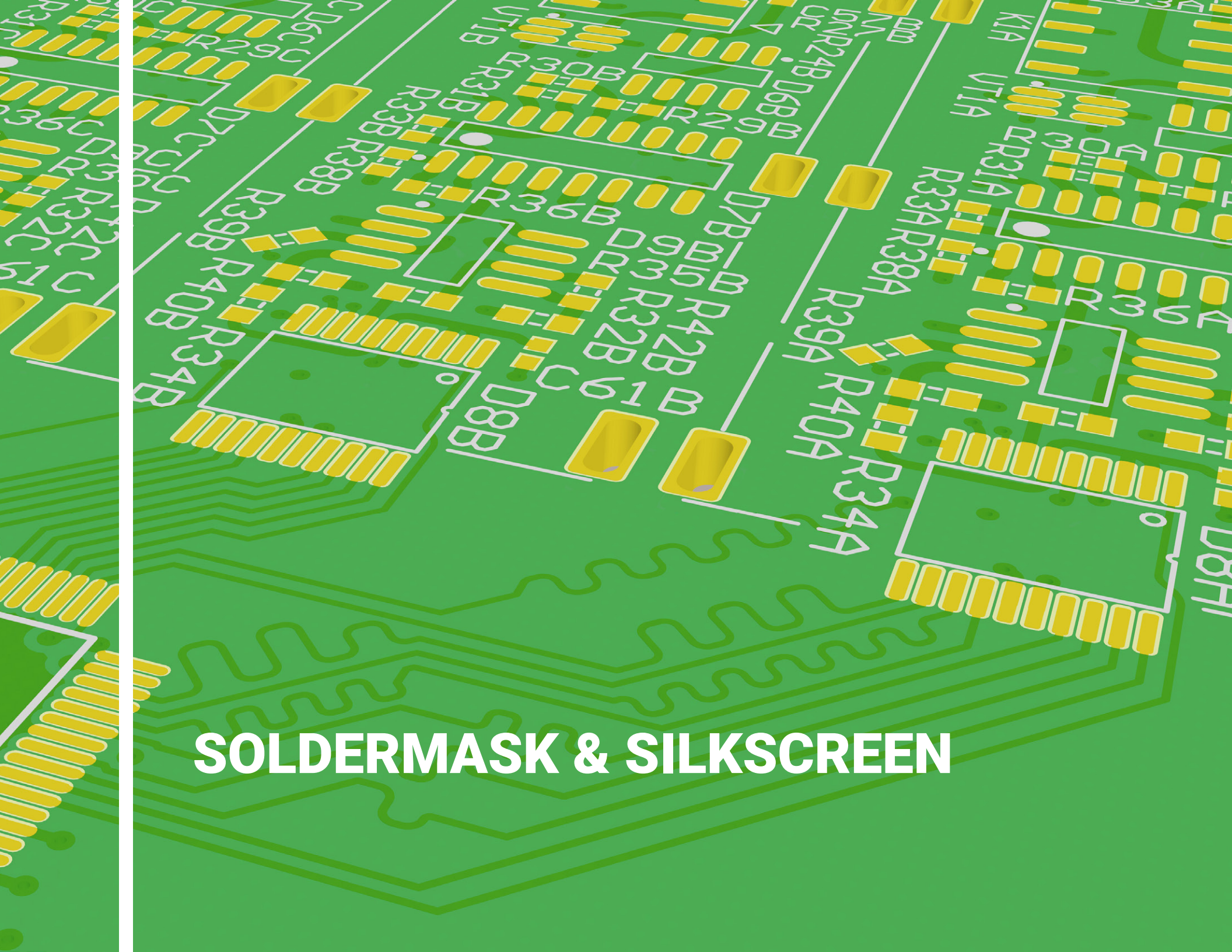

SOLDERMASK & SILKSCREEN

SOLDERMASK & SILKSCREEN

CAPABILITIES

Solder

- RoHS/lead-free solder only
- SAC305 for surface mount
- SN100 only for through-hole
- Solder resist: top and bottom standard

Soldermask Colors

- Red
- Green
- Blue
- Yellow
- Black
- White
- Matte Black
- Dark Brown
- Transparent
- Light Green
- Matte Green

Soldermask Dam

- .1mm

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SOLDERMASK & SILKSCREEN

CAPABILITIES

Soldermask Pad Relief	Silkscreen Colors	Minimum Silkscreen Size
• Min 4mil	• Red • Green • Blue • Yellow • Black • White	• 5mil

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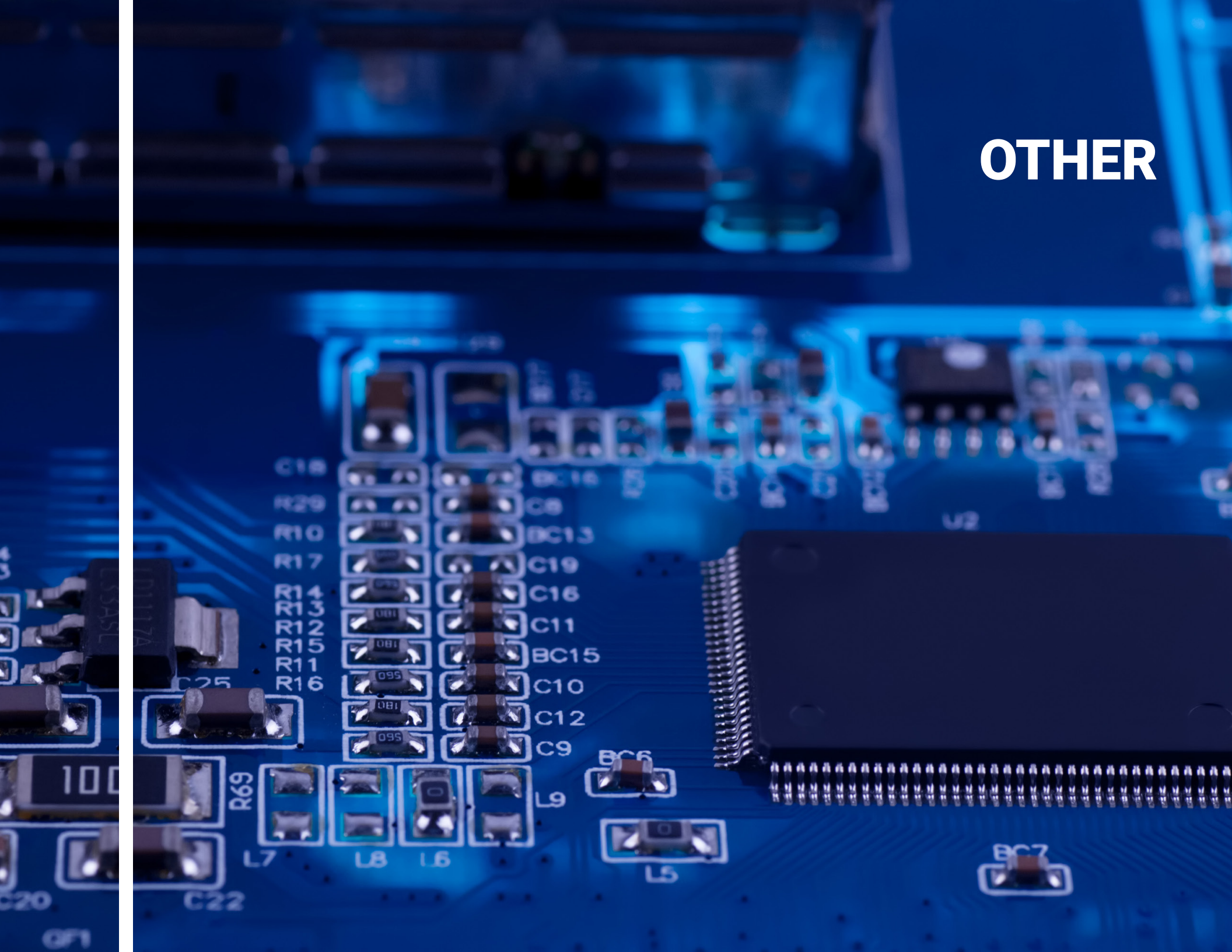
OTHER

OTHER

CAPABILITIES

Flux

- SMT: no-clean
- Through-hole:
  no-clean or water wash

Castellations

- Supported

Partner Facility Certifications

- AS9100D
- UL Registered
- ISO13485
- ISO/IATF 16949
- ISO9001
- ISO14001

Assembly Supported

- Single-sided or double-sided
- Through-hole
- SMD
- BGA
- LGA
- PTH
- Hybrid
- SoP
- Daughterboard components
- Modules
- We support double-sided assembly

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OTHER

CAPABILITIES

Depanalization

- Linear blade
- Mouse bites
- Routed

Component Programming

- Supported

Mechanical Limits

- Chip components, ex: resistors/ capacitors 01005 10 mil x 05 mil (0.25mm x 0.0125mm)
- Leaded packages, ex: SOIC/QFP/TSOP 11.8 mil (0.3mm) Lead Pitch
- Leadless packages, ex: QFN, TQFN 11.8 mil (0.3mm) Lead Pitch
- BGA, ex: BGA/FBGA/LGA 15.7 mil (0.4mm) Ball Pitch

Conformal Coating

A UV tracer is added to all conformal coating and boards are inspected under a UV light according to certified industry standards.

- Acrylic
- Silicone
- Polyurethane

Required Files

https://help.macrofab.com/knowledge/macrofab-required-design-files

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