cogent technology

Manufacturing Data Requirements

Manufacturing **YOUR** products with **OUR** pride

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Cogent Manufacturing Data Requirements

All assembly types:

The following information is required for all types of assemblies:

- Bill of materials (see below for detailed requirements)
- Drawings (see page 5 for detailed requirements)
- PCB manufacturing (see page 5 for detailed requirements)

Assemblies requiring Test /Device programming:

- Firmware for programmable devices (if applicable) including set-up information and checksums.
- Test Work Instructions (procedure)
- Test software and hardware (where applicable)
- ATE Test requirements
- For flying probe testing a BOM **must be** included with the following information – value/device name, tolerance (if applicable), device type, component reference, manufactures part number, component package, customer part number (if applicable)

Data transfer:

- Files up to 10MB can be e-mailed
- Files greater than 10MB should be transferred via FTP / or a file hosting service. e.g. We Transfer *www.**wetransfer**.com*, Rapidshare *www.**rapidshare**.com* or Dropbox *www.**dropbox**.com*

Please contact the Cogent sales account manager for additional details

Bill of Materials:

- All BOMs must be supplied in an Electronic format: e.g. Microsoft Excel (preferred), Microsoft Word Lotus 1-2-3, Delimited Text (If supplied in pdf format it must be text extractable, not an image!)
- The BOM should state if alternative components to the same or higher spec are NOT allowed (and if approval is required before use); a list of approved manufacturers should be provided, if applicable.
- The customer should identify any components which have manufacturer supported pricing
- The customer should identify any safety critical or manufacturer specific components
- The customer should provide a list of non-fitted components for all PCB assemblies
- The table on page 4 provides a list of the items which should be contained within the BOM

Items that should be contained within the BOM:

Column Title:	Comment:	Mandatory?
Description[1]	Description of Component	Mandatory
Quantity	Quantity of component on assembly	Mandatory
Reference	Component Ident/s on PCB or reference on assembly drawing	Mandatory
Manufacturer	Name of component manufacturer/s	Mandatory[3]
Manufacture Part Number	Manufacturers Part Reference/s	Mandatory[3]
Supplier	Name of component supplier/s	Mandatory if supported pricing
Supplier Part Number	Supplier Part Reference/s	Mandatory if supported pricing
Drawing Reference	Drawing number of bespoke component (ensure drawings are supplies)	Mandatory if bespoke parts
Part Number	Customer Part Number (if available)	Mandatory[2]
Package	Component package	Optional
Technology	Type of component (eg. SMT, Through Hole or Mechanical)	Optional

Table 1, BOM requirements

[1] Please ensure that the BOM contains enough information to procure the components (i.e. value, tolerance, voltage, power, package of the component, valid drawing reference, manufacture part number with version and issue)

[2] This will enable us to efficiently cross reference parts between different assemblies from the same customer

[3] If alternatives are acceptable, give an example manufacturer part or state 'Any' if description is complete

Drawings:

- PCB assembly drawings in electronic format
- Mechanical assembly drawings in electronic format
- Any bespoke parts that require procurement by Cogent Technology must have drawings supplied, ideally in an electronic format
- Acceptable Drawing formats:
  - AutoCAD DWG
  - AutoCAD DXF
  - Solidworks eDrawings
  - PDF
  - Other formats (e.g. 3D CAD/Vector graphics) should be accompanied by a PDF version

DHR (Device History Record):

Device history record requirements for medical products:

- Indicate any components that require specific inspection or testing
- Are there any unit build stages or testing that need to be specifically recorded?
  - Also include the test specification for Cogent to add the pass/fail criteria to these stages

PCB Manufacturing Data:

- PCB Gerber Data
  - RS274-X (RS274-D is an **obsolete format** and should not be used)
- Note - Solder paste files to be 1:1, i.e. no enlargement or reduction
  - NC drill (Excellon format)
  - Manufacturing specification file detailing PCB thickness, copper weight, layer order (if more than 2 copper layers), solder resist and silkscreen colour and any special requirements (e.g. controlled impedance, high temp material etc.)
    - Data supplied without specifications, will be taken to be 1.6mm thick, 1oz copper, Green Resist, White Legend, Immersion Silver (or suitable equivalent) finish
  - Breakout requirements if critical. Please see pages 13-14 for examples
    - If not specified Cogent Technology will use the most appropriate breakout method for their manufacturing processes

For more information regarding the layout of the PCB, please refer to information from page 8

Machine Programming:

For assemblies containing any surface mount components the following is required:

THIS IS AN ABSOLUTE MINIMUM REQUIREMENT FOR SM & AOI PROGRAMMING

FULL CAD ASCII File Suitable outputs include :-
ODB++; GenCAD; CADIF etc.

Please contact Cogent's Engineering department for assistance with extracting ASCII output for your CAD system.

Tel: 01394 445510
Email: EngineeringShared@cogent-technology.co.uk

Our term "*CAD ASCII*" is the **entire CAD** design exported as an ASCII file (Not Centroid pick and place), the format of this data is critical and is the essential component for programming our pick and place and AOI machines.

NOTE:

Where PCBs are not to be procured by Cogent (free issue) it is necessary for the customer to supply (where appropriate) stepped PCB solder paste gerbers (pad size to be 1:1, no enlargement or reduction), stepped panel outline and stepped NC drill files.

Please ensure that PCB panel fiducials (see pages 7 and 8) are included in the paste Gerbers supplied. Also break-outs **must** be considered and suitable ones (see page 13-14) for Cogent to efficiently remove the PCB from the panel (if required).

Design for Manufacture—PCB Guidelines

The following guidelines are to assist customers and suppliers to provide PCBs in the most efficient format for Cogent's manufacturing processes.

PCB Markings:

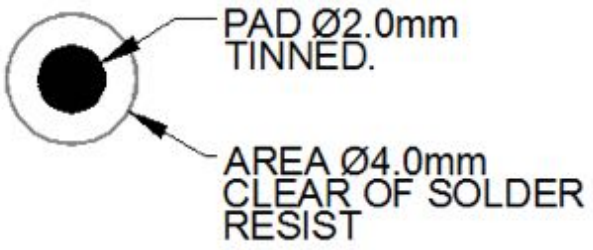
All PCBs shall include the date of manufacture and UL markings

Fiducials:

All PCBs containing surface mount components **must have** at least two local fiducials, in the case of panels each PCB on the panel should have two fiducials, and the panel may also have two or more fiducials. Note: In the case of PCBs with components on both sides, fiducials must be placed on both sides of the board.

- Fiducial pad sizes should ideally be between 1.0mm and 2.5mm
- Fiducial shapes can be round, diamond, square, or cross shaped
- Fiducials should be no closer than 20mm away from any pad/s of the same shape and size (±20%)
- PCB panel fiducials **must be** included on the stepped Gerbers provided by the bare PCB manufacturer
- All non-panelised PCBs, with surface mount components, must not have components or fiducials within 4mm from the edge of the PCB, otherwise a waste strip must be added
- Component fiducials, i.e. for registration of an IC, can be present, but are not currently used by Cogent
- The ideal size for Cogent for the panel registration fiducial is shown below

Figure 1, Example of Fiducial with clearance



Panelisation:

It is not always necessary to have a panelised PCB, however to run a PCB through our automated processes it is important that there are keep-out areas on the board/panel for our pick-ups/clamps etc.
A board does not need to be more than 1up (due to its size or complexity), but can still have the border edge added to allow keep-out areas, panel fiducials and tooling holes.

Cogent can process boards or panels up to the following sizes

Recommended PCB / panel size:	250-350mm x 150-250mm
Maximum PCB / panel size:	450mm x 350mm
PCB panel thickness:	0.5 – 4.0mm

DFM—PCB Guidelines

Standard Panel format:

- 10mm gap between each PCB, with 12mm border
- Used for boards where a gap between the PCBs is preferred
  - Irregular shaped PCB i.e. Non-rectangular, round etc.

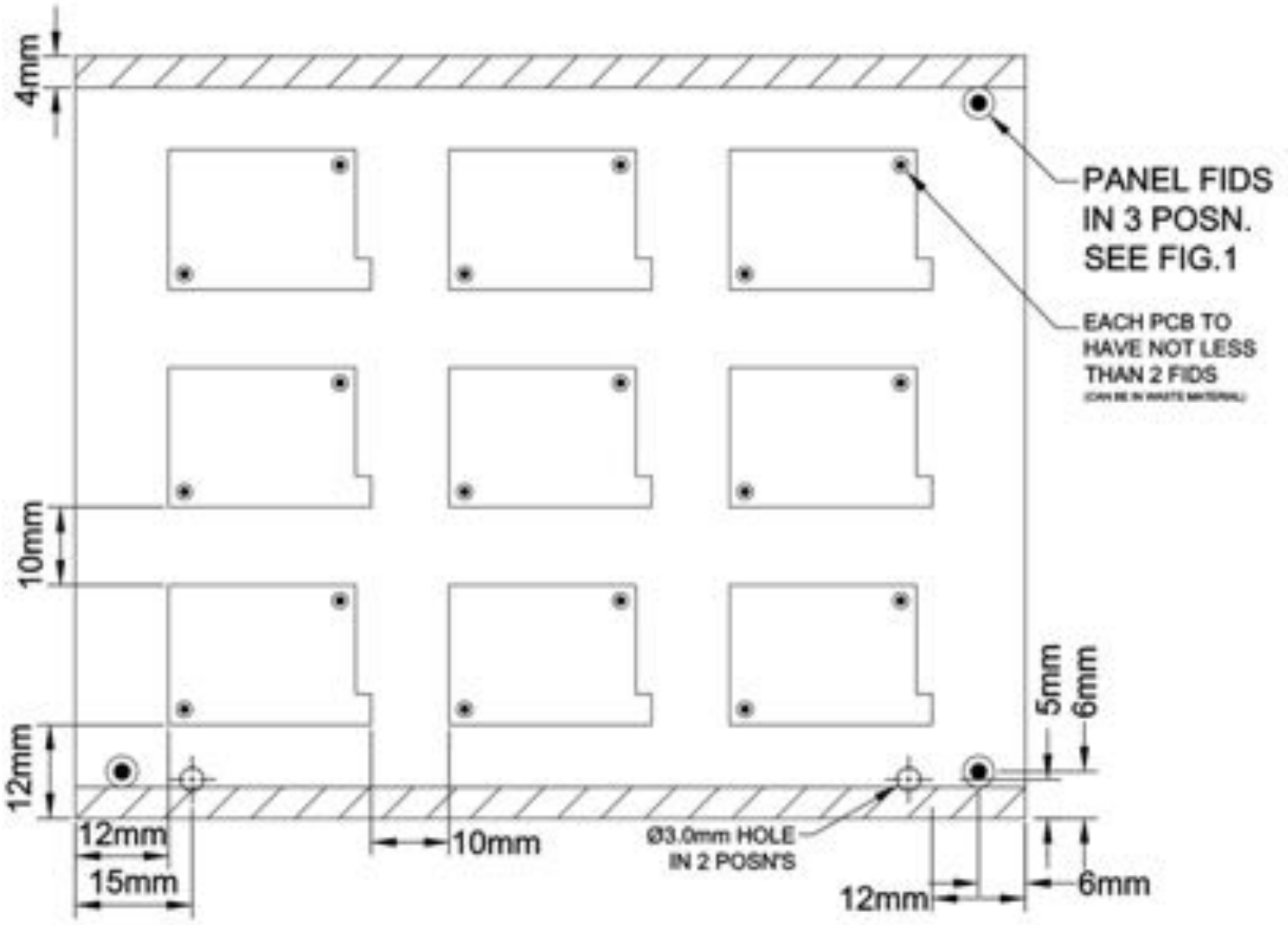


Figure 3, Example of V-scored panel, no gap between PCBs

V-Scored panel format:

- No gap between each PCB, however still has a 12mm border
- Used where a flush finish is paramount

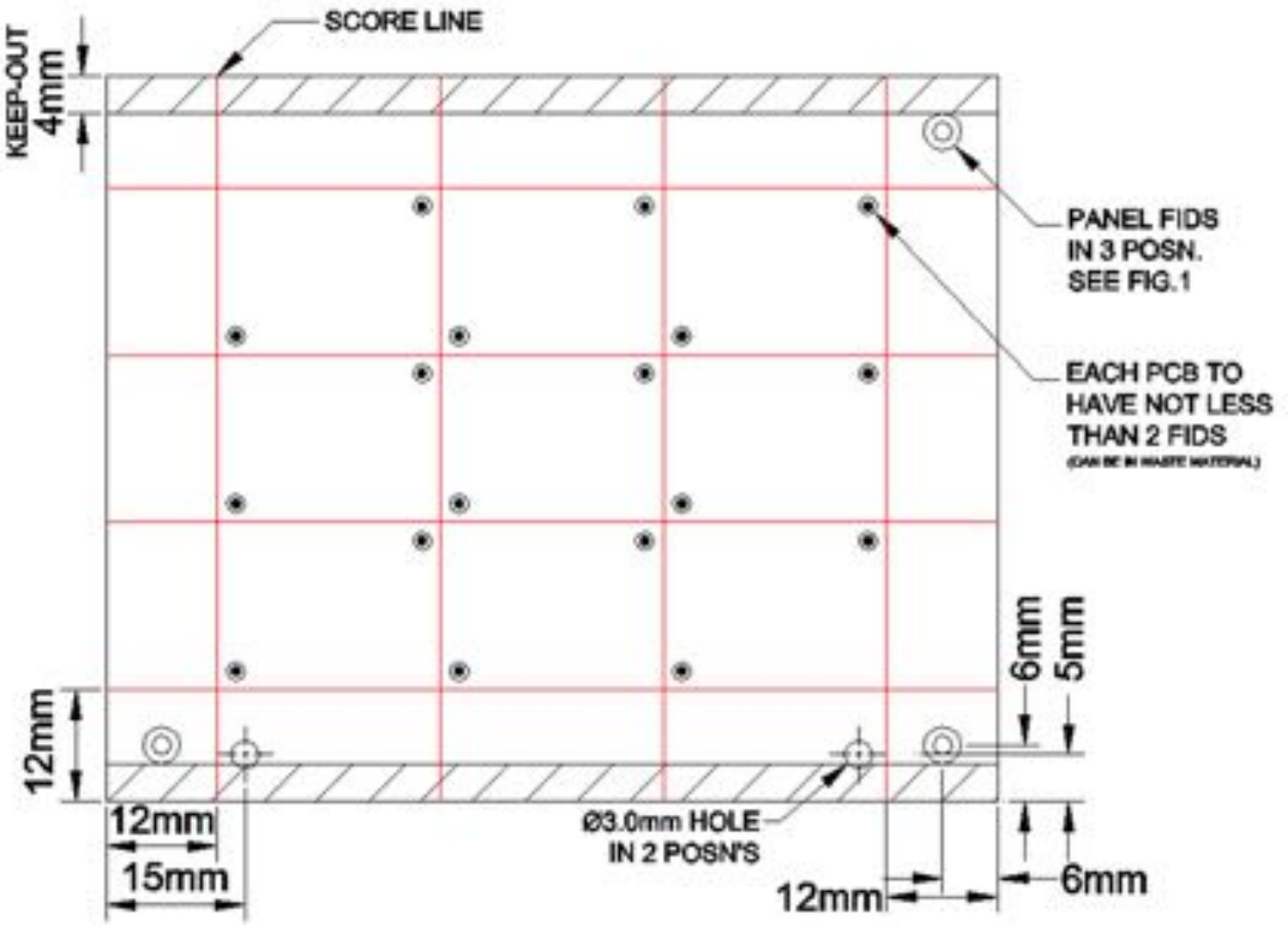


Figure 3, Example of V-scored panel, no gap between PCBs

Mixed Panel Format:

- Where some edges need to be flush, but can be an irregular shaped PCB
- Where the score line will cross a routed area or hole, the gap most not exceed 7mm, due to the de-panelising blade running off.

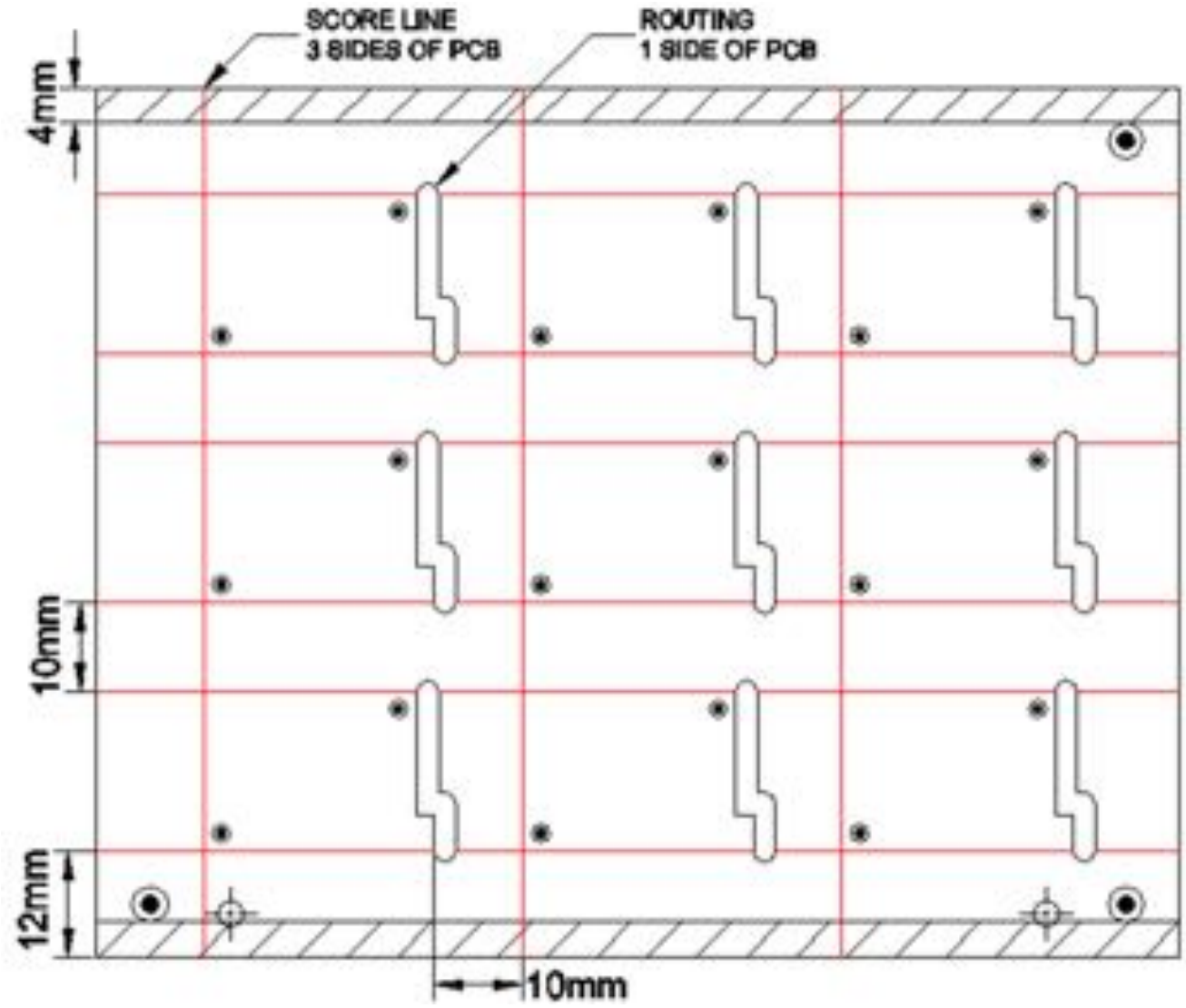


Figure 4, Example of panel with mixed breakouts

Resist (Solder Mask):

PCBs with surface mount components must have a suitable resist dam to avoid bridging between fine pitch components (see example below)

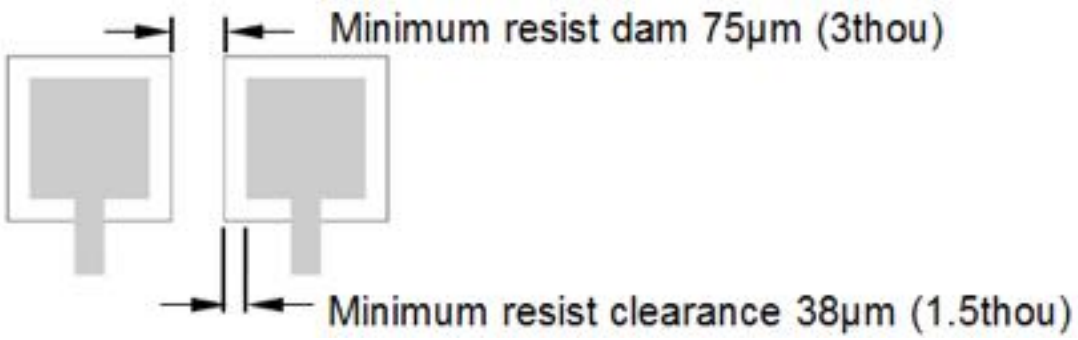


Figure 5, Example showing solder mask clearance

We recommend that you amend the default solder mask swell/clearance in your CAD programme to ensure that it is not greater than 1.5thou.

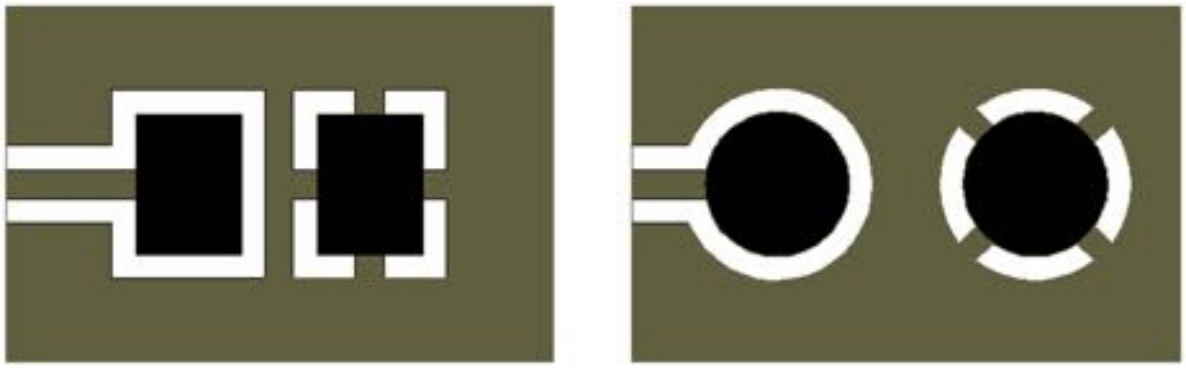
- Any via holes under a BGA component must be covered with solder resist.
- Any via holes in SM component pads should be avoided, however if unavoidable these will need to be epoxy filled and plated over to avoid manufacturing problems.
- Any solder resisted via holes that touch SM pads (i.e. no solder dam) should be removed from the resist layer to avoid manufacturing problems. Ideally it is better to ensure the via's are not touching the pads.

Figure 6, Example of bad SM pad to via spacing

Figure 7, Example of acceptable SM pad to via spacing

Thermal Relief:

All Pads on a solid copper plane or pour should have thermal relief to assist with soldering of the component.



Selective and Wave Soldering:

The most efficient process for soldering the conventional components is to wave solder the PCB, however this is not always appropriate (depending on the proximity of components and their location).

If SM components are on the soldering side of the conventional parts, ensure that they are kept away by 3mm to enable us to use our selective soldering machine, or get a selective wave solder pallet

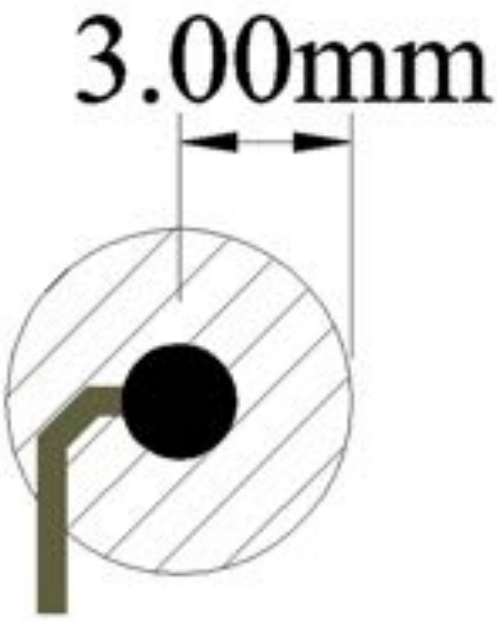


Figure 9, Example showing component clearance for selective (wave) soldering

Breakout Types:

Suitable breakout points used by Cogent are shown below.
Note, keeping to one style is preferred; however a mixture of types may be used if more appropriate to the board.

V-scoring:

- Scored edge must not exceed 300mm in length (Total length including waste material)
  - However provided the width is less than 300, a panel longer than 300 could be de-panelised
- Suitable for PCBs that do not have overhanging components
- Suitable for square or rectangular PCBs
- **Not suitable** for boards with solder joints (SM or conventional) that are closer to the score line (edge of PCB) than 2mm

Pip breakouts:

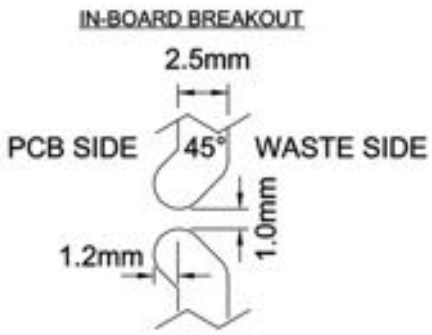


Figure 10, In-Board breakout

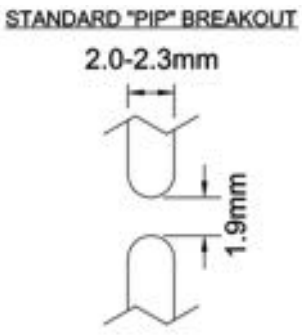


Figure 11, Standard pip breakout

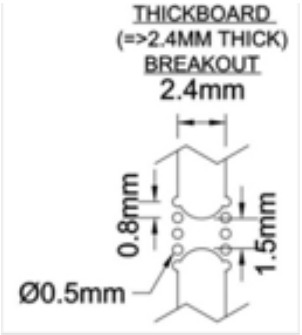
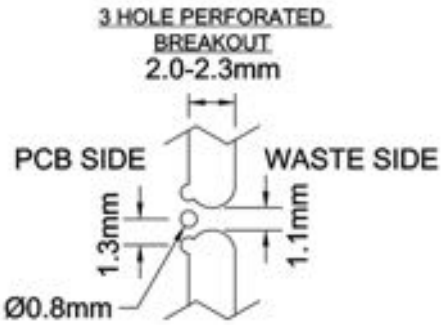
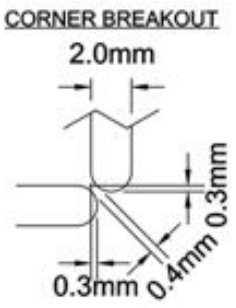


Figure 12, Thick board breakout

These are perfect for a flush finish, but encroach into the PCB Note copper plane/ pour areas will be cropped accordingly to avoid exposed copper	Once broken out will leave a small protrusion	Used for thicker boards Note copper plane/ pour areas will be cropped accordingly to avoid exposed copper





These leave a virtually flush finish

Note copper plane/ pour areas will be cropped accordingly to avoid exposed copper

Leaves a flush finish, but at the sacrifice of the corner. Ideal for thin PCB's.

- When using a break-out that requires the use of nibbling equipment i.e. Pips - Standard, Thickboard or Perforated, consideration must be made for accommodation of the tooling blade. A gap of 12.5mm (From the straight edge of the break-out) on one side is required (however both is acceptable) also there is a keep-out for components that should be adhered to.

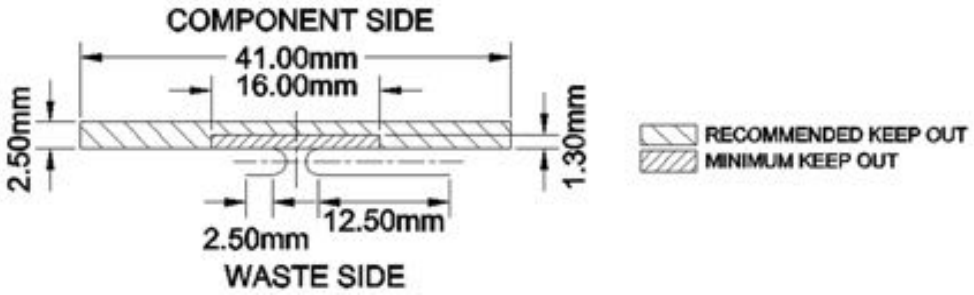


Figure 15, Breakout keep out areas

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