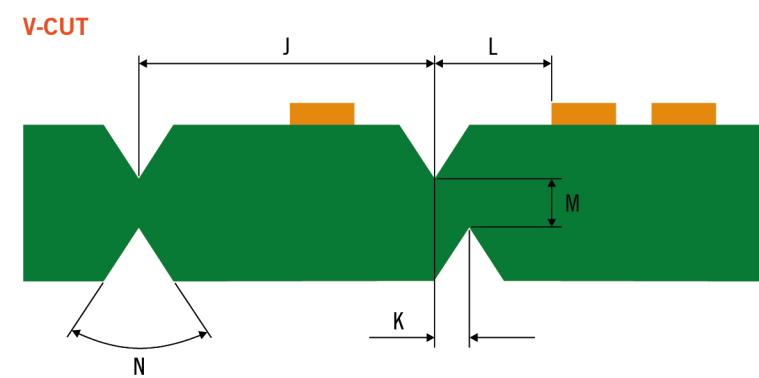
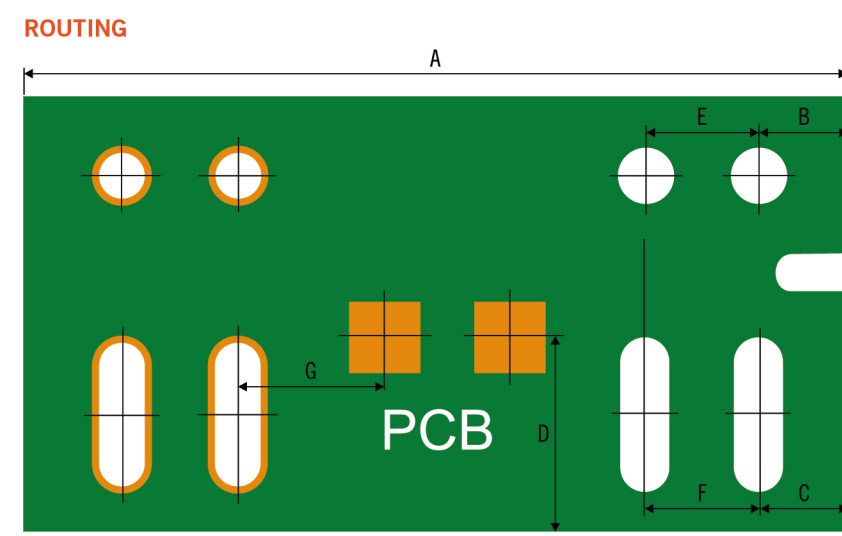


## Profile



	GENERAL	MID-DATE	ADVANCED
ROUTING (mm)			
A. Routing	+/-0.13	+/-0.10	+/-0.10
B. Hole to edge	+/-0.15	+/-0.13	+/-0.10
C. Slot to edge	+/-0.15	+/-0.13	+/-0.10
D. Pattern to edge	+/-0.15	+/-0.13	+/-0.10
E. Hole to hole	+/-0.13	+/-0.10	+/-0.075
F. Slot to Slot	+/-0.13	+/-0.10	+/-0.075
G. Slot to Pattern	+/-0.13	+/-0.10	+/-0.075
Recommended pattern to edge	0.50	0.30	0.20
Maximum PCB size	457 x 508	508 x 608	560 x 1080
V-CUT (mm)			
J. Position accuracy	+/-0.15	+/-0.13	+/-0.10
K. Blade offset	+/-0.15	+/-0.13	+/-0.10
L. Keep out area (dimension)	0.5	0.45	0.4
M. Web thickness @ 1,60mm	0.45 +/-0.10	0.45 +/-0.10	0.45 +/-0.10
N. Angle	+/-5°	+/-5°	+/-5°
Min board thickness	0.8	0.6	Check
Max board thickness	2.3	3.0	Check

For boards < 0.50mm, or > 2.30mm thick it is not recommended to use scoring / V-Cut.

### Surface finish

		Thickness of deposit	Solderability performance	Handing concerns	Fine pitch	Small PkGA & SMD	Excellent flatness	Press fit	Suitable for peelable	Short life concerns	Assembly rework	Wire bonding	Suitable for baking	Comments
Pb-F HASL		1-40	YYY				Y	Y		Y		Y		Bridging on fine pitch, avoid on thinn pcb
SnPb HASL		1-40	YYY				Y	Y		Y		Y		Bridging on fine pitch, avoid on thinn pcb
Flash gold	Au: 0.025-0.125 Ni: 3-6	Y		Y	Y		Y			Y (Alu)		Y		
OSP		0.2-0.65	Y	Y	Y	Y			Y					Short operating window storage limits
ENIG	Au: 0.05-0.125 Ni: 3-6	Y	Y	Y	Y	Y	Y		Y	Y (Alu)		Y		Avoid soldermask Defined bga
Immersion Tin		1.0-1.2	Y	Y	Y	Y	Y							Aggressive to s-mask, use > 0.125mm dam
Immersion Silver		0.12-0.4	Y	Y	Y	Y	Y		Y					Short operating window high speed pcb
OSP + Immersion Gold	OSP: 0.2-0.65 Ni: 3.0-6.0 Au: 0.05-0.125	Y	Y	Y	Y			Y						Short operating window storage limits
Carbon		8-25	NA		NA		NA	Y		NA		Y		Contacts
Edge hard gold contacts	Au: 0.8-1.5 Ni: ≥ 2.5	NA		NA	Y	NA	Y		NA	Y		Y		Contacts
Internal hard gold contacts	Au: 0.25-0.75 Ni: ≥ 2.5	NA		NA	Y	NA	Y		NA	Y				Contacts, need space to track out to edge

### Wrap copper

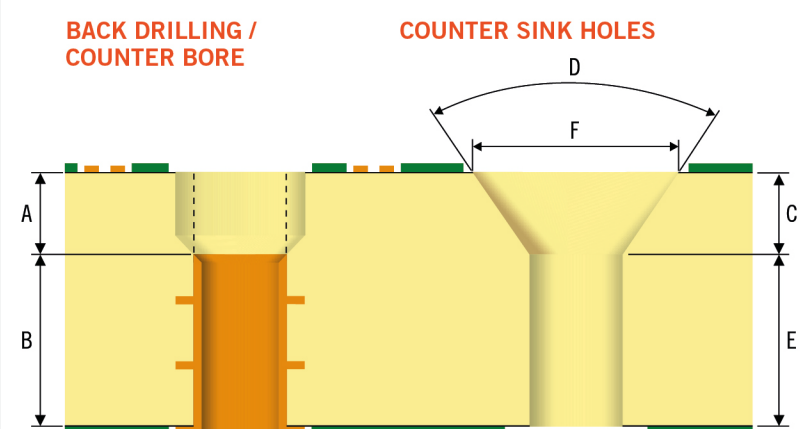
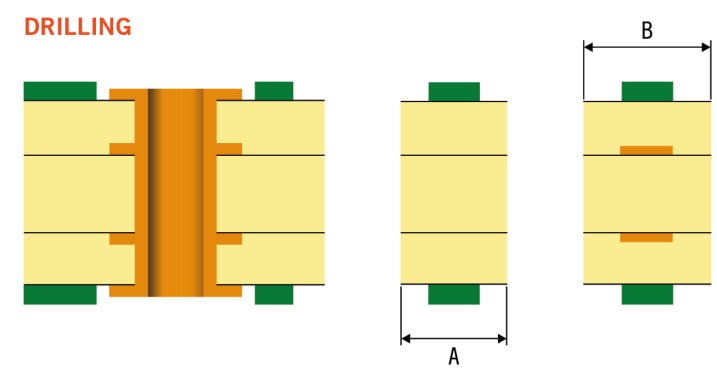
			GENERAL		MODERATE		ADVANCED	
IPC FEATURE	DEMAND (μm)	BASE COPPER (oz)	TRACE	GAP	TRACE	GAP	TRACE	GAP
Buried via > 2L (PTH and blind via)	Wrap copper 5 (IPC class 2)	1/3	N/A	0.12	0.12	0.10	0.10	0.10
		1/2	N/A	0.14	0.14	0.12	0.12	0.12
		1	N/A	0.15	0.15	0.14	0.14	0.14
	Wrap copper 12 (IPC class 3)	1/3	N/A	0.15	0.15	0.12	0.12	0.12
		1/2	N/A	0.17	0.17	0.15	0.15	0.15
		1	N/A	0.20	0.20	0.18	0.18	0.18
Microwia (blind and buried)	Wrap copper 5 (IPC class 2)	1/3	N/A	0.12	0.12	0.10	0.10	0.10
		1/2	N/A	0.14	0.14	0.12	0.12	0.12
		1	N/A	0.15	0.15	0.14	0.14	0.14
	Wrap copper 6 (IPC class 3)	1/3	N/A	0.15	0.15	0.12	0.12	0.12
		1/2	N/A	0.17	0.17	0.15	0.15	0.15
		1	N/A	0.20	0.20	0.18	0.18	0.18
Buried via cores (2L)	Wrap copper 5 (IPC class 2)	1/3	N/A	0.12	0.12	0.10	0.10	0.10
		1/2	N/A	0.14	0.14	0.12	0.12	0.12
		1	N/A	0.15	0.15	0.14	0.14	0.14
	Wrap copper 7 (IPC class 3)	1/3	N/A	0.15	0.15	0.12	0.12	0.12
		1/2	N/A	0.17	0.17	0.15	0.15	0.15
		1	N/A	0.20	0.20	0.18	0.18	0.18

For HDI+VIA IN PAD TYPE VII+Blind Vias etc high technology, please contact NCAB for confirmation of features

## Peelable & Carbon

	GENERAL	MODERATE	ADVANCED
PEELABLE MASK (mm)			
Nominal Thickness	0.3-1.0	0.3-1.0	0.3-1.0
Max covered hole diameter	1.50	4.50	5.00
Min distance to not covered feature	1.00	0.50	0.50
KAPTON TAPE (mm)			
Nominal Thickness	0.05	0.05	0.05
CARBON INK (mm)			
Min space between carbon	0.60	0.35	0.30
Min carbon opening bigger than copper pattern per side	0.30	0.15	0.13
Min space between carbon edge to around copper	0.56	0.35	0.20
Position accuracy	0.20	0.10	0.08
Nominal thickness		8-25µm	

### Drilling & hole sizes

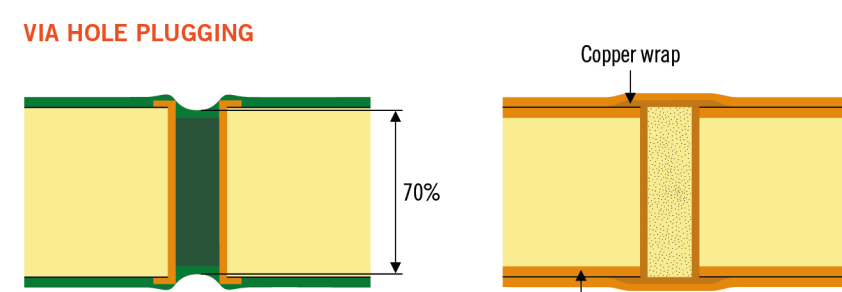
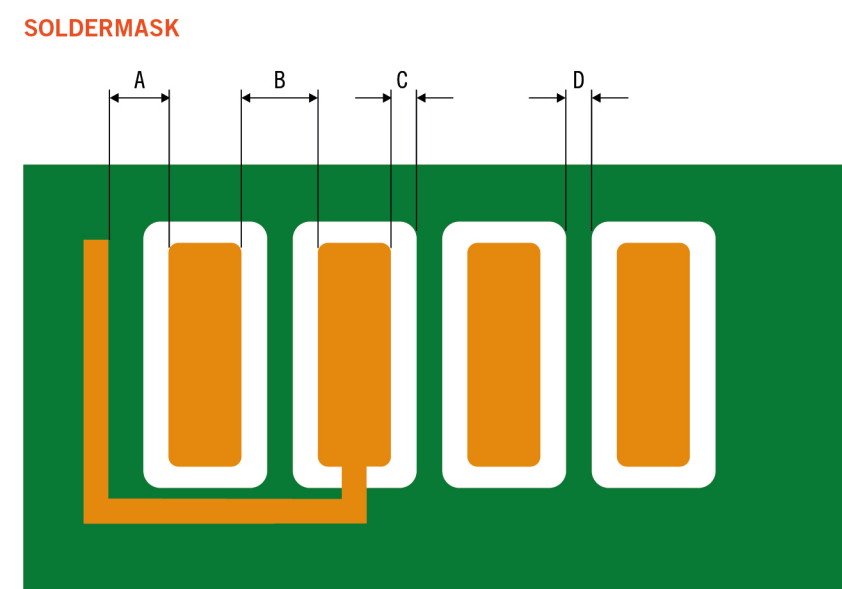


	GENERAL	MEDIATE	ADVANCED
DRILLING (mm)			
Min. finished PTH size (mech. drilled)	0.25	0.2	0.15
Max. finished PTH size (mech. drilled)	5.35	6.2	6.35
Min. slot width mechanically drilled	0.6	0.5	0.4
True positional tolerance	+/-0.1	+/-0.075	+/-0.05
Aspect Ratio	(0.30) 6:1	(0.30) 12:1	(0.25) 16:1
A. Min. space between holes	0.36	0.3	0.25
B. Min. space between NPTH and edge	0.4	0.3	0.25
BACK DRILLING / COUNTER BORE (mm)			
A. Depth tolerance	+/-0.20	+/-0.15	+/-0.10
B. Min. remain thickness and tolerance	0.5+/-0.25	0.35+/-0.1	0.3+/-0.1
COUNTER SINK HOLES (mm)			
C. Depth tolerance	+/-0.20	+/-0.15	+/-0.1
D. Angle and tolerance	90 +/-10°	82, 90 +/-10°	82, 90, 135+/-10°
E. Min. remain thickness and tolerance	0.50 +/-0.25	0.35 +/-0.1	0.3 +/-0.1
F. Countersink tolerance	+/-0.40	+/-0.15	+/-0.10

## Circuitry

	GENERAL		MODERATE		ADVANCED	
TRACK&GAP (mm)	IL	OL	IL	OL	IL	OL
1/3 oz					0.075 / 0.075	0.075 / 0.075
1/2 oz	0.150 / 0.200	0.150 / 0.200	0.100 / 0.150	0.125 / 0.150	0.075 / 0.075	0.075 / 0.100
1 oz	0.150 / 0.200	0.200 / 0.250	0.125 / 0.150	0.150 / 0.175	0.100 / 0.100	0.125 / 0.150
2 oz	0.200 / 0.250	0.250 / 0.300	0.175 / 0.225	0.200 / 0.250	0.150 / 0.175	0.175 / 0.225
3 oz	0.250 / 0.300	0.300 / 0.350	0.225 / 0.275	0.250 / 0.300	0.200 / 0.250	0.225 / 0.275
ANNULAR RING OF VIAS (ACCEPT 90°BROKEN PER IPC CLASS 2) (mm)						
1/3 oz					0.100	0.100
1/2 oz	0.200	0.200	0.150	0.150	0.100	0.125
1 oz	0.200	0.200	0.150	0.175	0.125	0.150
2 oz	0.250	0.300	0.225	0.250	0.175	0.200
3 oz	0.300	0.400	0.275	0.350	0.225	0.250
PTH TO COPPER (mm)						
1/3 oz					0.175	0.200
1/2 oz	0.350	0.400	0.250	0.300	0.200	0.225
1 oz	0.350	0.450	0.250	0.350	0.225	0.300
2 oz	0.450	0.600	0.300	0.500	0.250	0.425
3 oz	0.550	0.750	0.400	0.650	0.300	0.525
NPTH TO COPPER (mm)						
1/3 oz					0.200	0.200
1/2 oz	0.300	0.300	0.250	0.250	0.200	0.200
1 oz	0.300	0.300	0.250	0.250	0.200	0.225
2 oz	0.400	0.400	0.300	0.300	0.225	0.250
3 oz	0.400	0.400	0.300	0.300	0.250	0.275

## Soldermask / Via hole plugging



Type VI soldermask filled via hole. Target 100% fill. Acceptable  $\geq 70\%$  fill of via.

Type VII resin filled via hole  
(over plated / capped).

(mm)	GENERAL	Moderate	ADVANCED
Colors	<b>Gloss:</b> green / black / white / red / blue  <b>Matte:</b> green / black	<b>Gloss:</b> green / black / white / red / blue / yellow  <b>Matte:</b> green / black / red / blue	<b>Gloss:</b> green / black / white / red / blue / yellow / transparent  <b>Matte:</b> green / black / red / blue / yellow / white  <b>Semi matte:</b> green
Thickness	10-30µm on copper surface, 5µm on copper edge		
<b>A</b> SMT to covered copper	0.20	0.15	0.10
<b>B</b> Copper to copper spacing	0.24	0.20	0.18
<b>C</b> Solder mask oversize	0.08	0.06	0.05
<b>D</b> Minimum soldermask web	0.10	0.08	0.075

For >1oz base copper, please contact NCAB for confirmation of features

(mm)	GENERAL	MODERATE	ADVANCED
Soldermask IPC 4761 Type VI	0.30-0.60	0.25-0.60	0.20-0.60
Resin non conductive IPC4761 Type VI		0.25-0.50	0.20-0.50
Resin electrical conductive			0.20-0.50
Resin thermal conductive			0.20-0.50
Over plated/capped IPC 4761 type VII			0.20-0.50

## Base materials

	GENERAL	MODERATE	ADVANCED
MATERIAL TYPE & THICKNESS			
Rigid	CEM-3, FR4 (standard, mid performance, high performance, halogen free)	FR2, CEM-1, CEM-3, FR4 (standard, mid performance, high performance, halogen free)	FR4 (standard, mid performance, high performance, halogen free, high thermal conductivity FR4), Polyimide (PI)  High Speed materials: Mid – loss material (Panasonic / EMC / TUC ..)  Low – loss material (Nelco / Panasonic / Isola / EMC/ TUC ..)  Ultra low – loss material (Panasonic / Isola / Rogers / Hitachi / Getek / )  Micro-wave: Taconic / Arlon/Rogers
Flex		PI, PET material	PI, LCP material
IMS		Aluminum based: (Bergquist / Ventec / KW / Laird / Iteq / etc.)  Dielectric thickness = 75 - 200um Thermal conductivity = 1 w/m.k - 3 w/m.k	Aluminum, copper, stainless steel based: (Bergquist / Ventec / Polytronics / Dossan / Chin-shi / etc.)  Dielectric thickness = 50 - 200um Thermal conductivity = 1 w/m.k - 7 w/m.k
THICKNESS (mm)			
Min. dielectric	0.1mm for PCB	0.05mm for PCB; 0.025mm for FPC	0.05mm for PCB; 0.012mm for FPC
COMMON PP THICKNESS (TOLERANCE AS PER IPC-4101 B/C) (mm)			
7628 (50%)	0.22	0.22	0.22
7628 (43%)	0.18	0.18	0.18
2116 (52%)	0.12	0.12	0.12
2116 (56%)	0.13	0.13	0.13
1080 (65%)	0.08	0.08	0.08
1060 (75%)	0.05	0.05	0.05

Standard core thickness include 0.10, 0.20, 0.4, 0.6, 0.8 and 1.00mm.  
Please contact NCAB Group for full details regarding material availability.

### Board thickness

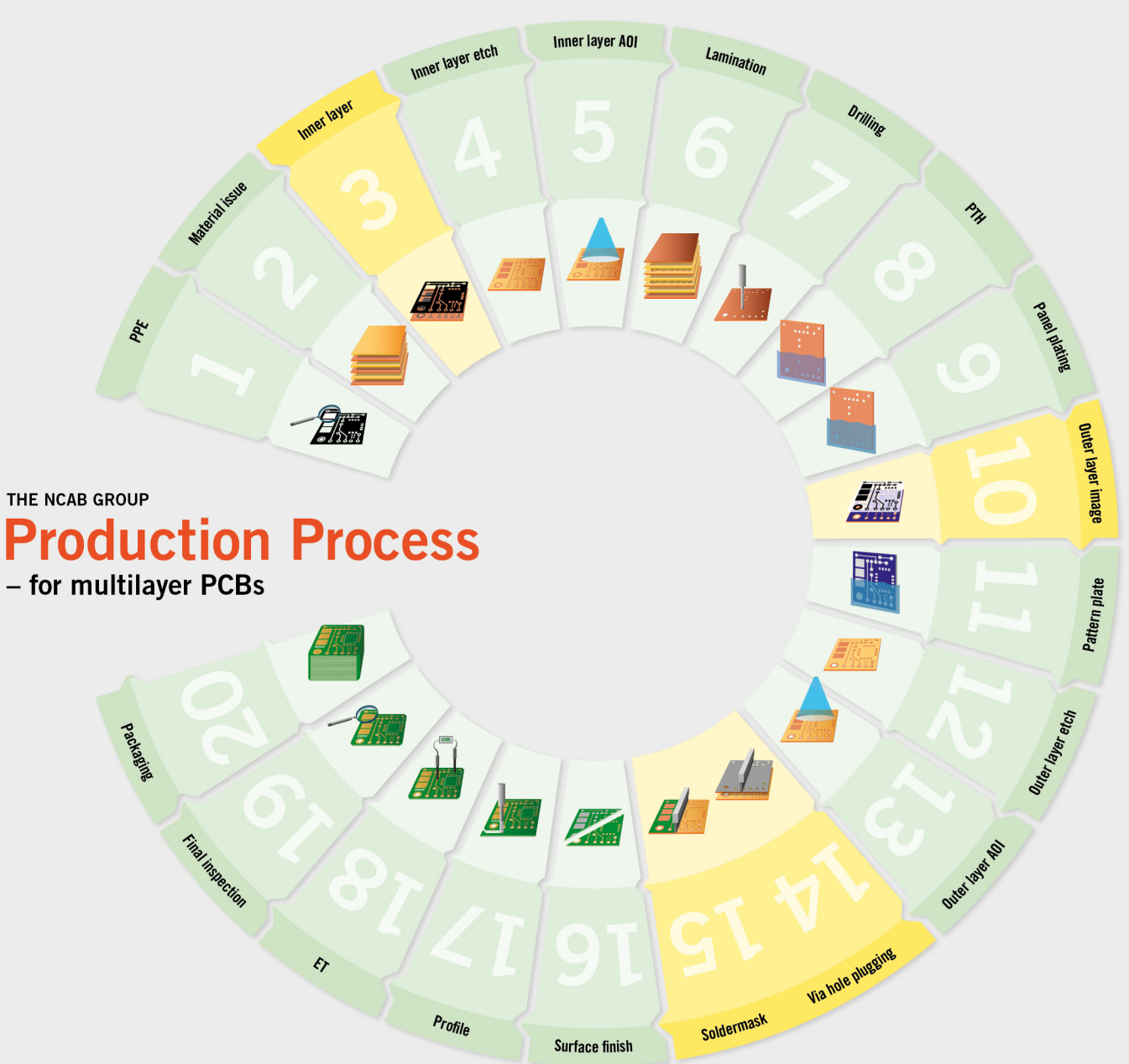
	GENERAL	MODERATE	ADVANCED
LAYER COUNT (Layers)			
Rigid ML	1-4	6-10	12-30
THICKNESS OF ML (mm)			
2-4L	0.6-2.5	0.5-3.2	0.2-8.0
6-10L	0.7-2.5	0.6-6.0	0.5-8.0
12L +		1.3-6.0	1.2-8.0
THICKNESS OF FLEX (mm)			
1-2L		0.1-0.4	0.07-0.4
Coverlay		0.03-0.08	0.025-0.073
Stiffener		0.075(P)-1.6(FR4)	0.025(P)-4.0(FR4)

## Getting it right from the start

Nothing affects the PCB's cost and quality as much as the initial design. As modern electronic products are expected to offer more and more advanced functions, while the products themselves are becoming smaller and smaller, this puts greater demands on the PCB design and the importance of making the right choices at the design stage.

More than 30% of the Gerber data packs we receive do have some issues, generally, ambiguous information, errors, design rule conflicts, missing information and contradictions between the data and specifications. To prevent that it gets wrong from the start, we have put together these design guidelines, to use as a checklist...

When using combinations of parameters, you should always consult your local NCAB technical contact person.



**THE NCAB GROUP**

## Production Process

– for multilayer PCBs

- for multilayer PCBs