

Design Rules

STRETCH.flex xS and xS-Ri

These design rules apply to:

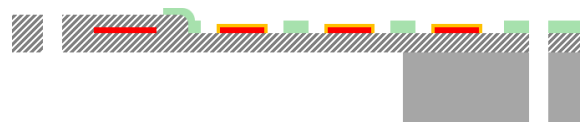
Flexible circuit boards with 1 or 2 copper layers on thermoplastic Polyurethane

- Optionally with glued mechanical stiffener (-Ri = Stiffener)
- No UL marking.

Examples:



2S: 2-layer stretchable PCB



1S-Ri: 1-layer stretchable PCB, with glued stiffener

Basic information

- Please note that there is currently no valid IPC standard for this technology.
- Essentially, marking print is not possible.
- For the assembly of the printed circuit boards, we recommended an assembly carrier made of FR4.
- Due to the softening range of TPU, you have to use a low temperature solder paste.
- We will be happy to create the optimal delivery panel for you (best price!)
- For the stretchability of the pcbs, the tracks have to be realized in meander shape. Horseshoe, wave and rectangle shapes are recommended for this purpose.

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Routing

		Wave	Horseshoe	Rectangle
Meander form				
Track width [µm]	W	100 - 300		
Opening angle	α	180 ° - 270 °	90 ° - 180 °	
Radius [mm]	R		$R = \frac{1}{2} * \frac{D+W}{2 * \sin(\frac{\alpha}{2}) - 1}$	
Distance [mm]	D		$D \geq W$ → Recommendation: min. 2 * W	
Height [mm]	H		$H = W + 2 * R * (\cos(\frac{\alpha}{2}) + 1)$	
Length 1 [mm]	L1			min. 4 * W
Length 2 [mm]	L2			min. 4 * W

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Material specifications

Material	Thickness	Description	Application
Flexible base material	100 µm	Thermoplastic Polyurethan	Standard for STRETCH.flex
Stiffener material, rigid	As needed	FR-4.0 TG 135 °C	For stiffener and solder carrier
Coverlay	100 µm	Thermoplastic Polyurethan	Standard for STRETCH.flex
s.mask		Soldermask in component area	To be clarified depending on the build-up

Standard design

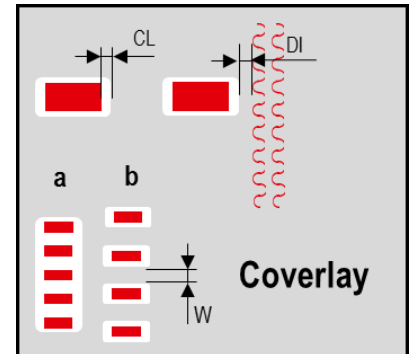
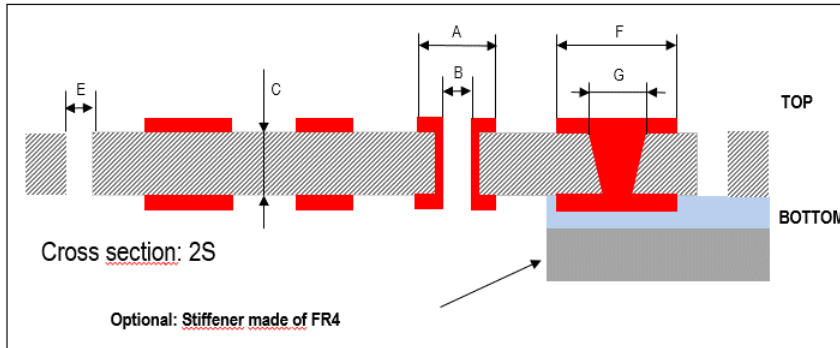
1. Thermoplastic Polyurethan, Final end thickness without stiffener 0,25 mm - 0,35 mm (depending on number of layers)
2. Final copper thickness: 18 µm + electroplating or 35 µm
3. Coverlay made of Thermoplastic Polyurethan
4. Standard vias or microvias are possible
5. Outline lasered, smallest laser diameter 150 µm, Milling and V-scoring not permitted
6. Solderable surface immersion Sn, immersion Ag and Pd/Au – other surfaces upon request

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- a) Coverlay-opening as one block
- b) Single window openings

Symbol	Description	Technical Standard	Advanced requirements
A	Minimum pad diameter of PTH	400 µm	
B	Hole diameter	0.25 – 0.70 mm	
C	Thickness of stretchable material	100 µm	
CL	Minimum clearance of copper pad with coverlay	400 µm circumferential	
DI	Minimum clearance of CL to copper	400 µm	
E	Minimum pad diameter of through holes	0.25 – 6.00 mm	0.20 mm
F	Minimum pad diameter of microvias	325 µm	300 µm
G	Finished hole diameter lasered microvia	150 µm	
--	Distance copper to outline	400 µm	350 µm
W	Minimum bridge width coverlay	500 µm	
--	Number x of copper layers (xF)	1-2	
--	Distance copper pad to contour	400 µm	
--	Track widths	≥ 100 µm	
--	Annular ring of PTH	150 µm	

Further specifications available on request, please contact us: stretch@we-online.com