

# Single sided & Double sided Flex PCB

## Design rules and production limits

### Basic information

#### Stackup

Flexible circuit boards with 1 - 2 copper layers, produced from polyimid material (Pyralux, Thinflex) .

Optional flexible solder mask; coverlay; stiffener; double sided tape.

### Notation code

Flex are described using short code which describe number of copper layers.

Optionally presence of stiffener/double sided tape

- **xF (+ stiffener/tape)**

x ... Number of copper layers on flex core

- Example of our flexi PCB configurations:

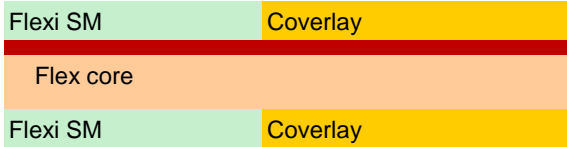
1F ... Single sided flexible PCB

2F ... Double sided flexible PCB

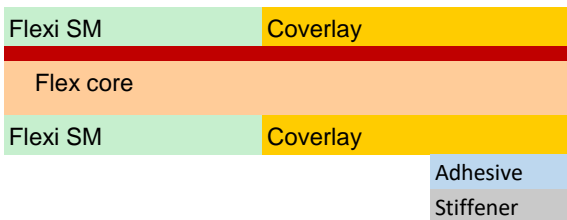
## Basic configurations

### Single sided flex Flex PCB

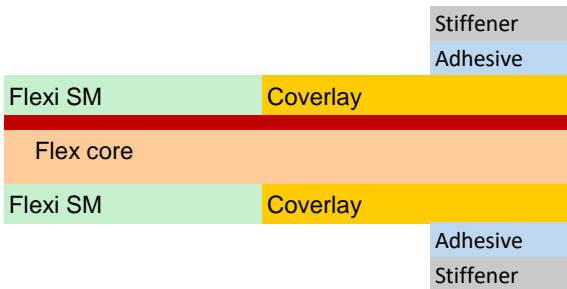
1F



1F + 1x stiffener

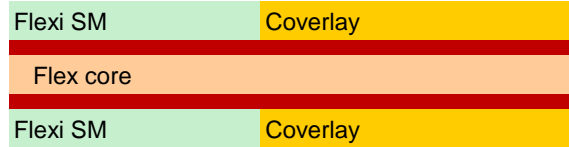


1F + 2x stiffener

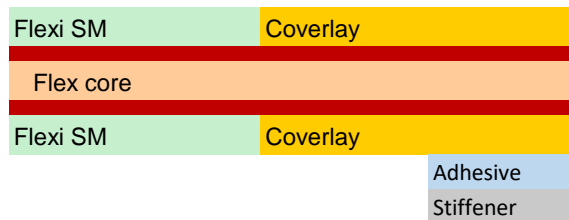


### Double sided flex Flex PCB

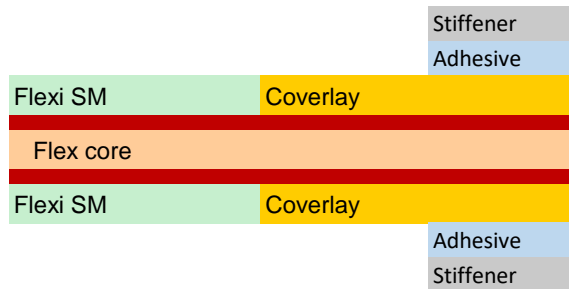
2F



2F + 1x stiffener

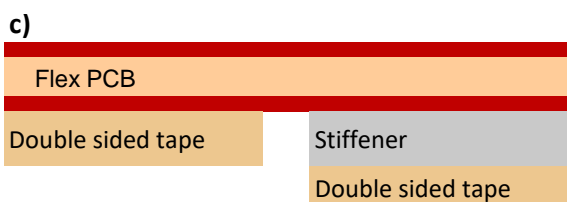
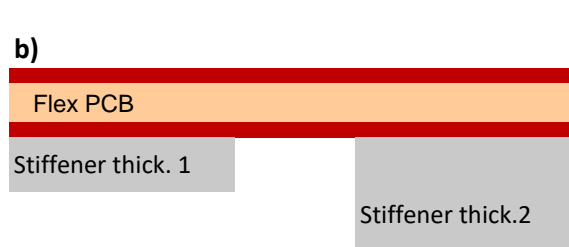
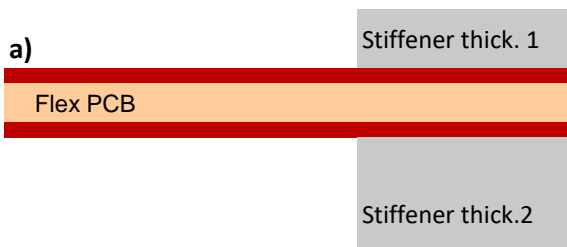


2F + 2x stiffener



### Special possibilities

- a) Different stiffener thickness from each side are allowed
- b) Also more stiffener thickness from one side is allowed
- c) Double sided tape on flex or stiffener for sticking PCB to final product



## 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	Cu lepidlo [ $\mu\text{m}$ ]	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>

Solder mask		
Brand	Type	Datasheet
Peters	SD 2463 HF	<a href="#">Datasheet</a>

Adhesive for stiffeners				
Brand	Typ	Thickness [ $\mu\text{m}$ ]	TG [ $^{\circ}\text{C}$ ]	Datasheet
3M	467MP	50	204	<a href="#">Datasheet</a>
	468MP	130	204	<a href="#">Datasheet</a>
	9077	50	260	<a href="#">Datasheet</a>

Stiffener basic material				
FR4	Thickness	Tg	Datasheet	
Isola DE104	100-1500 $\mu\text{m}$	135 $^{\circ}\text{C}$	<a href="#">Datasheet</a>	
Isola IS400	100-1500 $\mu\text{m}$	150 $^{\circ}\text{C}$	<a href="#">Datasheet</a>	

## Design rules

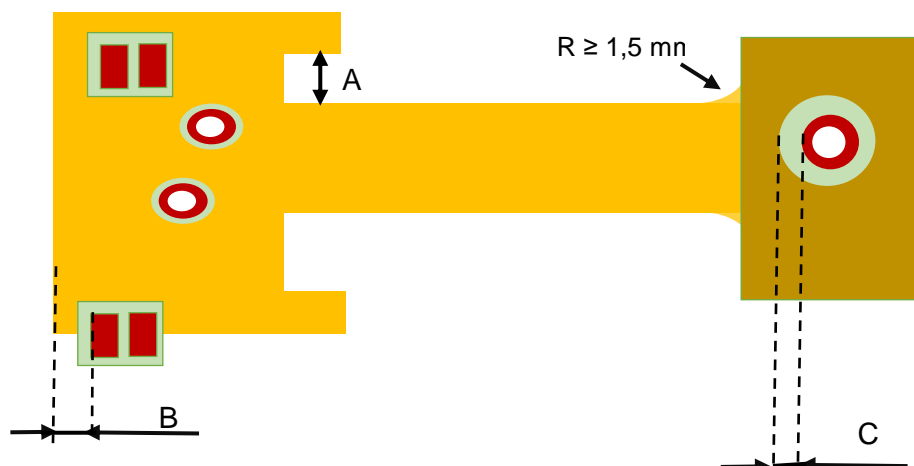
Coverlay vs solder mask pad clearance		
	Polyimid coverlay	Flexible solder mask
<b>Min. bridge</b>	300 $\mu\text{m}$	150 $\mu\text{m}$
<b>Min. clearance</b>	250 $\mu\text{m}$	50 $\mu\text{m}$
<b>Min radius in pad clearance</b>	300 $\mu\text{m}$ (routed with tool D 0,6 mm)	no radius (DI - direct imaging)
<b>Color</b>	amber	green
<b>Bend radius</b>	unlimited	radius 1,5 mm 90°
<b>Application</b>	Dynamic, semi-dynamic, stable	semi-dynamic, stable

Min radius 300 $\mu\text{m}$   
Clearance 250 $\mu\text{m}$   
Bridge 300 $\mu\text{m}$

Clearance 50 $\mu\text{m}$   
Bridge 150 $\mu\text{m}$

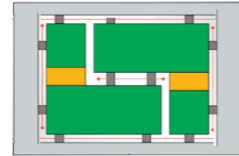
Design rules		
Legend	Description	Value
A	Countering of flex area	Min. 1.6 mm
B	Spacing - Exposed cu - board outline	Min. 0,25 mm
C	Stiffener distance from pads/holes	Min. 0,25 mm



## Panelisation

Typ DPS	Panel	Single pieces
<b>xF (without coverlay/stiffener)</b>	min 10	min 10
<b>xF + coverlay/stiffener</b>	min 2,5	min 6,5

- Larger spaces between PCB in panel better  $\geq 10\text{mm}$
- Panelise as "interlock" in order production panel utilization



## Surfaces

<b>Imersion Ni/Au</b>	Yes
<b>Imersion Tin</b>	Yes
<b>Imersion Ag</b>	Yes

## Other limits

<b>Maximal PCB dimension</b>	275 mm x 428 mm
<b>Minimal PCB dimension</b>	40x40 mm or 1600 mm <sup>2</sup>
<b>Min. track/isolation</b>	100 $\mu\text{m}$
<b>Minimal stiffener thickness</b>	100 $\mu\text{m}$

## General recommendations

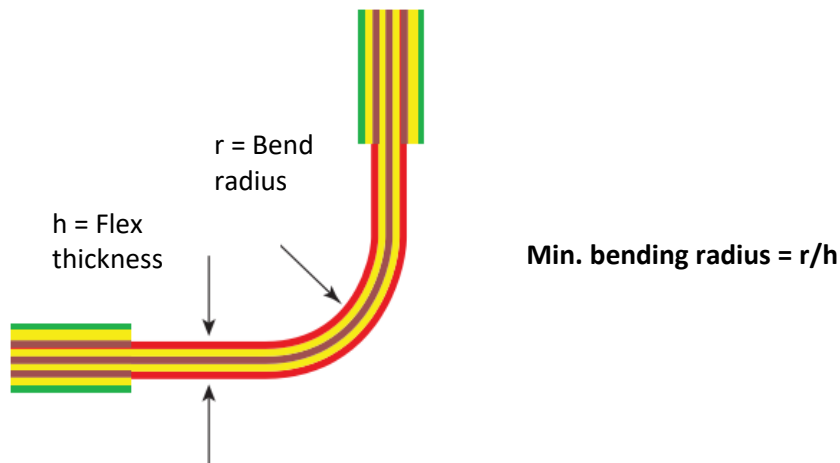
We recommend following the design recommendations listed in **IPC-2223 Sectional Design Standard for Flexible/Rigid-Flexible Printed Boards** when designing a Flex or RigidFlex PCB.

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 Elp. SD 2463 FLEX-HF	Pyralux LF Elp. SD 2463 FLEX-HF
<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