

# RigidFlex - Inner PCB

## Design rules and production limits

### Basic information

#### Stackup

RigidFlex board with one or two flexible copper layers inside symmetrical stackup.  
Flexible layers are covered by coverlay

### Notation code

Flex are described using short code which describe number of copper layers.  
Code also shows position of flexible core inside symmetrical stackup

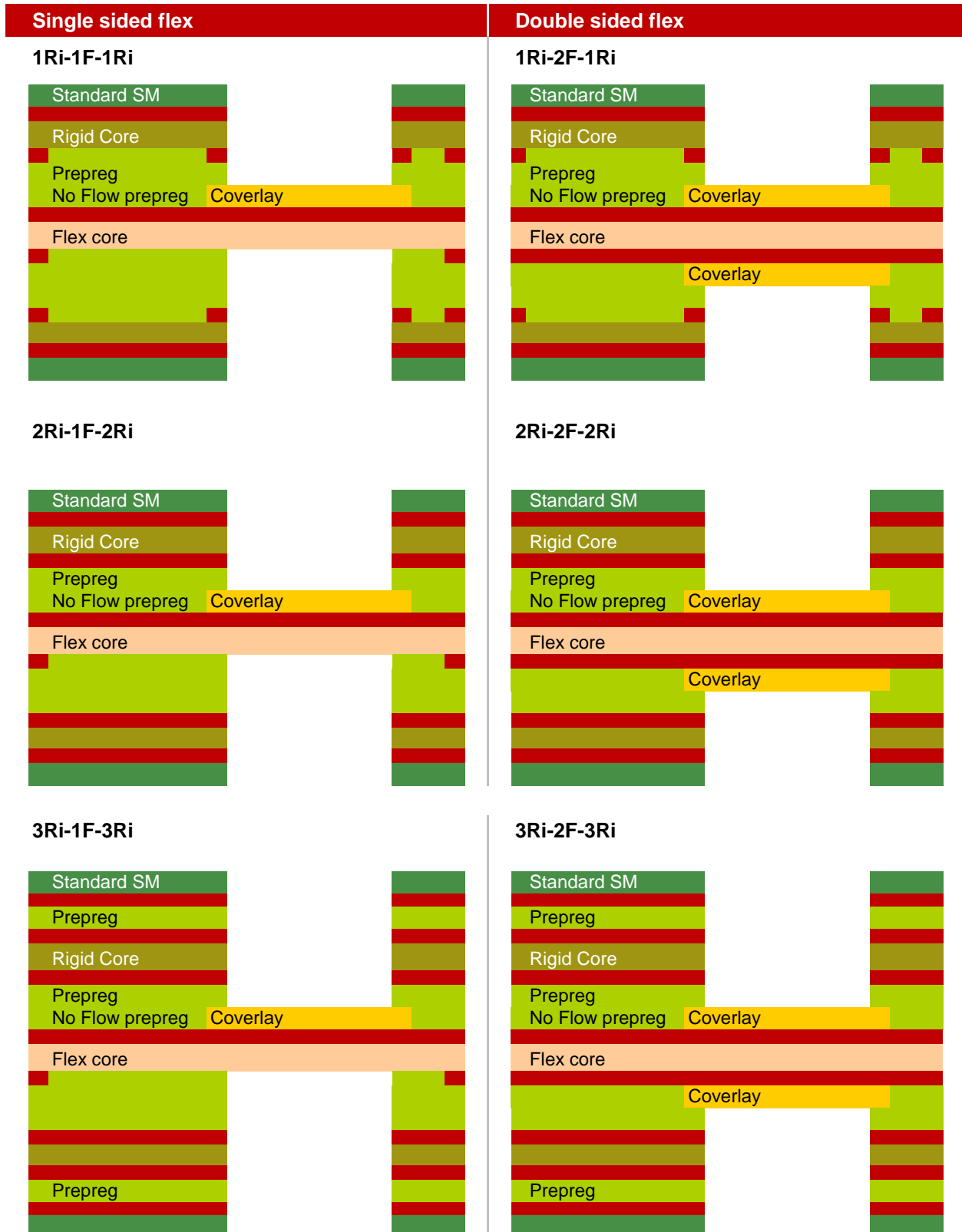
- **xRi-yF-zRi**

<b>x</b>	...	Number of copper layers above flex core (on rigid area of PCB)
<b>y</b>	...	Number of copper layers on flex core
<b>z</b>	...	Number of copper layers below flex core (on rigid area of PCB)

- Example of our flexi PCB configurations:

1Ri-2F-1Ri	...	Total of four copper layers with 2 flex on the inner layers
3Ri-1F-3Ri	...	Total of seven copper layers with 1 flex on the inner layers

## Basic configurations



## Materials

Basic materials								
Brand	Type	PI [ $\mu\text{m}$ ]	Cu [ $\mu\text{m}$ ]	Cu type	Adhesive [ $\mu\text{m}$ ]	TG [ $^{\circ}\text{C}$ ]	Diel. Stren. [kV]	Datasheet
Pyr Lux AP	AP8525R	50	18/18	RA	Adhesiveless	220	13	<a href="#">Datasheet</a>
	AP9121R	50	35/35	RA	Adhesiveless	220	13	<a href="#">Datasheet</a>
Brand	Type	PI [ $\mu\text{m}$ ]	Cu [ $\mu\text{m}$ ]	Cu type	Adhesive [ $\mu\text{m}$ ]	TG [ $^{\circ}\text{C}$ ]	Diel. Stren. [kV]	Datasheet
ThinFlex W	W-2005RD	50	18/18	RA	Adhesiveless	350	11	<a href="#">Datasheet</a>
	W-2010RD	50	35/35	RA	Adhesiveless	350	11	<a href="#">Datasheet</a>
	A-4005RD	100	18/18	RA	Adhesiveless	250	27,6	<a href="#">Datasheet</a>

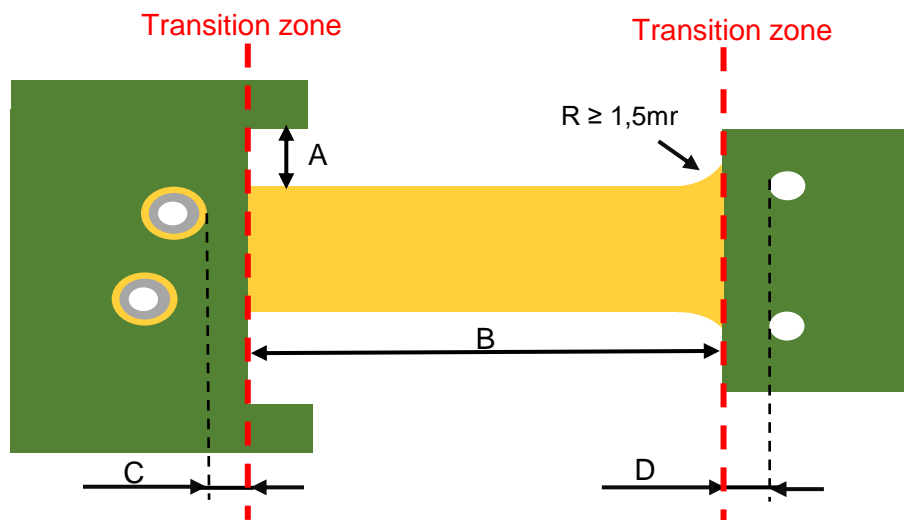
\*RA Rolled copper; \*ED Elektrodeposited copper (not on stock)

Coverlay						
Brand	Type	PI [ $\mu\text{m}$ ]	Adhesive [ $\mu\text{m}$ ]	TG [ $^{\circ}\text{C}$ ]	Diel. Stren. [kV]	Datasheet
Pyr Lux LF	LF0110	25	25	220	5	<a href="#">Datasheet</a>
	LF0210	25	50	220	5	<a href="#">Datasheet</a>

Prepregs		
Standard prepregs	Tg	Datasheet
Isola IS400	150 $^{\circ}\text{C}$	<a href="#">Datasheet</a>
PCL370HR	170 $^{\circ}\text{C}$	<a href="#">Datasheet</a>
No Flow Prepreg		
Arlon 49NP	170 $^{\circ}\text{C}$	

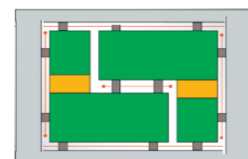
## Design rules

Design rules		
Legend	Description	Value
<b>Transition zone</b>	Is outline at which the layer structure changes from a rigid area to a flex only area and vice versa	
<b>A</b>	Countering of flex area	Min. 1.6 mm
<b>B</b>	Length of flex area	Min. 5 mm
<b>C</b>	- Spacing via pad to flex-rigid transition - Recommendation in IPC-2223D 5.2.2.3	Min. 2 mm 3.18 mm+ ½ pad diameter
<b>D</b>	Distance of NPTH pad to Transition zone	Min. 0.5 mm



Panelisation		
PCB type	Panel [mm]	Single pieces [mm]
xRi-yF-zRi	min 12	min 12

- Larger spaces between PCB in panel better  $\geq 12\text{mm}$
- Panelise as "interlock" in order production panel utilization



## Surfaces

<b>HAL/HAL PbFree</b>	No
<b>Imersion Ni/Au</b>	Yes
<b>Imersion Ni/Ag</b>	Yes
<b>Galvanic Ni/Au</b>	Yes

## Other limits

<b>Maximal PCB dimension</b>	263 mm x 385 mm
<b>Minimal PCB dimension</b>	20x20mm or 400mm <sup>2</sup>
<b>Min. track/isolation</b>	100 μm
<b>Minimal stiffener thickness</b>	100μm

## General recommendations

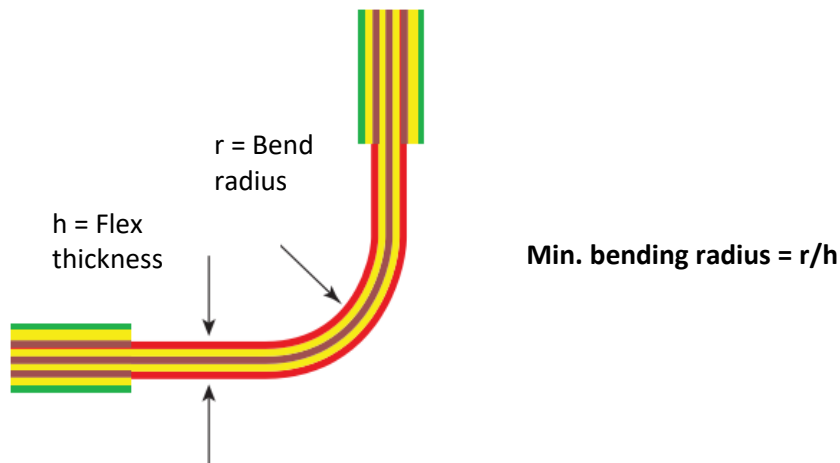
We recommend following the design recommendations listed in **IPC-2223 Sectional Design Standard for Flexible/Rigid-Flexible Printed Boards** when designing a Flex or RigidFlex PCB.

IPC standard is available in online store:

[shop.ipc.org](http://shop.ipc.org)

Datasheet

Flexi PCB types according to number of bending cycles		
Types	Number of bending	Min. bending radius
<b>Dynamic</b>	Frequent	100-150 x flex layer thickness
<b>Semi-Dynamic</b>	Max. 20x	> 20 x flex layer thickness
<b>Stable</b>	Bend to install	> 10 x flex layer thickness



How to select the right material			
Flex type	Dynamic	Semi-Dynamic	Stable
<b>Flex covering</b>			
Covering type:	Coverlay	Coverlay or flexi SM	Coverlay or flexi SM
Material:	Pyralux LF	Pyralux LF	Pyralux LF
<b>Flex core</b>			
Copper type:	RA copper	RA or ED copper	RA or ED copper
Material:	Pyralux AP/ Thinflex	Pyralux AP/ Thinflex	Pyralux AP/ Thinflex