



DESIGN INPUTS AND  
ARCHITECTURE

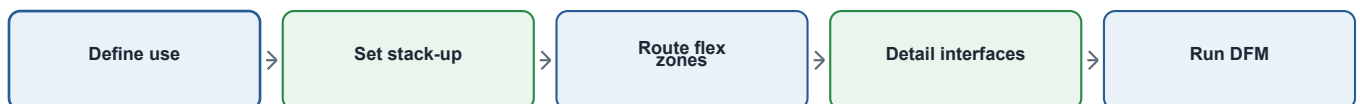
# FPC Design Guide

A practical design-input and DFM guide for flexible printed circuits. Project drawings and approved specifications remain controlling.

**Design note. This guide describes the information needed for a manufacturable design. Feature limits are confirmed for the project stack-up.**

|                                                                            |                                                                              |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Use condition<br>Static bend, installation flex or repeated dynamic motion | Core inputs<br>Stack-up, copper, outline, bend zones, termination and finish |
| Design output<br>Dimensioned fabrication drawing plus controlled CAD data  | Release gate<br>Material and feature limits confirmed through project DFM    |

## 1. Start with the Use Condition



| Input group | Information to provide                                                  |
|-------------|-------------------------------------------------------------------------|
| Application | Function, environment, service life and installation sequence           |
| Circuit     | Netlist, conductor layers, current paths and controlled impedance needs |
| Mechanics   | Finished outline, thickness envelope, bend path and available space     |
| Interfaces  | Connector, exposed pads, stiffeners, component areas and mating parts   |
| Materials   | Base film, copper type, coverlay, adhesive and surface finish           |
| Quality     | Inspection class, test coverage, traceability and acceptance criteria   |

## 2. Controlled Design Package

Use one revision-controlled package. The fabrication drawing, CAD data, netlist and referenced interface drawings must describe the same design.

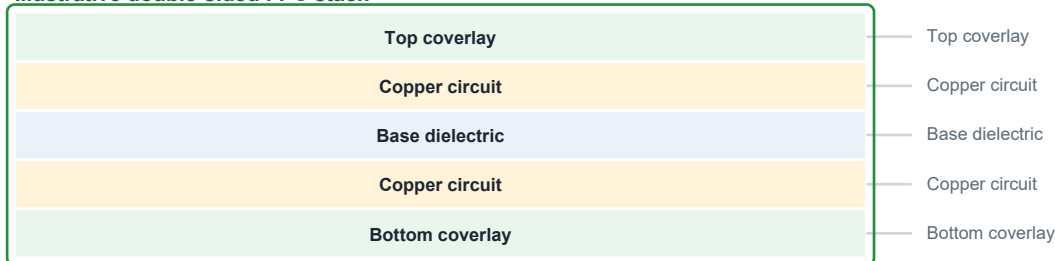


STACK-UP AND FLEX MECHANICS

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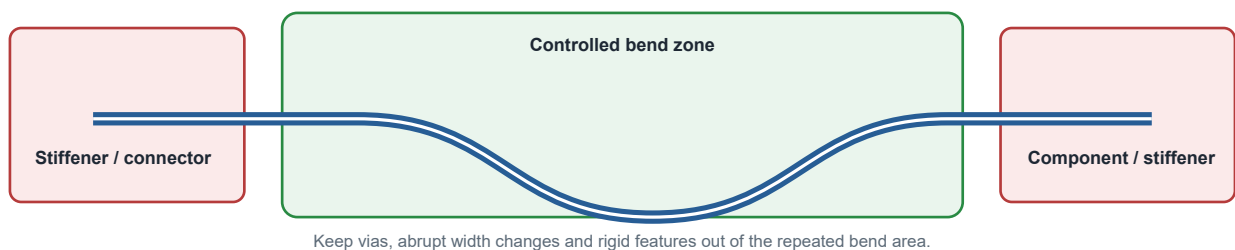
Illustrative double-sided FPC stack



| Stack element   | Design instruction                                                                  |
|-----------------|-------------------------------------------------------------------------------------|
| Base dielectric | Specify material family and target construction; do not use only a total thickness. |
| Copper          | Define layer count, copper type and finished copper requirement by layer.           |
| Coverlay        | Show openings, adhesive system, overlap and registration datums.                    |
| Stiffener       | Define material, thickness, adhesive, location and finished stack height.           |
| Finish          | Define exposed-pad finish and any keepout or contact-wear requirement.              |

### 3. Bend-Zone Design

Flex-zone layout concept



**Bend radius, cycle life and allowable strain are construction-specific. Confirm them against the actual stack-up and use profile during DFM.**



**ROUTING, COVERLAY AND  
TERMINATION**

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| Bend-zone topic | Design review question                                                              |
|-----------------|-------------------------------------------------------------------------------------|
| Bend use        | Classify each zone as one-time installation, occasional flex or repeated motion.    |
| Conductor path  | Route conductors through the bend as smoothly and directly as practical.            |
| Transitions     | Use gradual width and direction changes; review neck-downs at rigid boundaries.     |
| Rigid features  | Keep vias, pads, stiffener edges and component terminations outside the bend zone.  |
| Layer balance   | Review copper distribution and neutral-axis placement for multilayer constructions. |
| Installation    | Define bend direction, forming sequence, retention and the final installed shape.   |

## 4. Coverlay and Stiffener Definition

- Dimension openings from functional datums and identify registration-critical features.
- Avoid unsupported narrow coverlay webs and abrupt adhesive edges at flex transitions.
- State whether local thickness is functional, cosmetic or only a reference value.
- Show stiffener orientation and prevent ambiguity about the side of application.

## 5. Terminations and Assembly Interfaces

| Interface         | Required definition                                                                       |
|-------------------|-------------------------------------------------------------------------------------------|
| Connector fingers | Define pitch, datum, pad geometry, finish, insertion direction and mating connector.      |
| Stiffener support | Extend and locate the stiffener to support insertion without loading the flex transition. |
| Exposed pads      | Identify probe, solder, pressure-contact and wear surfaces separately.                    |
| Components        | Provide assembly side, orientation, height limits, keepouts and strain-relief intent.     |
| Tail exit         | Show the free-tail direction and prevent the housing from pinching or sharply folding it. |



DFM RELEASE CHECKLIST

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| Package element  | Minimum release content                                                      |
|------------------|------------------------------------------------------------------------------|
| Geometry         | Controlled outline, datums, holes, slots, bend zones and critical dimensions |
| Stack-up         | Layer order, materials, copper, coverlay, stiffeners and finished thickness  |
| Fabrication data | Gerber or approved artwork data, drill/rout data, netlist and readme         |
| Interface data   | Connector drawing, mating envelope, contact finish and assembly orientation  |
| Requirements     | Electrical test, cosmetic criteria, marking, packaging and regulatory needs  |

### 6. Pre-Release Check

- All dimensions use one declared unit system and a defined datum scheme.
- The drawing distinguishes finished dimensions from nominal material thickness.
- Each bend zone has a stated use condition and installed geometry.
- Coverlay and stiffener openings are dimensioned from functional features.
- Connector, finish and mating requirements are tied to controlled references.
- Advanced features are released only after manufacturing DFM approval.

### 7. Questions for Manufacturing Review

| Question                                  | Why it matters                                                              |
|-------------------------------------------|-----------------------------------------------------------------------------|
| Is the stack-up available and compatible? | Material choice controls thickness, forming and feature capability.         |
| Are bend zones fully identified?          | Unknown motion or installation geometry can invalidate routing assumptions. |
| Are critical tolerances measurable?       | Inspection needs datums, feature definitions and acceptance criteria.       |
| Is the termination proven with its mate?  | Pad, finish, stiffener and housing details must work as one interface.      |
| Are tests and samples defined?            | Electrical and mechanical approval needs agreed evidence before release.    |

**Release gate: Close DFM actions, issue one approved drawing revision and retain the review record with the project file.**