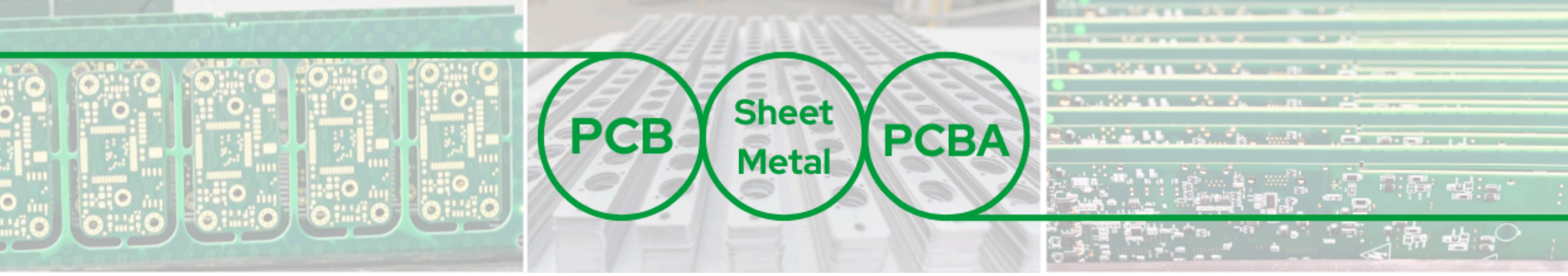


PCB Division Capability Sheet

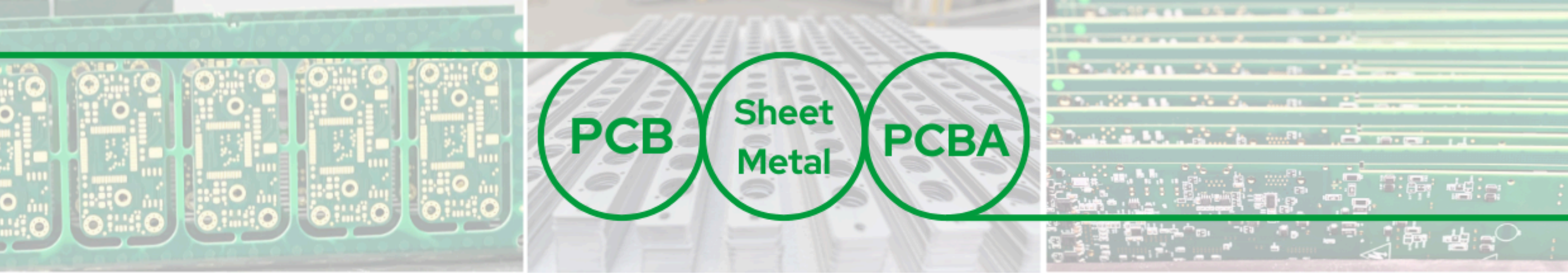
For other enquiries, please visit our website or contact us directly

info@zot.co.uk

Inveresk Mills Ind Park
Musselburgh EH21 7UQ

0131 653 6834

www.zot.co.uk



Material

	Standard Capabilities	Prototype Capabilities
FR4 – High TG Isola 370HR, VT47	Y	Y
FR4 - Mid TG Ventec VT 481 , IS 400	Y	Y
FR4 - Low TG	Y	Y
Polyimide – various options	Y	Y
PTFE – Rogers 3000 (SS / PTH only)	Y	Y
Rogers 4000 series	Y	Y
EMC	Y	Y
Omega Ply	Y	Y
Halogen Free	Y	Y
DuPont – Pyralux AP/FR/LF	Y	Y
Other Flex material – on request	Y	Y
Ask for other materials		

Surface Finishes

ENIG	Y	Y
Lead Free HASL	Y	Y
Leaded HASL	Y	Y
Immersion Silver	Y	Y
Electrolytic Nickel /Gold	Y	Y
Selective & Multiple Surface Finish	Y	Y
Immersion Tin	S	S
ENEIPG	S	S

S = subcontract, this will add to lead-time

Standard Features

Maximum Panel Size	574mm X 406mm	574mm X 406mm
Minimum Panel Thickness	0.400mm	0.100mm
Maximum Panel Thickness	3.2mm	6.00mm
Maximum PTH Aspect Ratio	8:1	15:1
Maximum Copper weight	3oz	6oz
Maximum Layer Count	2-18	18-28
Minimum Core Thickness	0.100mm	0.075mm
Minimum Dielectric	0.065mm	0.025mm
Minimum Drill size (pth)	0.200mm	0.150mm
Soldermask Registration	+/- 0.100mm	+/-0.037mm
Copper feature to PCB edge	+/-0.200mm	+/-0.150mm
Minimum Track & Space – Outer*	0.100mm	0.075mm
Minimum Track & Space – Inner*	0.100mm	0.075mm

Other

	Standard Capabilities	Prototype Capabilities
Blind & Buried Microvia	Y	Y
Buried Resistors x	Y	Y
Non Conductive hole fill	Y	Y
Copper filled via – via in pad	Y	Y
Multi copper weight PCB	Y	Y
Depth Control Drill & Rout	Y	Y
Countersink	Y	Y
Back Drilling	Y	Y
Impedance (Single Ended & Differential)	+/-10%	
Scoring	Y	Y
PCB Edge Chamfer	Y	Y
Laser Direct Imaging	Y	Y
Mixed Dielectrics & Hybrid constructions	Y	Y
Sequential Lamination	Y	Y

Microvia Features

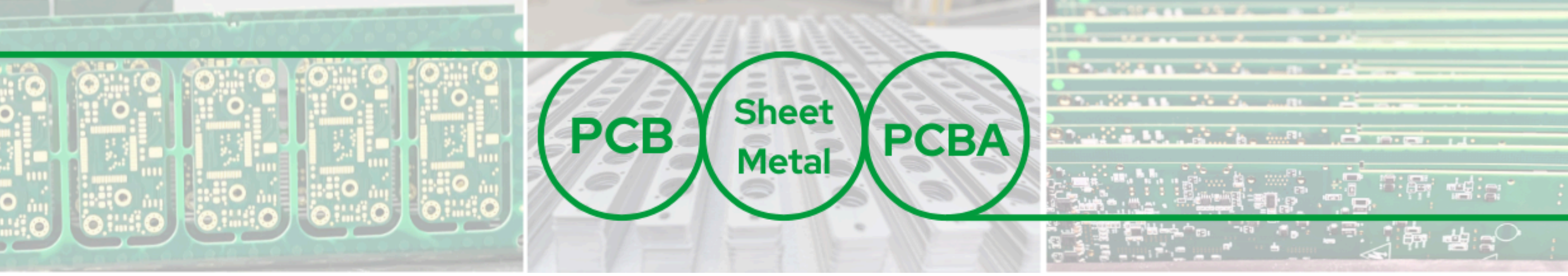
Stacked	Y	Y
Staggered	Y	Y
Solid Copper Fill	Y	Y
1+N+1	Y	Y
2+N+2	Y	Y
3+N+3	N	Y

Electrical Test

Cad Net-list testing (ipc-356A)	Y	Y
Computer Aided test Engineering work stations	Y	Y
Electrical Test compliance to IPC-9252	Y	Y
Flying Probe pitch	0.400mm	0.300mm
Standard SMD pitch	0.400mm	0.300mm

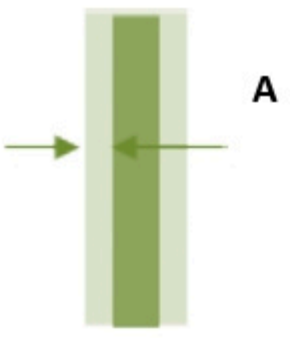
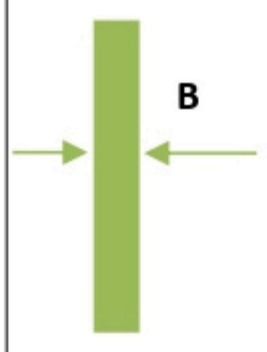
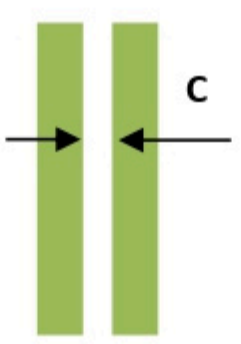
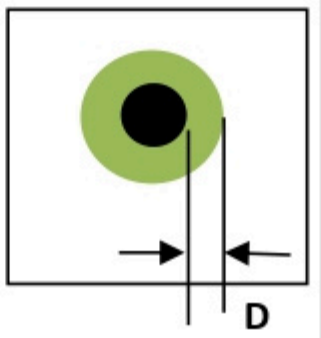
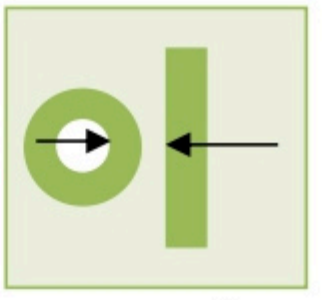
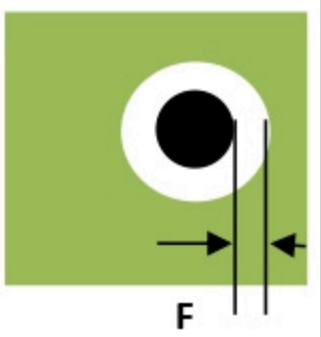
Quality System & Certifications

AS9100
ISO 9001
UL CERTIFICATE NO. E76334
BS EN 123000
IPC-600,6011 / 6012 / 6013 / 6016
UNLESS OTHERWISE STATED DEFAULT IS CLASS 2



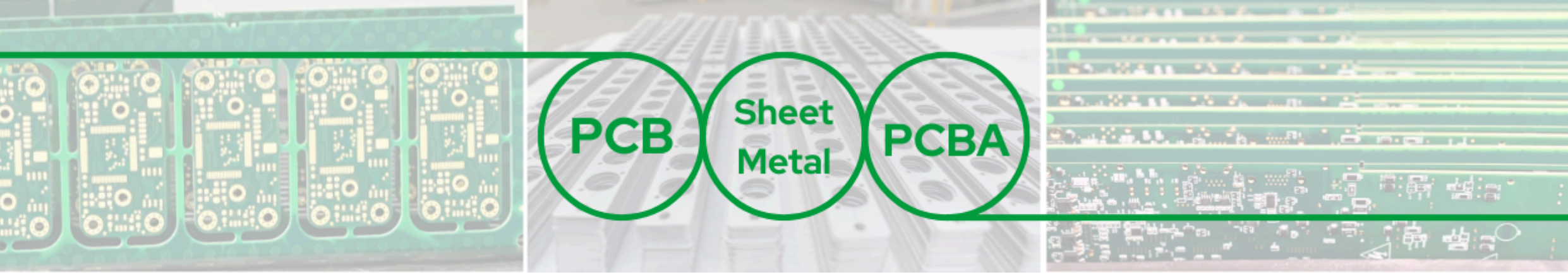
1 Inner and outer layer copper features

1.1 Description

Etch Compensation	Min. Track width	Min. Space (feature to feature)	Min. Annular Ring	Min. Space: PTH hole to copper	Min. Space: NPTH hole to copper
					

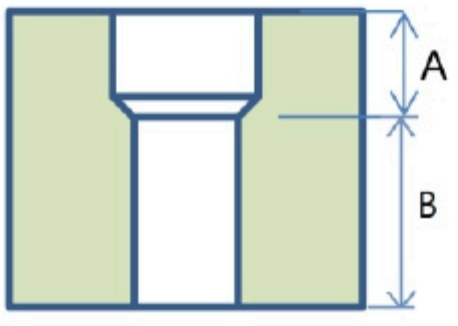
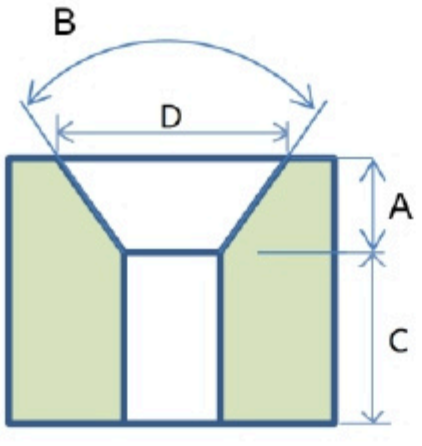
1.2 Capability

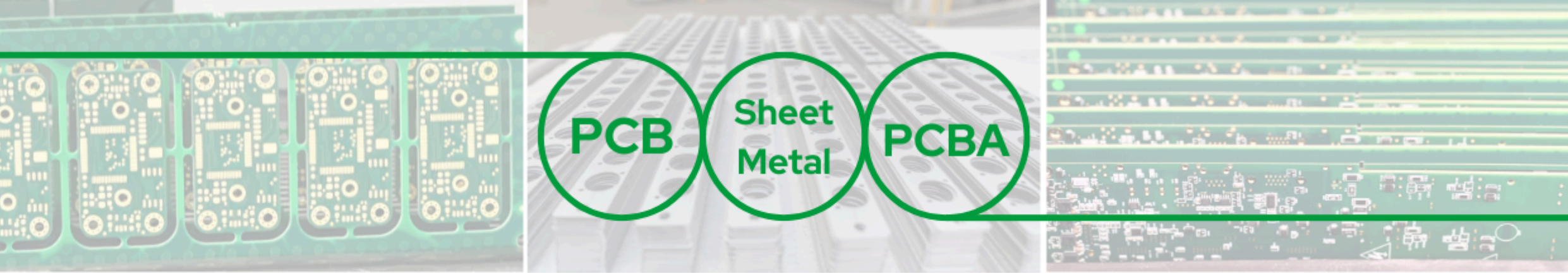
Base copper thickness		A	B	C	D	E	F
Inner layer	18um / ½ oz	0.0075	0.075	0.075	0.075	0.125	0.15
	35um / 1oz	0.015	0.100	0.100	0.090	0.190	0.15
	70um / 2oz	0.030	0.175	0.185	0.105	0.280	0.15
	105um / 3oz	0.045	0.225	0.240	0.115	0.340	0.15
	140um / 4oz	0.060	0.300	0.270	0.135	0.435	0.15
	175um / 5oz	0.075	0.300	0.300	0.150	0.450	0.15
	210um/ 6oz	0.090	0.300	0.330	0.165	0.465	0.15
Outer layer	12um/ $^{1}/_{3}$oz	0.008	0.075	0.075	0.075	0.125	0.15
	18um / ½oz	0.015	0.100	0.100	0.075	0.175	0.15
	35um / 1oz	0.025	0.125	0.125	0.100	0.225	0.15
	70um / 2oz	0.040	0.150	0.180	0.125	0.275	0.15
	105um / 3oz	0.055	0.200	0.259	0.150	0.350	0.15
	140um / 4oz	0.070	0.200	0.274	0.175	0.375	0.15
	175um / 5oz	0.090	0.250	0.330	0.200	0.450	0.15
	210um / 6oz	0.110	0.300	0.370	0.225	0.525	0.15



2 Drilling/Routing/V-cut/Bevel

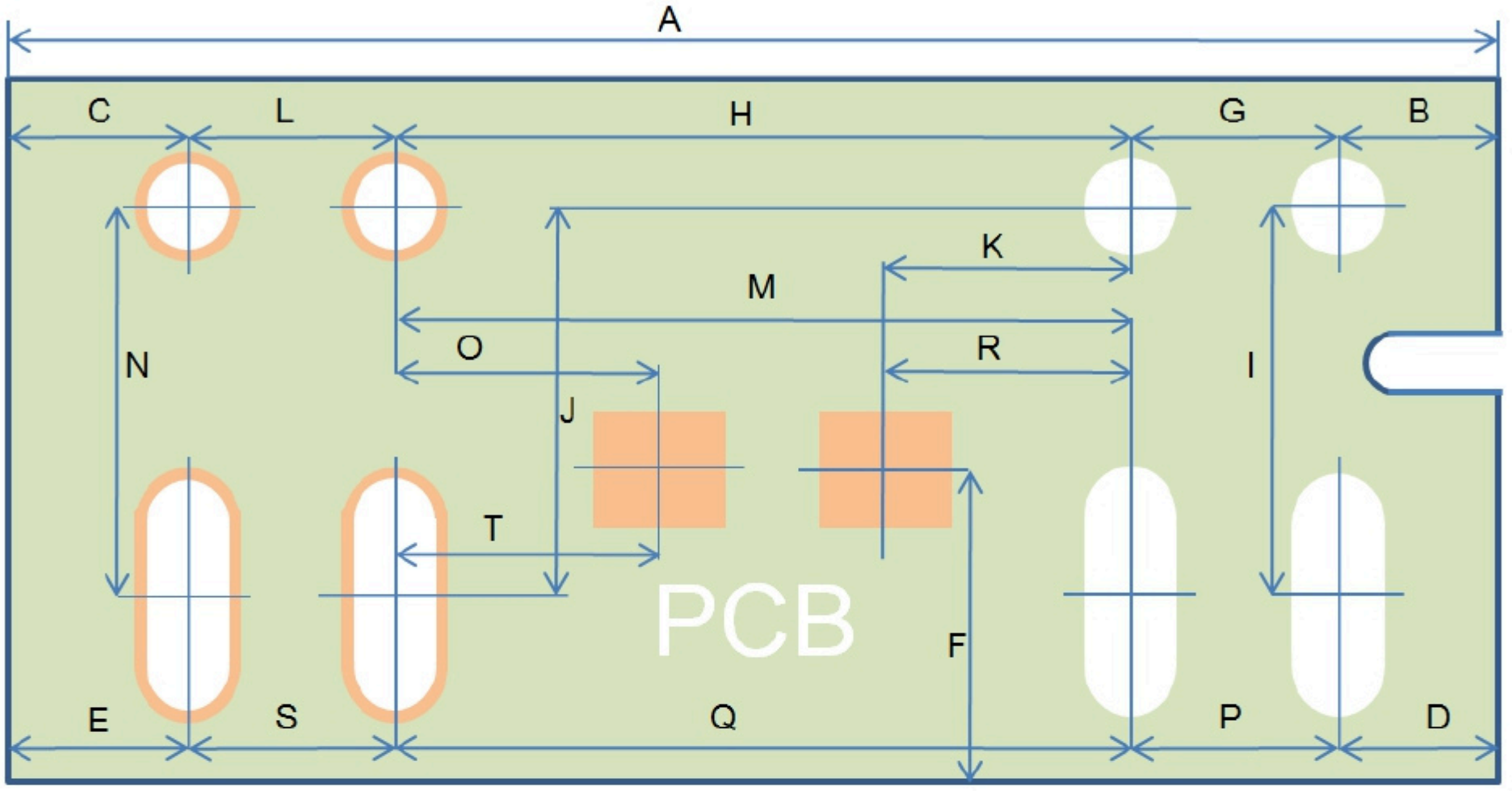
2.1 Drilling

	Size		Best tolerance PTH		Best tolerance NPTH	
Min. hole mechanically drilled	0.15	mm	0.05	+/-mm	0.025	+/-mm
Max. hole mechanically drilled	6.3	mm	0.05	+/-mm	0.025	+/-mm
Min. slot width mechanically drilled	0.5	mm	0.05	+/-mm	0.025	+/-mm
Min. slot length mechanically drilled	1.0	mm	0.05	+/-mm	0.025	+/-mm
True positional tolerance	hole to hole		0.075	+/-mm	0.075	+/-mm
Aspect Ratio	15:1 (0.2mm drill)					
Min. space between holes	0.175 mm					
Min. space between NPTH and edge	0.200 mm					
Back drilling / Counter bore 	Depth tolerance (A)		0.050 +/- mm		0.050 +/- mm	
	Min. remain thickness and tolerance (B)		0.075 +/- mm		0.075 +/- mm	
Counter sink holes 	Depth tolerance (A)		0.05 +/- mm		0.05 +/- mm	
	Angle and tolerance (B)		4 +/-Degree		4 +/-Degree	
	Min. remain thickness and tolerance (C)		0.075 +/- mm		0.075 +/- mm	
	Countersink tolerance (D)		0.05 +/- mm		0.05 +/- mm	

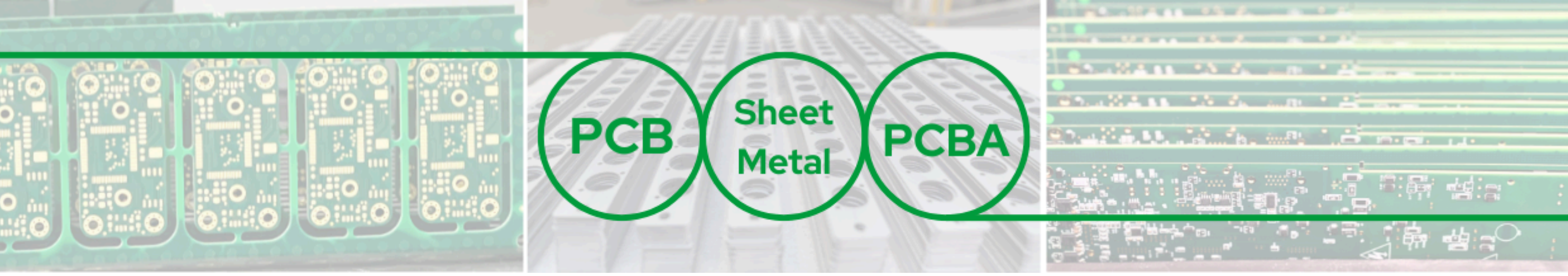


2.2 Routing

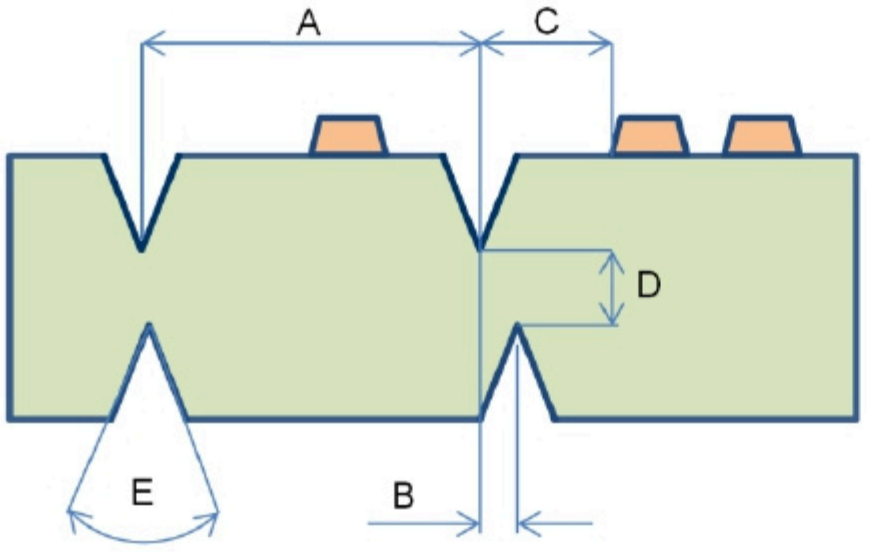
Rout Diameter	Standard:	2.4	mm
	Other:	0.5 – 3.175	mm



Tolerance in mm (±)	Board Edge	NPTH	PTH	NP Slot	PT Slot	Cu Pad
Board Edge	A 0.20 +/-mm	B 0.20 +/-mm	C 0.20 +/-mm	D 0.20 +/-mm	E 0.2 +/-mm	F 0.15 +/-mm
NPTH		G 0.20 +/-mm	H 0.10 +/-mm	I 0.20 +/-mm	J 0.20 +/-mm	K 0.075 +/-mm
PTH			L 0.25 +/-mm	M 0.20 +/-mm	N 0.075 +/-mm	O 0.075 +/-mm
NP Slot				P 0.60 +/-mm	Q 0.20 +/-mm	R 0.10 +/-mm
PT Slot					S 0.55 +/-mm	T 0.10 +/-mm

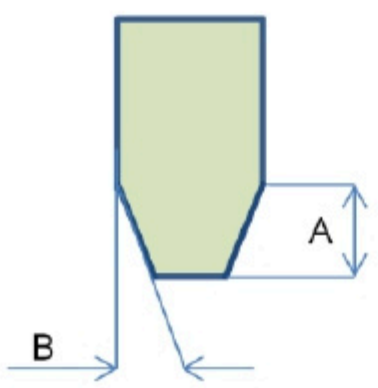


2.3 Scoring/V-cut

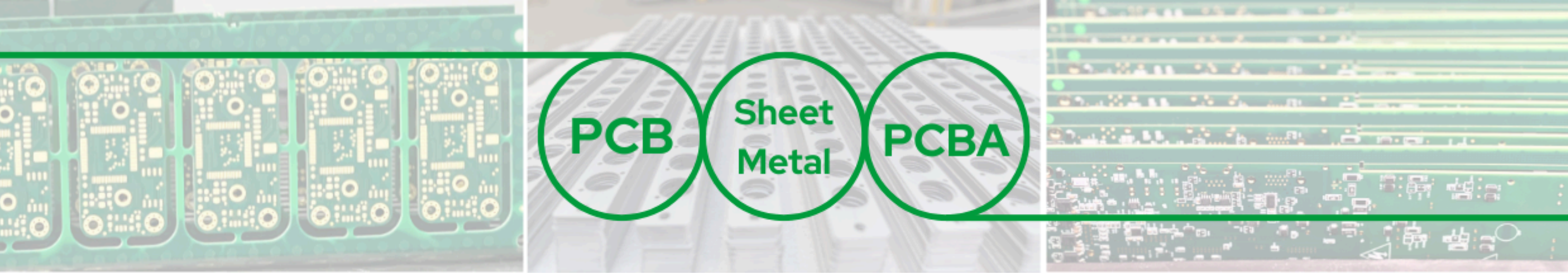


Feature type		Nom (mm)	Min (mm)	Tolerance +/- (mm)
Position accuracy	**A**	0.2	0.10	
Blade offset	**B**	0.050	0.025	
Keep out area	**C**	0.20	0.15	
Web	**D**	0.4	0.10	
Angle	**E**	30	30	
Min board thickness:		0.30mm		
Max board thickness:		2.40mm		
Min safe buffered distance from the cutting point to the beginning of jump v-cut		0.20mm		

2.4 Chamfer/Bevel



Feature type		
A - Bevel height tolerance	0.1	+/-mm
B - Bevel angle range	20 - 45	degree
Bevel angle tolerance	5	+/-degree



3 Solder mask Capability (Rigid board)

3.1 Finished solder mask type and thickness capability:

Brand + type	Available colors	Matte	Gloss	Semi gloss / matte	Halogen Free	
Sun Chem XV501T	Green			Y		
Sun Chem XV501T	Black			Y	Y	
Sun Chem XV501T	Red			Y	Y	
Sun Chem XV501T	Blue			Y	Y	
Sun Chem XV501T	Yellow			Y	Y	
Sun Chem XV501T	White			y	Y	
Electra EFP140/3044	Green			y		
Electra EFP140/3044	Brown			y		

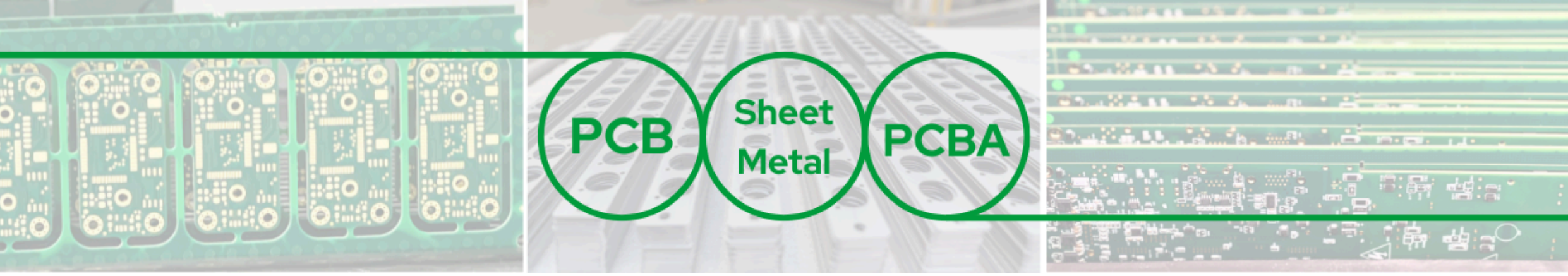
3.2 Via hole plugging techniques:

3.2.1 General

	Detail	Yes or No	Max hole size	Min hole size
Plugging techniques	Over plated/ capped IPC 4761 type VII	Y	0.50mm	0.15mm

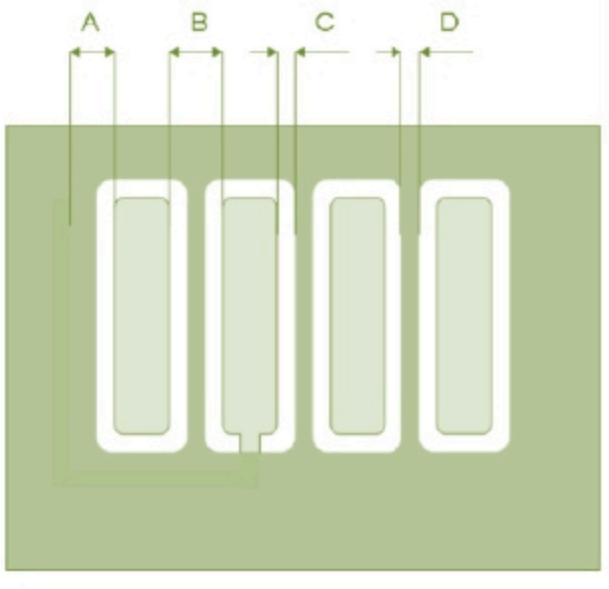
3.2.2 Plug depth (soldermask IPC4761 type VI)

Board Thickness (H) / Holes size(D)	0.4 - 1.0mm	1.0 - 1.8mm	1.8 - 2.4mm	2.4 - 3.6mm
0.2mm≤D<0.6mm	80%	80%	70%	50%
0.6mm≤D≤0.8mm				



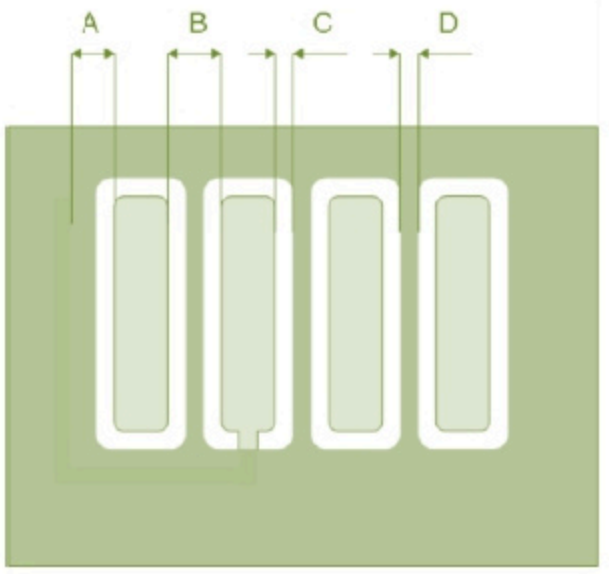
3.3 Soldermask capability:

3.3.1 Green Solder resist features to ensure no encroachment

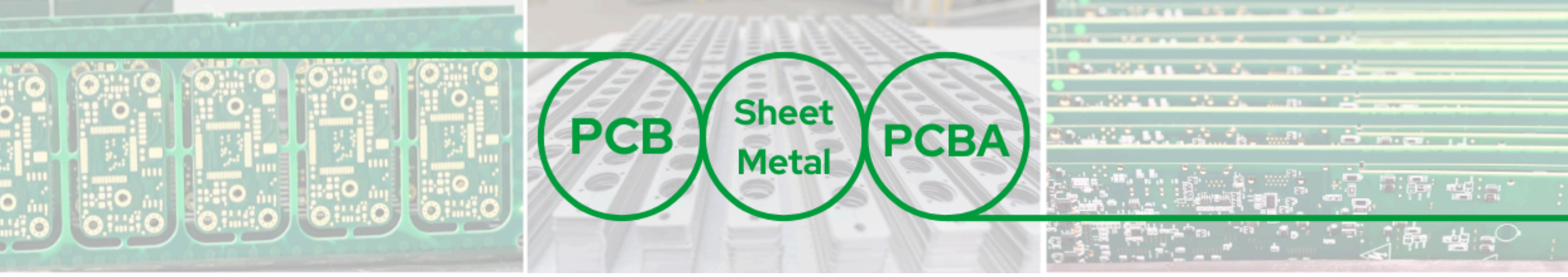


Feature type		Base copper Hoz	Base copper 1oz	Base copper 2oz	Base copper 3oz	Base copper 4oz
SMT to covered copper	**A**	0.10	0.125	0.180	0.260	0.275
Copper to copper spacing	**B**	0.10	0.125	0.180	0.260	0.275
Solder mask oversize	**C**	0.062	0.062	0.087	0.112	0.137
Minimum soldermask web	**D**	0.075	0.075	0.1	Not specified	Not specified

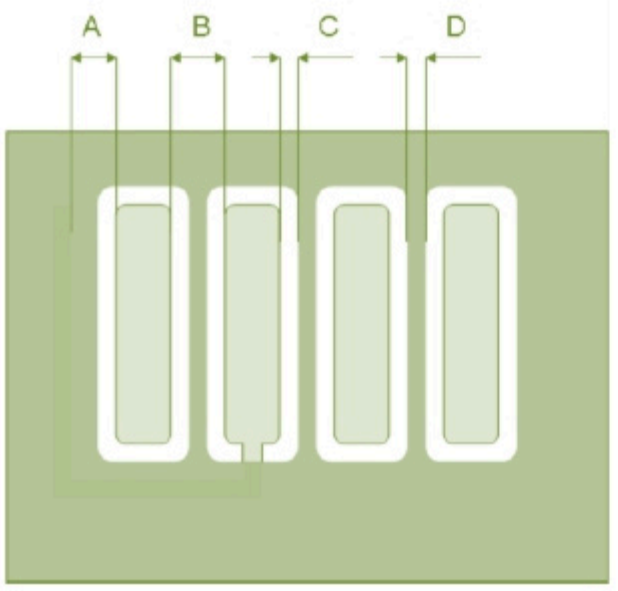
3.3.2 Red/blue/yellow Solder resist features to ensure no encroachment



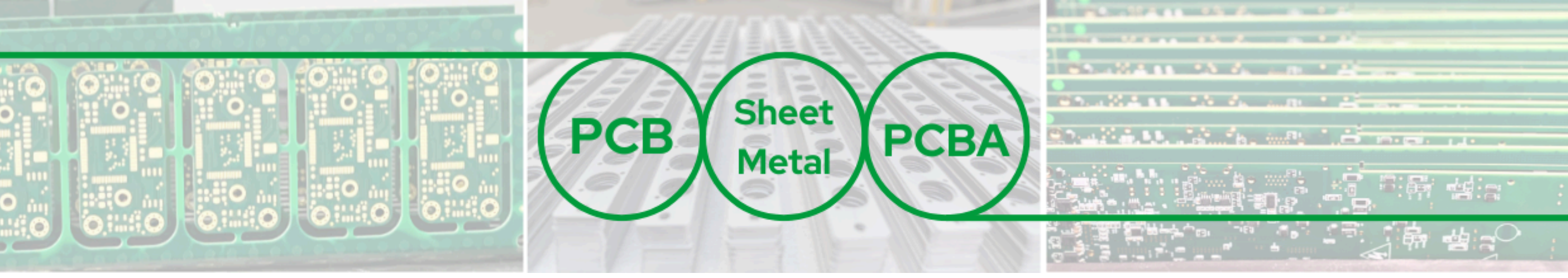
Feature type		Base copper Hoz	Base copper 1oz	Base copper 2oz	Base copper 3oz	Base copper 4oz
SMT to covered copper	**A**	0.10	0.125	0.180	0.260	0.275
Copper to copper spacing	**B**	0.10	0.125	0.180	0.260	0.275
Solder mask oversize	**C**	0.062	0.062	0.087	0.112	0.137
Minimum soldermask web	**D**	0.075	0.075	0.100	Not specified	Not specified



3.3.3 White/black Solder resist features to ensure no encroachment



Feature type		Base copper Hoz	Base copper 1oz	Base copper 2oz	Base copper 3oz	Base copper 4oz
SMT to covered copper	**A**	0.10	0.125	0.180	0.260	0.275
Copper to copper spacing	**B**	0.10	0.125	0.180	0.260	0.275
Solder mask oversize	**C**	0.062	0.062	0.087	0.112	0.137
Minimum soldermask web	**D**	0.1	0.125	0.15	Not specified	Not specified



4 Marking capability

4.1 Silkscreen / Legend

Colors	White	**Standard**
	Yellow, Black, Red, Blue	**Others**
Min legend width	0.125	**mm**
Min legend height	0.125	**mm**
Position accuracy	0.1	**+/- mm**

4.2 Soldermask defined text

Min soldermask text width*	0.100	**mm**
Min soldermask text height	1.0	**mm**
Position accuracy	0.05	**+/- mm**

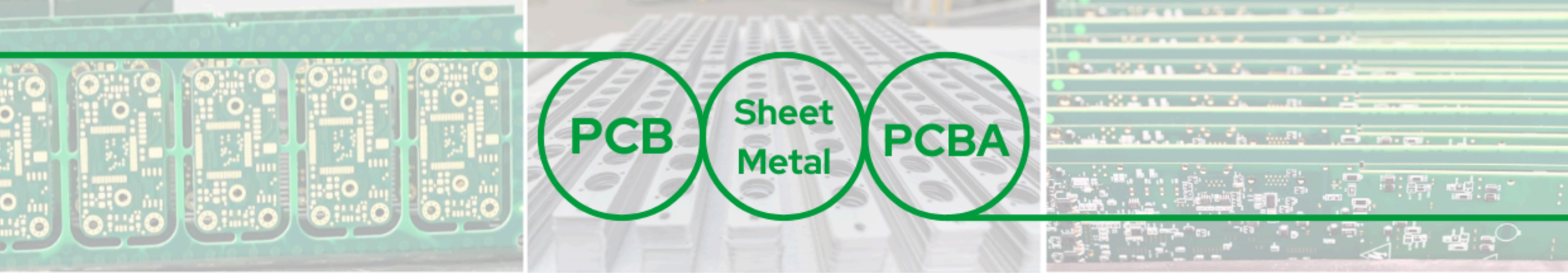
*** not applicable with HASL or LF HASL**

4.3 Etched copper text

Min etching text width	0.10	**mm**
Min etching text height	1.0	**mm**
Position accuracy	0.050	**+/- mm**

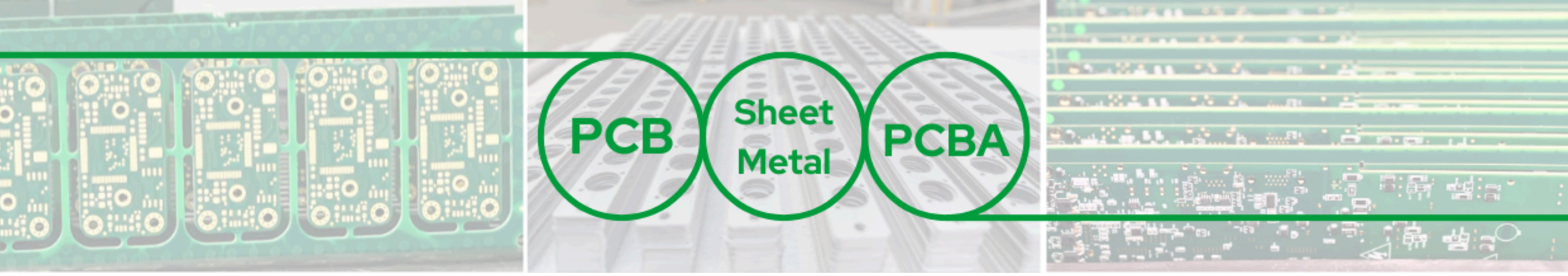
5 Peelable mask & Kapton tape

Peelable Mask	Nominal Thickness:	>300um
	Minimum Thickness:	300um
	Max covered hole diameter:	2.5mm
	Peelable mask used (UL approved)	SD2955
	Min distance to not covered feature:	1.0mm
Kapton tape (to cover larger holes)	Can Use:	JIT4677
	Nominal Thickness:	300um



6 Carbon

Min space between carbon	0.20	**mm**
Min carbon opening bigger than copper pattern per side	0.20	**mm**
Min space between carbon edge to around copper	0.20	**mm**
Position accuracy	0.15	**+/- mm**

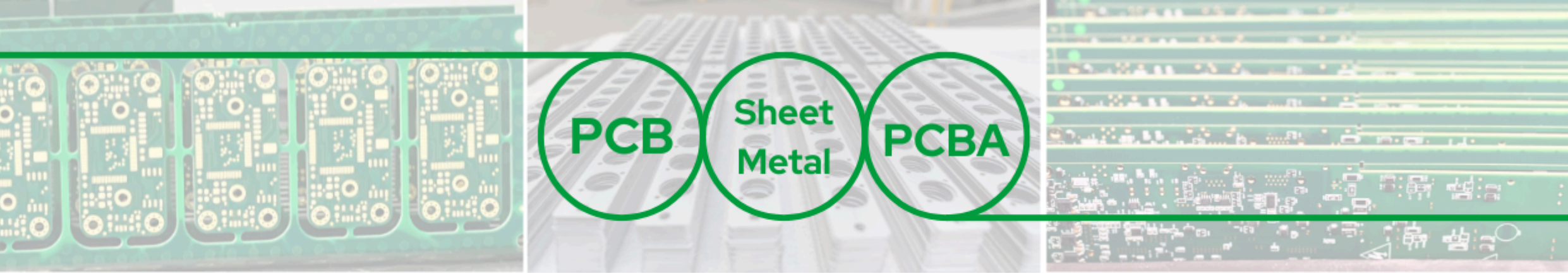


7 Surface finish

Surface Finish	YES/NO	Sub-contracted?	Thickness (um)
Pb-F HASL	YES		Solderable <20um
SnPb HASL	YES		Solderable <20um
Edge hard gold contacts	YES		As Below
Internal hard gold contacts	YES		3-7um Nickel 1.5-3.0um Gold
Flash gold			
ENIG	YES		0.05um-0.1um Gold 3um – 7um Nickel
Immersion Tin		YES	
Immersion Silver	YES		0.25-0.50um
Carbon	YES		15-25um
ENEPIG		YES	

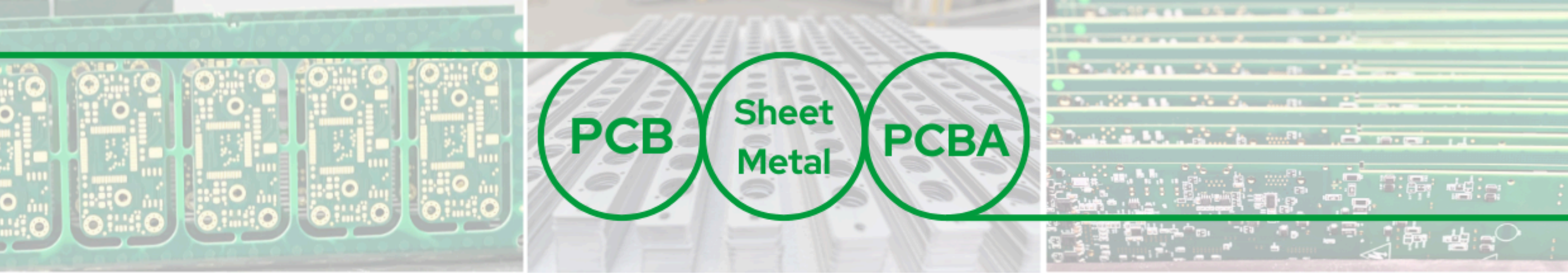
8 E-Test

Max test area	578*412	mm x mm
Minimum Test board thickness	0.05	mm
Minimum test PAD width	0.05	mm
Minimum test pad pitch	0.1	mm
High voltage test	N	V
Automated segregation of pass / fail	N	Y/N



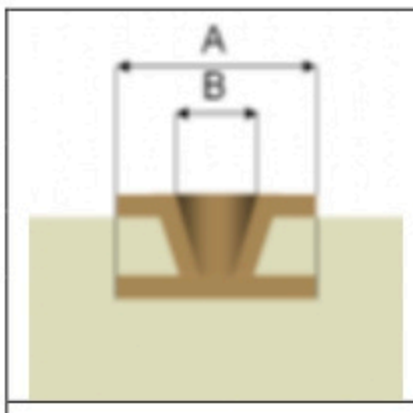
9 HDI (Complete if applicable)

Mechanical Hole	Min. hole size	0.15	mm
	Max. hole size	0.40	mm
Laser Hole	Min. hole size	0.05	mm
	Max. hole size	0.2	mm
Aspect Ratio	Normal	0.7:1	X:X
	Best	1:1	X:X
Build-up material used	RCC	N	
	RCC High Tg	N	
	Polyimide	Y	
	No-Flow prepreg	Y	
Technique	1+N+1	Y	UL
Technique (Cont.)	2+N+2 (staggered µvia)	Y	UL
	3+N+3 (staggered µvia)	Y	Non UL
	2+N+2 (stacked µvia)	Y	UL
Filling technique µvia	Copper filled	Y	
	Resin filled (over plated)	Y	

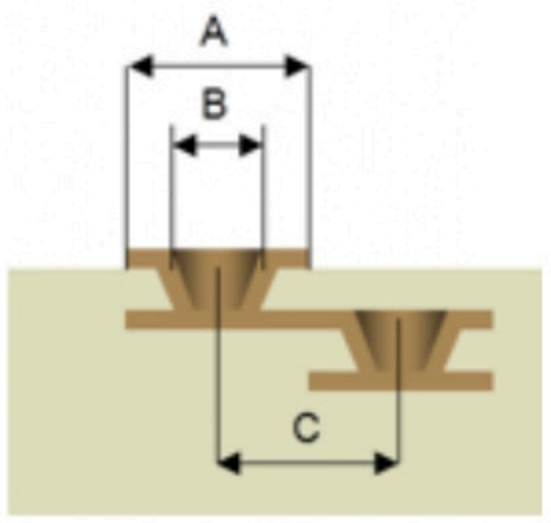


9.1 Design features HDI

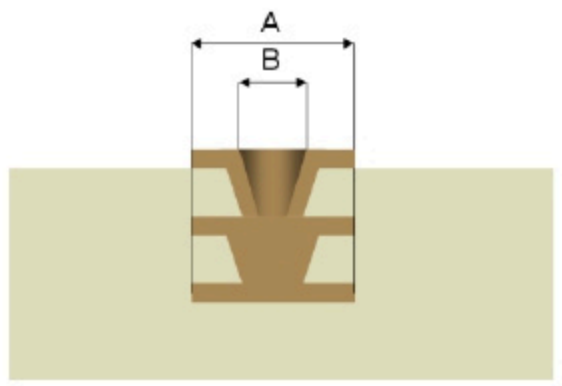
	Preferred	**Min.**
Entry pad (A)	300um	250um
Target pad L1 (A)	300um	250um
Hole L1-L2 (B)	150um	100um



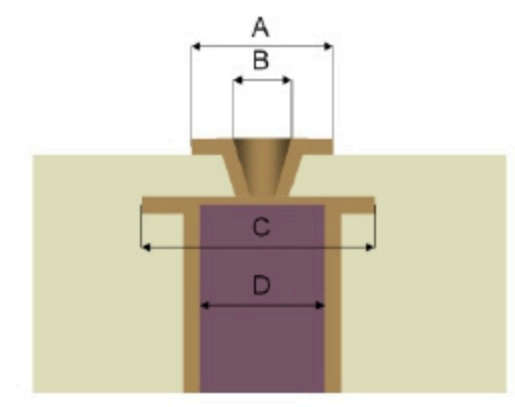
	Preferred	**Min.**
Entry pad (A)	300um	250um
Target pad L2 (A)	300um	250um
Entry pad L2 (A)	300um	250um
Target pad L3 (A)	300um	250um
Hole L1-L2 (B)	150um	100um
Hole L2-L3 (B)	150um	100um
Hole Pitch (C)	400um	350um



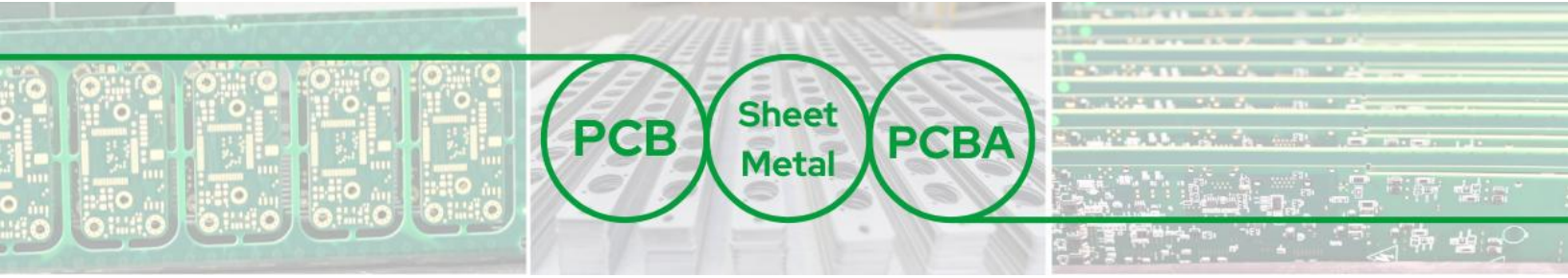
	Preferred	**Min.**
Entry pad (A)	300um	250um
Target pad L2 (A)	300um	250um
Target pad L3 (A)	400um	350um
Hole L1-L2 (B)	200um	150um
Hole L2-L3 (B)	200um	150um



	Preferred	**Min.**
Entry pad (A)	400um	350um
Target pad L2 (A)	400um	350um
Target pad L3 (D)	300um	250um
Hole L1-L2 (B)	150um	100um
Hole L2-L3 (C)	150um	100um



	Preferred	**Min.**
Entry pad (A)	300um	250um
Target pad L1 (C)	400um	350um
µvia hole L1-L2 (B)	200um	150um
Buried hole (D)	300um	200um



Electro-Mechanical Assembly Capabilities Sheet

For other enquiries, please visit our website or contact us directly

info@zot.co.uk

Inveresk Mills Ind Park
Musselburgh EH21 7UQ

0131 653 6834

www.zot.co.uk

Overview

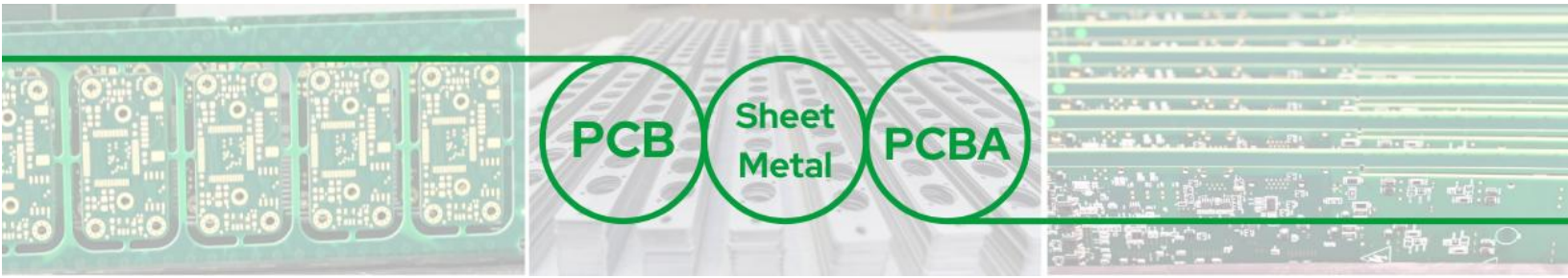
ZOT provides high-quality electronic manufacturing services within a secure, ESD-controlled, and climate-regulated environment. Our operations are underpinned by a commitment to continuous improvement, driven by experienced manufacturing and test engineers. All operators are certified to IPC-A-610 and IPC-A-620 standards, with our hand soldering team holding IPC-J-STD-001 certification. We maintain compliance through dedicated in-house IPC trainers.

Our standard process utilises RoHS-compliant SAC305 solder with a no-clean methodology. We also accommodate client-specific requirements, including leaded alloys and post-solder flux removal.

1. Material Procurement & Automated Storage

To ensure an efficient and error-free start to production, we utilise a state-of-the-art automated storage system that provides full material traceability and humidity control.

Capability	Details
System	Essegi Automation ISM UltraFlex 3600
Core Benefits	Enhanced efficiency, error elimination, and a scalable, integrated workflow.



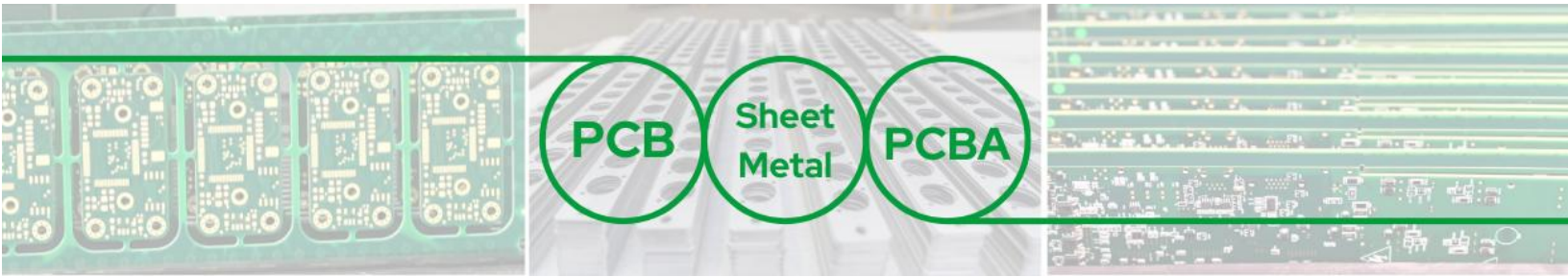
2. Surface Mount Technology (SMT)

Our high-speed, high-accuracy SMT lines are designed for complex builds, ensuring quality and scalability.

Specification	Details
Placement Rate	Up to 24,000 cph
Max PCB Panel Size	510 x 508 mm (including process carrier; 4 mm edge clearance required for single circuits)
PCB Thickness Range	0.4 mm to 6.0 mm
Component Package Range	01005 to 56 x 56 x 15 mm
Minimum Pitch	0.10 mm (leaded) / 0.15 mm (BGA)
Reflow Methods	Convection (Vapour phase available for demanding boards)
Standard Solder Process	RoHS-compliant SAC305 with a no-clean process
Alternate Processes	Customer-specified alloys (including Pb/Sn non-RoHS) and post-solder flux removal available on request.

SMT Equipment

Pick & Place	Mycronic MY100 - Qty: 2
	Mycronic MY300 - Qty: 1
Stencil Printing	DEK Horizon 03ix - Qty: 2
	DEK Neo Horizon 03ix - Qty: 1
Convection Reflow	TRI I-F82S - Qty: 1
	VIP70A - Qty: 1
Vapour Phase Reflow	VP 1000-66 - Qty: 1



3. Through-Hole (PTH) Assembly

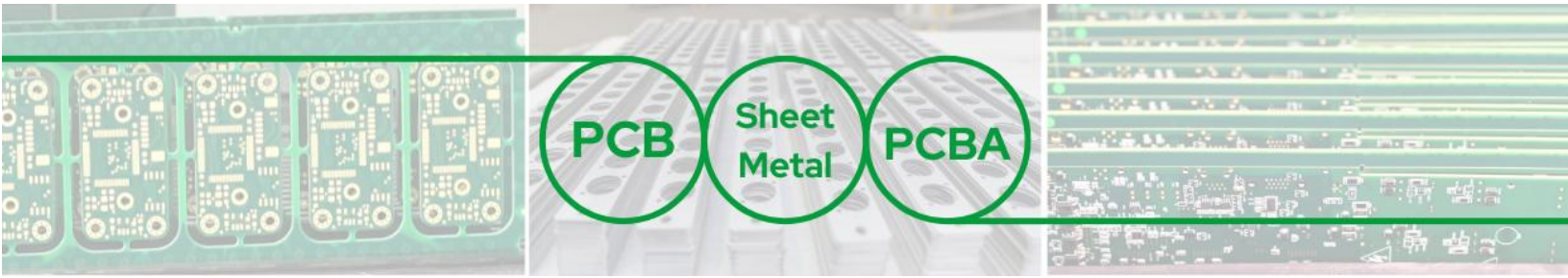
Our skilled operators, supported by digital work instructions and laser-guided systems, deliver consistent and reliable through-hole assembly.

Capability	Details
Soldering Stations	8 fully equipped benches
Operator Certification	IPC J-STD-001
Process Control	Digital Work Instructions (WI) at each station
Assisted Placement	Robotas laser-guided system

4. Selective Soldering

Our automated selective soldering capability ensures high-quality joints and consistency.

Specification	Details
System	Ersa Versaflow One F-Series
Max PCB Size	510 x 508 mm
Features	Multidrop flux heads, preheating zones, mini-wave solder nozzle, and ERSASOFT 5 interface.
Alloys	Both RoHS and non-RoHS options are available.



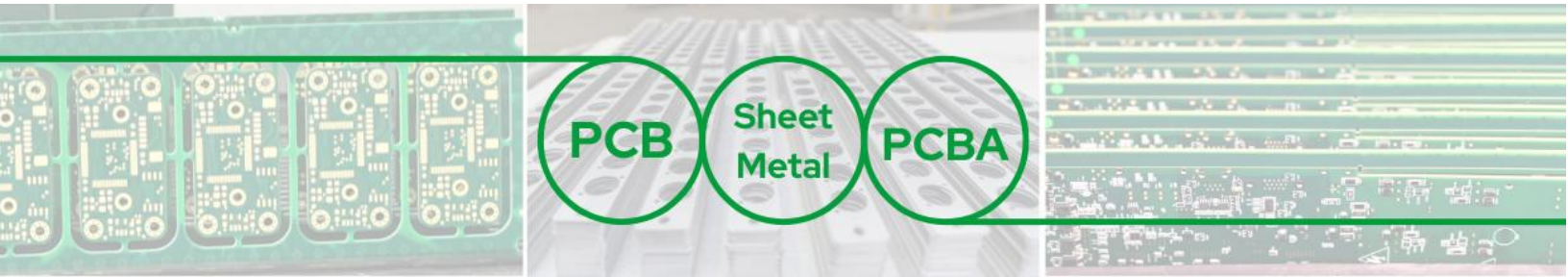
5. PCB Cleaning

To ensure long-term reliability, we offer comprehensive cleaning services.

Specification	Details
System	Automated NC25 PCB Cleaner
Max PCB Size	510 x 508 mm
Process Verification	In-house ionic contamination testing

6. Conformal Coating

Specification	Details
System	Gen3 Spray Booth System (Chamber: 850 x 750 x 580 mm)
Application	HVLP spray of HumiSeal protective conformal coating (IPC-CC-830 compliant).
Coating Details	UV-fluorescent for inspection; typical acrylic thickness of 25-75 µm.
Inspection	UV light and non-destructive ultrasonic thickness measurement.
Curing	Dedicated curing ovens.



7. Box Build & Systems Integration

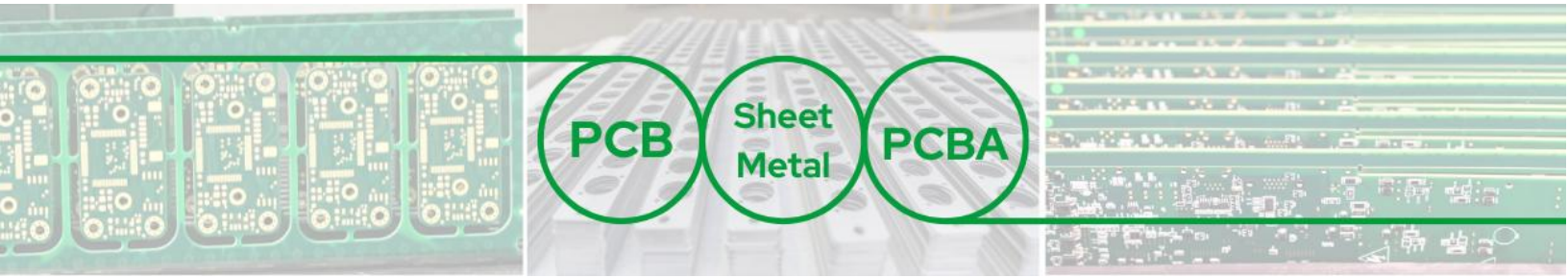
We deliver fully tested, market-ready products, offering full system builds, enclosure integration, and final verification.

Capability	Details
Cable Assemblies	Looms
	Harnesses
	Ribbon
	Multi-core
	Coax
Calibrated Crimp Tooling	JST, Molex, AMP and durable labelling. Manual crimps meet IPC Class 2 standards
Wire Processing	Schleuniger E300 for automated, precision cutting and stripping.
Verification	Dedicated test equipment for continuity, insulation, pull, and hi-pot verification.

8. Engineering Support

Our engineering team provides crucial support to reduce risk, lower costs, and improve manufacturability.

Discipline	Outcome
New Product Introduction (NPI)	Hands-on guidance to optimise efficiency and reduce time-to-market.
Design for Manufacture (DFM)	Expert feedback to simplify builds and increase yield.
Design for Test (DFT)	Guidance to optimise test, access and reduce diagnostic time.



9. Testing & Debugging

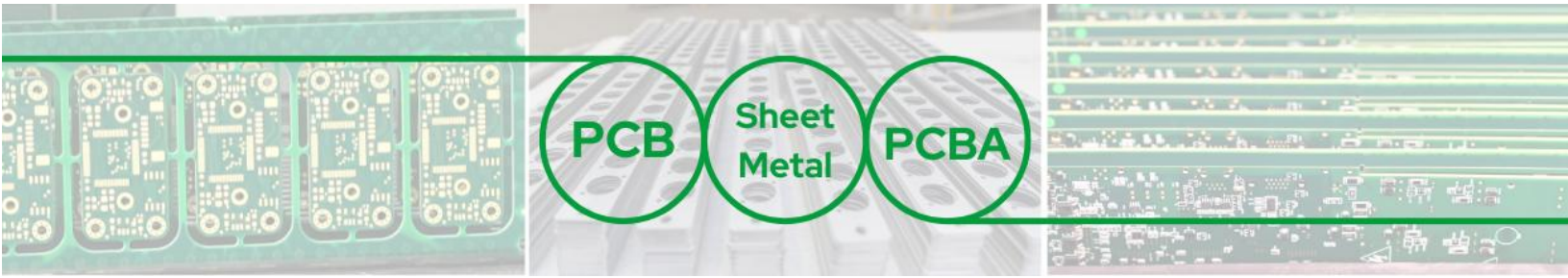
Our comprehensive in-house testing capabilities ensure product reliability and performance.

Capability	Details
In-Circuit Test (ICT)	GenRad 228X Bed-of-Nails with custom fixtures.
Automated Optical Inspection (AOI)	MYPro-151 3D-SMT Inspection.
X-ray Inspection	Unicomp AX8200 for BGA/LGA/QFN/CSP joint analysis.
Visual QC	Scienscope CC SMART-A1-4K digital inspection.
Functional & EMC Testing	Performed to customer specifications in our in-house shielded chamber.
Radiation Safety Governance	In-house RPS and RPA on retainer, with IRR17-compliant rules and training.
Nitrogen Purge (Test Support)	On-station nitrogen supply for purge/blanket during specified tests.

10. Sector Experience

We have a proven track record of delivering for regulated, high-reliability sectors.

Application Area	What We Deliver
Mass Spectrometry	Long-term production of assemblies and sub-assemblies for MS instruments.
Medical RF Generators	Production and test of HF/UHF/SHF RF assemblies.
X-ray Imaging	Production and test support for X-ray devices.
Analytical Instruments	Pressure/flow sensor test.
High-Voltage Systems	Production and test of HV units up to 5KV.



11. Accreditations & Global Presence

ZOT is a trusted global partner with customers across the UK, Europe, USA, and Asia-Pacific.

Standard / Scheme	Status
ISO 1345:2016 (Medical)	Certified
BS EN 9100:2018 / AS9100D (Aerospace)	Certified
ISO 14001:2015 (Environmental)	Certified
IPC Standards	Compliant with J-STD-001, IPC-A-610, IPC-A-620
Cyber Essentials Plus	Achieved
JOSCAR Registered	Registered