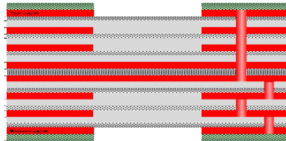
Design Rules SLIM.flex
xF and xF-Ri

WÜRTH ELEKTRONIK
MORE THAN YOU EXPECT

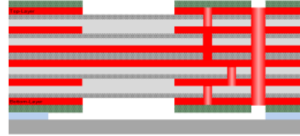
These design rules apply to:
Flexible circuit boards with 3 to 8 copper layers on flexible polyimide material, optionally with glued mechanical stiffener or solder carrier.

Application in accordance with IPC-2223 Use A: Flex-to-installl, no UL marking (all materials are UL listed).

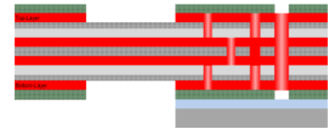
Beispiele:



SLIM.flex 8F
Standard: Only Microvias used



SLIM.flex 6F
Option: Solder carrier, PTH

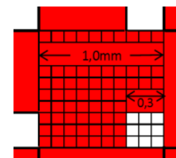


SLIM.flex 4F-Ri
Options: Stiffener, PTH

Nomenclature: F = Flex, Ri = Rigid, i.e. Stiffener or solder carrier out of FR4

<u>Basic instructions</u>

- Please comply with general standards, such as IPC or IEC.
- Please take note of the useful information and tips in our WE Flex-Solutions Design Guide at www.we-online.com/flex.
- Please see the WE BASIC Design Guide for rules for line widths, spacing, via and pad sizes, solder resist mask at www.we-online.com/basic.
- Essentially, marking print is not possible.
- Flexible circuit boards must be dried before they are assembled. Further information about this is available at www.we-online.com/starrflex.
- Copper removal is required in ground or reference layers for drying.
- Recommendation: Copper openings 0.3 mm per 1 mm length of copper.



  Flex-to-install bending radius: Installation Use A in accordance with IPC-2223 up to 90° bending angle:
  - 1 or 2 copper layers: 10 x total thickness (IPC-2223 section 5.2.3.3)
  - More than 3 copper layers: 20 x total thickness (IPC-2223 section 5.2.3.3)
  - For use in more demanding conditions, please contact us.

- We will be happy to create the optimal delivery panel for you (best price!).

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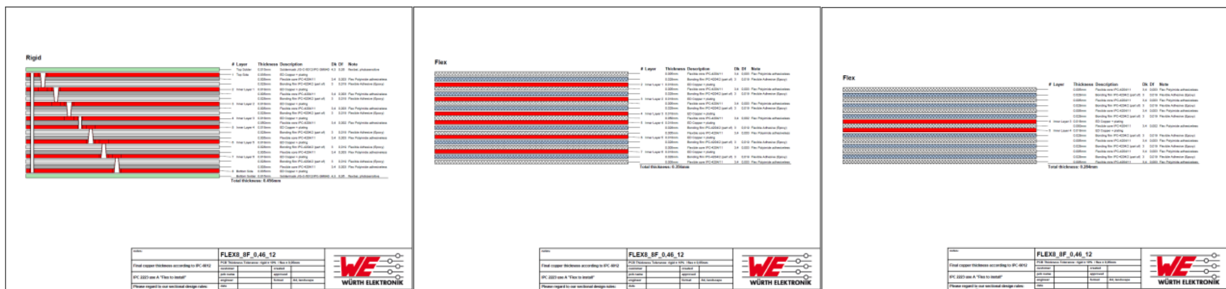
Material specifications

Material	Standard	Spec. sheet	Description	Application
Flexibles base material	IPC-4204	11	Polyimide adhesiveless	Core of SLIM.flex
	IPC-4204	2	Polyimide with glue	Build-up layers of SLIM.flex
Rigid material	IPC4101	21	FR4 Tg135°C	Standard for stiffener and solder carrier
Flex solder mask	JIS C 5012/ IPC-SM840		green, photosensitive	Standard
Coverlay	IPC-4203	1 / 2	Polyimide covering film 25µm, acrylic or epoxy glue (multilayer process)	Optional in place of flex solder mask (surcharge)

Standard Stackups

Standard stackups see www.we-online.com/slimflex.



Standard design

1. Core Polyimide 50µm adhesiveless, sequential lamination of 5µm Polyimide foil + Epoxy glue Minimum dielectric strength 500VDC at minimum dielectric thickness of 20µm
2. Base Copper thickness inner layers 17µm, exterior layers 9µm + electroplating
3. Flexible photosensitive solder resist green
4. Standard vias are laser drilled microvias, plating thickness according to IPC-6013
5. Outline lasered or milled, smallest milling diameter 1.6 mm. V-scoring not permitted!
6. Solderable surface ENIG (electroless Nickel – immersion Gold)
7. Packaged in ESD shrink wrap

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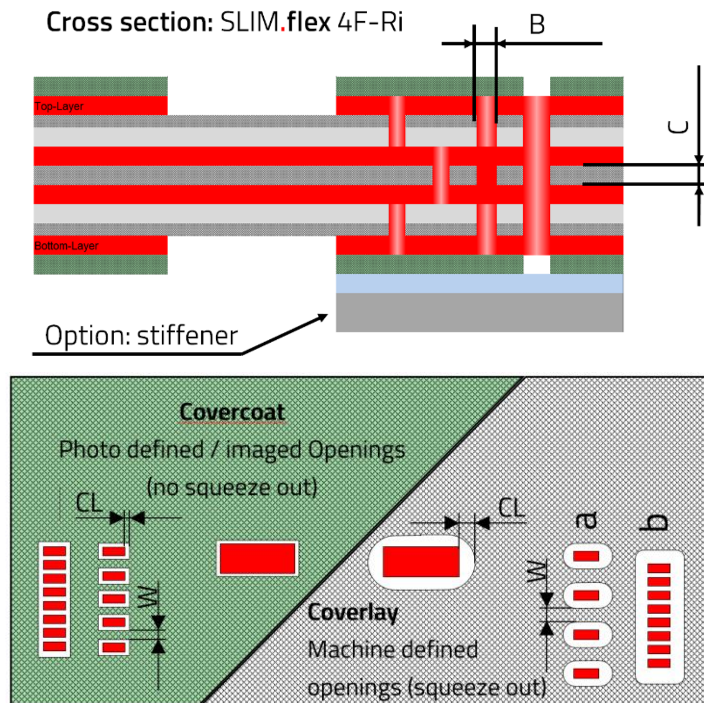

a: single Coverlay opening larger than pad **b**: window opening

Symbol	Desicription	Technical Standard	Advanced requirements
	Line widths and spacing	75µm/75µm only Microvias	75µm/100µm with PTH
A	Minimum pad diameter for microvia (PTH)	225µm (-)	200µm (450µm)
B	Finished hole diameter of lasered microvia	70µm	70µm
Important:	**Avoid vias in bending areas! Use Teardrops!** **Don´t remove on-used Pads!**		
-	Distance copper to outline	≥300µm	≥100µm (Laser)
-	Number x of copper layers (xF)	3 up to 8	
C	Thickness of flexible core (polyimide)	50µm	75µm/100µm
-	Thickness of cold-bonded stiffener made of FR4 material	0.1 – 0.5 mm	0.5 – 0.8 mm
	Thickness of cold-bonded solder carrier made of FR4	0.8mm	0.8mm
-	Thickness of glue for stiffener or solder carrier	50µm	
CL (soldermask)	Minimum clearance of copper pad with flex solder mask	50µm circumferential	
CL (Coverlay)	Minimum clearance of copper pad with coverlay	450µm circumferential	
W (soldermask)	Minimum bridge width photosensitive flex solder mask	70µm circumferential	
W (Coverlay)	Minimum bridge width coverlay (milled, lasered)	500µm	
„ZIF"	**ZIF contact thickness tolerance**	± 0.05mm	

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