



Cost-cutting online prototype & small batch PCB services

Eurocircuits – a new generation of online PCB services

Low prices

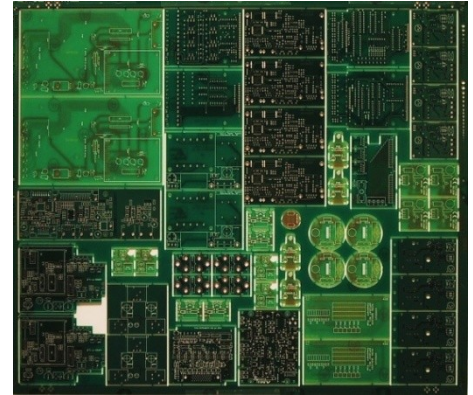
- **Order-pooling** technology (combining several customers' orders on standard manufacturing panels) cuts costs without compromising quality or delivery.
- **No tooling** charges or minimum order size.

Wide choice

- **4 pooling services** and one non-pooling service.
- **Widest range** of online PCB options.

Quality

- All boards are made in our own ISO9001:2008 approved factories in Hungary, Germany and India.
- **100% CAM verification check** prior to manufacture to ensure a high quality board delivered on time.



Typical order pooling panel

Speed and Convenience

- **Immediate online prices** 24/7 against minimum data. No waiting for a sales office to call you back.
- **Order directly** online.
- **Deliveries from 2 working days.**
- **Access your complete PCB records** online (order status, data files, previous orders, invoices etc)

NEW 2010 "TECH pool" 2010 NEW

- **100µm technology.**
- A one page menu for fast ordering of 100µm technology PCBs from 2 up to 8 layers. Details overleaf.
- Only high tech pooling service in the market.
- **Deliveries from 5 working days**

NEW 2010 "IMS pool" 2010 NEW

- **Insulated Metal Substrate** PCBs.
- 1 layer, 1.5mm ALU, 75µm insulator, 35µm copper, white or black solder mask
- **Low pooling prices** – for example: **20 off boards 25 x 25 mm in 5WD, €12.20 each**

"PCB proto" – dedicated prototype pooling service

- **2 boards in 2, 3 or 5 days:** 2 or 4 layers fully finished with 2 soldermasks and 1 legend.
- **Bonus board:** to make 2 PCBs we launch 3. If the third board is good we ship it free of charge.
- **Lowest prices:** for example: **2 off boards 100 x 80 mm in 5WD, 2L €38.12 each or 4L €77.23 each.**

"STANDARD pool"

- A one page menu for fast ordering of standard **150µm technology** PCBs up to 8 layers. Details overleaf.
- **Widest choice** of technical options in pooling services.
- **Deliveries from 2 working days**

"On demand" full choice

- **1 – 16 layers.**
- **Full choice** of materials, copper weights, mask and legend colours. Details overleaf.
- **Deliveries from 2 working days**

Eurocircuits are part of the Belgian-owned Europrint Group founded in 1991. We specialise in the online supply of prototype and small-series PCBs from our ISO9001:2008 approved plants in Hungary, Germany and India. Our 5000 m² factory at Eger in Hungary was built from new in 2004 but our staff there has over 30 years continuous PCB experience. We acquired our factory in Aachen, Germany in summer 2009 to provide more prototype capacity for European design and development. A dynamic re-investment program keeps our production continuously at the leading edge of PCB technology.

www.eurocircuits.com

Eurocircuits bvba

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Technical Specifications “Pooling” & “On demand” Services

The first 4 columns show the specification of our “pooling” services. “On demand” represents our “non-pooling” options.

	“PCB proto”	“STANDARD pool”	“TECH pool”	“IMS pool”	“On demand”
Number of layers	2, 4	1, 2, 4, 6, 8	2, 4, 6, 8	1	1, 2, 4, 6, 8, 10, 12, 14, 16
Maximum PCB dimension	425mm x 425mm	425mm x 425mm	410mm x 410mm	425mm x 425mm	On request
Minimum PCB dimension	20mm x 20mm	5mm x 5mm	5mm x 5mm	5mm x 5mm	On request
Base material	FR-4, Td>=325°C, T260>=60', T288>=5', CTEz=<3.7%, Tg>=135°C	FR-4, Td>=325°C, T260>=60', T288>=5', CTEz=<3.7%, Tg>=135°C	FR-4, Td>=325°C, T260>=60', T288>=5', CTEz=<3.7%, Tg>=150°C	T300>60', Tg135°C, >=1.3W/m-K, =<0.65°C/W, >=8.5kV, 0.58 °C-cm²/W	FR-4, Tg 135-150-170°C Rogers RO4000 series
Base material thickness	1.55mm	1.55mm for 1L/2L only: 1mm & 2.4mm	1.55mm	ALU 1.5mm, 75µm Insulation	FR-4: 0.3mm – 6.4mm Rogers: on request
Base copper foil – outer layers	18µm/½oz	1L: 35µm/1oz, 2L: 18-35-70µm, 4-6-8L: 18µm/½oz,	12µm/½oz	35µm/1oz	12µm, 18µm, 35µm, 70µm & 105µm ½oz, ½oz, 1oz, 2oz & 3 oz
Base copper foil – inner layers	35µm/1oz	35µm/1oz	18µm/½oz	-	18µm, 35µm, 70 µm & 105µm ½oz, 1oz, 2oz & 3 oz
Surface finish	Lead-free finish at our discretion for best price	Lead-free for best price, ENIG, IM Ag, LF HAL	ENIG	LF HAL	Lead-free, ENIG, IM Ag, LF HAL, HAL Sn/Pb, IM Sn
Soldermask type/colour	Liquid Photo Imageable - Green	LPI: Green, black, blue	LPI: Green	LPI: White, black	Green, black, blue, red, white, clear
Extra options	None	Gold fingers, carbon pads, peelable mask, via filling	Peelable mask, via filling	-	Gold fingers, carbon pads, peelable mask, via filling, heat sink paste
Legend colour	White (one side only)	White both sides	White both sides	Black, white	White, yellow, black
Min. track width/spacing	0.150mm	0.150mm	0.100mm	0.150mm	0.090mm
Min. finished hole size	0.25mm	0.25mm, press fit holes	0.15mm, press fit holes	1.00mm	0.10mm, press fit holes
Minimum outer layer pad diameter = finished hole size + listed value	Hole ≤ 0.45mm: 0.350mm Hole ≥ 0.50mm: 0.400mm	Hole ≤ 0.45: 0.350mm Hole ≥ 0.50: 0.400mm	Hole ≤ 0.45: 0.300mm Hole ≥ 0.50: 0.350mm	Hole ≥ 1.00: 0.350mm	Hole ≤ 0.45: 0.300mm Hole ≥ 0.50: 0.350mm
Minimum inner layer pad diameter = finished hole size + listed value	Hole ≤ 0.45mm: 0.450mm Hole ≥ 0.50mm: 0.500mm	Hole ≤ 0.45: 0.450mm Hole ≥ 0.50: 0.500mm	Hole ≤ 0.45: 0.400mm Hole ≥ 0.50: 0.450mm	-	Hole ≤ 0.45: 0.350mm Hole ≥ 0.50: 0.400mm
Minimum copper to board-edge clearance – outer layers	0.250mm (routed)	0.250mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge	0.250mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge	0.250mm (routed), 0.450mm (V-cut)	0.250mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge. Round-edge plating
Minimum copper to board-edge – inner layers	0.400mm (routed)	0.400mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge	0.400mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge	-	0.400mm (routed), 0.450mm (V-cut). Copper up to edge. Plated holes on edge. Round-edge plating
Slots and cut-outs	2.0mm tool	0.5, 0.8, 1.0, 1.2, 1.6, >= 2.0mm tool	0.5, 0.8, 1.0, 1.2, 1.6, >= 2.0mm tool	2.0mm tool	0.5, 0.8, 1.0, 1.2, 1.6, >= 2.0mm tool. Depth routing
Delivery panels	2.0mm break-routed	2.0mm break-routed + V-cut	2.0mm break-routed + V-cut	2.0mm break-routed + V-cut	2.0mm break-routed + V-cut
Multilayer-build	Standard	Standard	Standard	-	Custom option
Electrical test	Standard for 4L	Standard for ML, option for 1-2L	Standard	option	Standard for ML, option for 1-2L
UL marking	Available	Available	Available	Not yet available	Available
Stencil material	130µm stainless steel	130µm stainless steel	130µm stainless steel	130µm stainless steel	130µm stainless steel
Maximum stencil size	465 x 465mm	600 x 600mm	600 x 600mm	600 x 600mm	600 x 600mm

For further information, please go to www.eurocircuits.com and go to the “PCB proto”, “STANDARD pool”, “TECH pool”, “IMS pool” or “On demand” menus.

January 2010

Notes

1. Introduction

The world is divided into a part that works with the Metric system and a part that works with the Imperial system for defining measurements. The "µm" is 25.4 times smaller than the "Mil". Dimensions for electronics are driven smaller all the time. To ensure the highest quality possible, we decided many years ago to work exclusively in the Metric system in our front end department. Therefore the basis of all measurements given in this document and in our website is the Metric system. All Imperial values are there for clarification and general understanding only.

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2. Board dimensions

The maximum dimension for a single PCB is limited to 425mm x 425mm or 16.732" x 16.732".

The minimum dimensions for a single PCB depend on the specific service and are 5mm x 5mm (0.200" x 0.200") in general with the exception for "PCB proto" where the minimum is 20mm x 20mm (0.788" x 0.788").

For ease of handling for manufacture and assembly, we recommend that you order very small board sizes in a customer panel. For panel specifications see [note 11](#) below.

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3. Base material

For all our services we use RoHS-compliant base materials. In addition our base materials are specially selected to withstand the more severe lead-free soldering temperatures. For our "PCB proto" and "STANDARD pool" pooling services we only use the "improved" FR-4 materials (for example Isola DE104i). For "TECH pool" we use higher grade MID Tg improved materials (for example Isola IS400). In "On demand" we offer a wide range of materials as boards are not pooled to produce. See our material specification for more detailed information.

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4.1. Standard copper thickness

Pooling services - "PCB proto" and "STANDARD pool":

For outer layers of PTH boards we use a standard copper foil of 18µm/½oz base copper. Over this we plate 20 – 25µm (+½oz) of copper so the final thickness is equivalent to (just over) 35µm/1oz copper. In "STANDARD pool" you can also specify a thicker copper foil prior to plating; see [note 4.2](#). For inner layers the standard copper foil thickness is 35µm/1oz. Inner layer copper is not plated up so the final thickness is the foil thickness.

Pooling service - "TECH pool":

For outer layers we use a standard copper foil of 12µm/⅓ oz base copper. Over this we plate 20 – 25µm (+½oz) of copper so the final thickness is equivalent to 35µm/1oz copper. For inner layers the copper thickness is 18µm/½oz.

Pooling service - "IMS pool":

We use 35µm/1oz foil

Non-pooled service "On demand":

We offer a full range of base copper thicknesses.

Note: the maximum copper thickness that can be used depends on the pattern classification of your board and vice versa (see table in note 4.2).

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4.2. Option 35µm/1 oz, 70µm/2 oz & 105µm/3 oz base copper foil.

Pooling service - "STANDARD pool":

Thicker base copper foils (35µm/1oz and 70µm/2oz) are available for 1L and 2L boards. The base copper thickness affects the minimum pattern class of the board. (See table below)

Non-pooled service "On demand":

A full range of base copper thicknesses are available subject to corresponding pattern values: 12µm/⅓oz, 18µm/½oz, 35µm/1oz, 70µm/2oz and 105µm/3oz.

Base Cu OL	OTW	OTT-OTP-OPP	Base Cu IL	ITW	ITT-ITP-IPP
12µm/⅓oz	0,090mm/3.5mil	0,090mm/3.5mil	12µm/⅓oz	0,090mm/3.5mil	0,090mm/3.5mil
18µm/½oz	0,100mm/4mil	0,125mm/5mil	18µm/½oz	0,100mm/4mil	0,100mm/4mil
35µm/1oz	0,150mm/6mil	0,200mm/8mil	35µm/1oz	0,150mm/6mil	0,150mm/6mil
70µm/2oz	0,200mm/8mil	0,250mm/10mil	70µm/2oz	0,200mm/8mil	0,250mm/10mil
105µm/3oz	0,250mm/10mil	0,300mm/12mil	105µm/3oz	0,250mm/10mil	0,300mm/12mil

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5. Surface finish

Our pooling services offer three RoHS-compliant lead-free finishes: electroless nickel immersion gold (ENIG or Ni/Au), immersion silver (IM Ag) and lead free hot-air levelling (LF HAL).

For customers who want the best price for prototype boards and are not concerned about the surface-finish we offer the option "Any lead-free". This means that we pick the surface finish which gives the best utilisation of our pooling panels on the day and hence the lowest possible price.

The option "Any lead-free" is the only available option for the "PCB proto" service and is the Eurocircuits default for the "STANDARD pool" program. To pick a specific finish, please go to the "technical specifications" menu and choose a finish from the options menu.

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6. Solder mask

We only use Liquid Photo Imageable soldermask. This is available as default in colour green, but as an option also in other colours. Choosing a blue or black soldermask affects the shortest available delivery period on the "STANDARD pool" service.

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7. Extra

As extra options we offer:

- Gold fingers: this means galvanic/hard gold-plated edge connectors ("STANDARD pool" and "On demand")
- Carbon pads: these are carbon ink printed pads for keyboards or similar applications ("STANDARD pool" and "On demand")
- Peelable mask: blue peelable mask for protecting PTH holes during wave soldering ("STANDARD pool", "TECH pool" and "On demand")
- Via filling: closing the vias by double solder mask printing over the vias ("STANDARD pool", "TECH pool" and "On demand")

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8. Legend

For most "PCB proto" and "STANDARD pool" services we offer white legend printed on a digital legend printer. This brings more flexibility and speeds up the process to ensure timely deliveries.

Otherwise we use screened Liquid Photo Imageable Legend ink. The default colour is white but as options in "IMS pool" and "On demand" we offer other colours as well. Choosing different colours on both sides of the board will result in extra costs.

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9. 1. Minimum finished (final) hole size

On both the "PCB proto" and the "STANDARD pool" services the minimum finished hole size is now 0.25mm = 0.010". We recommend the use of 0.30mm = 0.012" diameter vias.

All holes equal to and smaller than 0.45mm = 0.018" are defined as via holes. According to IPC rules, via holes have no negative tolerance on diameter. To keep prices down we will use this to reduce the number of via tool changes on the production panels.

In the "TECH pool" service the minimum hole size is 0.15mm = 0.006".

In the "IMS pool" service the minimum hole size is 1.0mm = 0.039" due to drilling in aluminium.

In the "On demand" service the minimum hole size is 0.1mm = 0.004".

The minimum hole size affects the maximum board thickness that we can achieve. See classification table for detailed info.

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9. 2. Minimum annular ring

Good PCB plating, soldering and appearance (no breakout) require the specified minimum annular ring of copper around each hole. To calculate the minimum annular ring take the finished hole size and add a value to accommodate the hole-wall plating and manufacturing tolerances: 0.1mm (4mil) on holes up to 0.45mm (18mil) in diameter and 0.15mm (6mil) on larger holes. This gives the production hole size. The annular ring value is half the difference between the pad size and the production drill hole size. In the table above (page 2) we show this (plating thickness + annular ring) as a single figure to be added to the desired finished hole size.

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9. 3. Minimum pattern & drill class overview

Pattern & Drill class	"PCB proto"	"STANDARD pool"	"TECH pool"	"On demand"	"IMS pool"
OTW	0,150mm/6mil	0,150mm/6mil	0,100mm/4mil	0,090mm/3.5mil	0,150mm/6mil
OTT-OTP-OPP	0,150mm/6mil	0,150mm/6mil	0,100mm/4mil	0,100mm/4mil	0,150mm/6mil
OAR	0,125mm/5mil	0,125mm/5mil	0,100mm/4mil	0,100mm/4mil	0,125mm/5mil
ITW	0,150mm/6mil	0,150mm/6mil	0,100mm/4mil	0,090mm/3.5mil	-
ITT-ITP-IPP	0,150mm/6mil	0,150mm/6mil	0,100mm/4mil	0,100mm/4mil	-
IAR	0,175mm/7mil	0,175mm/7mil	0,150mm/6mil	0,125mm/5mil	-
pattern class	6	6	8	9	6
Smallest Final Hole	0,250mm/0.010"	0,250mm/0.010"	0,150mm/0.006"	0,100mm/0.004"	1,000mm/0.039"
Drill Classification	C	C	D	D	A

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10. Slots and cut-outs

Terminology.

We use "routing" or "break-routing" to refer to external profiling, and "slots", "milling" and "cut-outs" to refer to internal cut-outs. Specify slots, internal milling and cut-outs with their finished dimensions (widths and lengths) to ensure that they are produced correctly.

External profiling.

This can be shown on the copper, mask or legend layer or on a separate mechanical layer. It is important to make sure that there is only one profile shown. If you want a circular board, please show a circular profile and not a circle within a square box.

Internal slots and cut-outs.

For maximum accuracy, please indicate slots, milling and cut-out information clearly in a Gerber mechanical layer, showing the border of the PCB, the internal slots, milling, and cut-outs. Indicate in text the size of the slots with tolerances (if needed) and whether plated or not. Do not indicate these features in copper layers or by text outside the layout.

For the "On demand" service only you can use a separate text-file in English language, a drawing or a document. Include the text-file, PDF or HPGL file in the WinZip file that contains your layout data.

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11. Delivery panels/customer arrays

11.1. Customer-panelised data

- Maximum number of different circuits per panel: 10
- Maximum panel size: 250 x 350mm = 9.84" x 13.78"
- Minimum borders to give a stable panel: 2 x 5mm = 0.2" in X & Y. Allow an extra 2mm (0.079") between the edge of the panel and the edge of the circuit for the cutter path if the panel is to be break-routed (total border = 7mm (0.28")). Panels drawn without a border are evaluated to check the panel stability.
- Minimum clearance between PCBs for break-routing: 2mm (0.079"). Any larger value is OK
- If you require V-cut scoring, we advise to use the "Panelised by Eurocircuits" option for technical reasons.
- Break-out routing tabs will be defined by our engineers to ensure a stable panel. Rout tabs will be drilled to break inside the board profile for clean break-out.
- All fiducials (e.g. for mounting SMD components) and external tooling holes must be included in your data.

11.2. Panelised by Eurocircuits to Eurocircuits rules

- One type of circuit only. For multiple panels please supply pre-panelised data.
- Minimum dimensions of the single circuit are 5 x 5mm = 0.2" x 0.2", except for "PCB proto": 20 x 20mm = 0.197" x 0.197"
- Maximum panel size: 250 x 350mm = 9.84" x 13.78"
- Minimum border to give a stable panel: 2 x 5mm (0.2") in X & Y. Select border width (5mm (0.2") or 7mm (0.28") or 10mm (0.4")) from the pick-list "Panel Border" in the price calculator. The system will automatically add 2mm (0.079") on all sides for the cutter path if the panel is to be break-routed. Panels without a border are possible but not recommended for stability reasons.
- Minimum clearance between PCBs for break-routing: 2mm (0.079"). Select clearance (2mm (0.079"), 5mm (0.2") or 10mm (0.4")) from the pick-list "Distance between two PCBs" in the price calculator.
- No clearance between PCBs is required for V-cut scoring (but note that all lay-out elements and holes should be 0.45mm (0.018") away from the edge of the board and that the minimum panel size is 100 x 100mm = 4" x 4")
- Break-out routing tabs will be defined by our engineers to ensure a stable panel. Routed tabs will be drilled to break inside the board profile for clean break-out.
- Circuits cannot be rotated or nested. If rotation or nesting are required, please supply pre-panelised data
- Standard fiducials and tool-holes (3mm European and 0.125" US) are included in the panel border in each corner. For special fiducials, please supply pre-panelised data.
- For paste files see Note below.

11.3. Panelised by Eurocircuits to your panel plan

We can also panelise to your drawings. Supply the Gerber single image and a clear drawing in Gerber, PDF or HPGL format. We will handle up to 10 different circuit types per panel, plus rotation and nesting. Enter the circuit size, panel size and separation method in the Panel Specification menu and leave the border and spacing boxes at default. For paste files see Note below. This option is only available in the "On demand" service.

Note – paste files:

We recommend that you supply us the paste file for the single image together with the rest of the Gerber data. If we panelise the job, we automatically panelise the paste layers. If no paste file is supplied with the original data, we will generate a paste file from the SMD pads on a "best efforts" basis. It is advisable to check this paste layer before submitting it for screen making. You can download the panelised paste files from the web site.

Detailed guidelines for designing and ordering customer panels are to be found on the home page under Panel instructions.

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12. Traceability

To identify every individual customer order, all orders are marked with the Eurocircuits order number: e.g. P456951 for "PCB proto" orders, S123456 for "STANDARD pool" orders, T987654 for "TECH pool" orders, I357456 for "IMS pool" orders or D234567 for "On demand" orders. The marking is done either in the solder mask or in the silk-screen (legend). We use this identification to track the circuits after they have been routed out of the production panels. The order number can be used to trace batch and date information via the website.

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13. UL

UL marking is possible in all our service except for the "IMS pool" service. If your data is already set up for volume production needing the UL logo and you want to order "IMS pool" prototypes without the UL-logo, add a text file in your set of data and call this (empty) file NO_UL.txt.

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14. Standard build-ups for all services.

The standard build ups for 0, 1, 2, 4-, 6- and 8-layers are shown below.

For other builds and thicknesses and for multilayer using Rogers material use the "On demand" service. Select a standard build from the drop down or choose special and input the smallest core thickness, the number of press cycles and the number of extra galvanic plating stages. If you do not know this choose special, attach your files and launch an inquiry.

The tolerance on total thickness: $\pm 10\%$ and max. 0.18mm (0.007"), measured on epoxy.
 The insulation between layers is according IPC6012 performance spec for rigid boards.

0 Layer STD Build 1.55mm 0.062"

Core	1550 μ m	62mil
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1 Layer STD Build 1.55mm 0.062"

Core	1550 μ m	62mil
copper - 1	35 μ m	1oz

2 Layer STD Build 1.55mm 0.062"

copper - 1	18 μ m	$\frac{1}{2}$ oz
Core	1550 μ m	62mil
copper - 2	18 μ m	$\frac{1}{2}$ oz

4 Layer STD Build 1.55mm 0.062"

copper - 1	18 μ m	$\frac{1}{2}$ oz
Prepreg 7628	180 μ m	7mil
Prepreg 7628	180 μ m	7mil
copper - 2	35 μ m	1oz
Core	710 μ m	27.95mil
copper - 3	35 μ m	1oz
Prepreg 7628	180 μ m	7mil
Prepreg 7628	180 μ m	7mil
copper - 4	18 μ m	$\frac{1}{2}$ oz

6 Layer STD Build 1.55mm 0.062"

copper - 1	18 μ m	$\frac{1}{2}$ oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 2	35 μ m	1oz
Core	360 μ m	14.2mil
copper - 3	35 μ m	1oz
Prepreg 7628	180 μ m	7mil
Prepreg 7628	180 μ m	7mil
copper - 4	35 μ m	1oz
Core	360 μ m	14.2mil
copper - 5	35 μ m	1oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 6	18 μ m	$\frac{1}{2}$ oz

8 Layer STD Build 1.55mm 0.062"

copper - 1	18 μ m	$\frac{1}{2}$ oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 2	35 μ m	1oz
Core	200 μ m	4mil
copper - 3	35 μ m	1oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 4	35 μ m	1oz
Core	200 μ m	4mil
copper - 5	35 μ m	1oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 6	35 μ m	1oz
Core	200 μ m	4mil
copper - 7	35 μ m	1oz
Prepreg 2125	100 μ m	4mil
Prepreg 2125	100 μ m	4mil
copper - 8	18 μ m	$\frac{1}{2}$ oz

All materials are suitable for lead free soldering.
 We exclusively use FR-4 improved materials
 All used materials comply with the RoHS regulations

The minima for the key material parameters are: Td $\geq 325^\circ\text{C}$
 T260 ≥ 60 min
 T288 ≥ 5 min
 CTEz $\leq 3.7\%$
 Tg $\geq 135^\circ\text{C}$

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