(Exploring the Advantages for Modern Electronics)

Why Choose Rigid-Flex PCBs?

In today’ s fast-evolving electronics industry, Rigid-Flex PCBs (Printed Circuit Boards) have emerged as a game-changing solution for high-performance and compact designs. Combining the best of rigid and flexible PCBs, they offer unparalleled reliability, space efficiency, and durability—making them ideal for cutting-edge applications.

This month, we dive into why Rigid-Flex PCBs are the future and how they outperform traditional PCB designs.

What is a Rigid-Flex PCB?

A Rigid-Flex PCB is a hybrid circuit board that combines the benefits of both rigid and flexible PCBs into a single, integrated design. It consists of rigid PCB sections (for component mounting) connected by flexible circuit layers, allowing the board to bend or fold while maintaining electrical connections.

Key Advantages of Rigid-Flex PCBs

1. Space & Weight Reduction

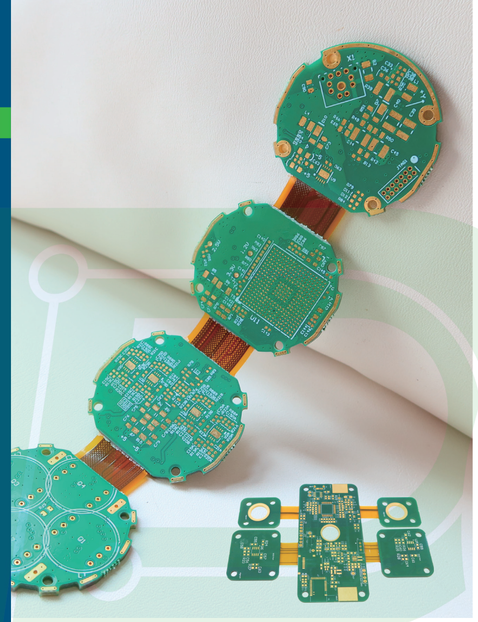
- Eliminate bulky connectors—Seamless transitions between rigid and flexible sections and reduce assembly size.
- Lighter than rigid PCBs—Perfect for aerospace, wearables, and portable devices.

Example: A medical wearable using Rigid-Flex PCBs reduced weight by 30% compared to traditional designs.

2. Enhance Durability & Reliability

- Fewer solder joints –Lower risk of failure due to vibration/shock.
- Bendable without cracking –Withstands 100,000+ flex cycles (IEC 60112 tested).
- Better thermal performance –Efficient heat dissipation in high-power applications.

Case Study: Automotive control modules using Rigid-Flex saw a 40% drop in field failures.



3. Simplify Assembly & Lower Costs

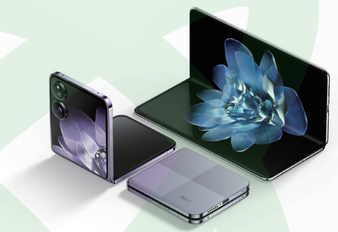
- Fewer interconnects–Reduce assembly time and labor costs.
- Single-unit construction –No need for multiple PCBs + harnesses.
- Long-term savings –Higher reliability = lower maintenance costs.

A drone manufacturer cut assembly costs by 25% after switching to Rigid-Flex.

4. Design Freedom for Innovation

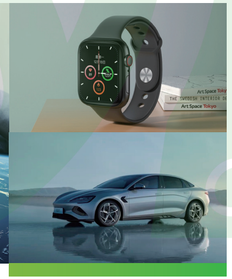
- 3D packaging – Fits into complex shapes (e.g., foldable phones, robotic arms).
- High-speed signal integrity – Minimizes EMI in 5G/RF applications.

Foldable smartphones rely on Rigid-Flex PCBs for seamless hinge integration.



What Industries Use Rigid-Flex PCBs?

- Medical Devices (Hearing aids, endoscopes)
- Consumer Electronics (Smartwatches, foldable phones)
- Industrial IOT(Robotics, sensors)
- Aerospace & Defense (Avionics, satellites)
- Automotive (ADAS, EV battery management)



Design Tips for Rigid-Flex PCBs

Bend Radius	→ Keep ≥ 10x the flex layer thickness to avoid cracking.
Stiffener Placement	→ Reinforce high-stress areas (e.g., connectors).
Material Selection	→ Polyimide for flexibility, FR4 for rigidity.
Controlled Impedance	→ Critical for high-frequency signals.

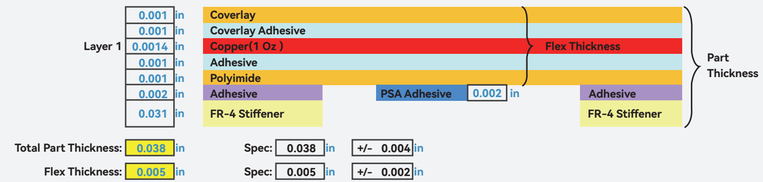
POE Rigid-Flex PCB capabilities

Category	Process Capability	Category	Process Capability
Production Type	Single/Double-sided boards, Multi-layer boards, Zinc-plated boards, Layered boards, Rigid-Flex boards, HDI buried hole boards, Special process boards	Layers	1-14 layers FPC, 2-14 layers Rigid-Flex boards and HDI buried hole boards
Max. Production Size	Single/Double-sided: 250*2500mm, Multi-layer: 500*750mm, Rigid-Flex: 500*750mm	Insulation Thickness	27.5μm / 50μm / 75μm / 100μm / 125μm / 150μm
Board Thickness	FPC: 0.06-0.4mm, Rigid-Flex: 0.25-6.0mm	Non-Metal Hole Tolerance	±0.05mm
Surface Treatment	Immersion Gold, Immersion Silver, Electroplating Gold, Electroplating Tin, OSP	Reinforcement Material	FR4 / PI / PET / SUS / PSA
Min. Half-Hole Size	0.4mm	Immersion Gold	Au 0.025-0.075μm / Ni 1-4μm
Min. Line Space /Width	0.045mm/0.076mm	Electroplating Gold	Au 0.025-25.4μm / Ni 1-25.4μm
Board Thickness Tolerance	±0.03mm	Impedance Value	50Ω-120Ω
Copper Thickness	12μm / 18μm / 35μm / 70μm	Impedance Tolerance	±10%
Hole Tolerance (Plated Through Hole)	±0.05mm	Min. Slot Width	0.80mm
Min. Drilling Size	0.1mm	Standards	GB / IPC-650 / IPC-6012 / IPC-6013H / IPC-6013H

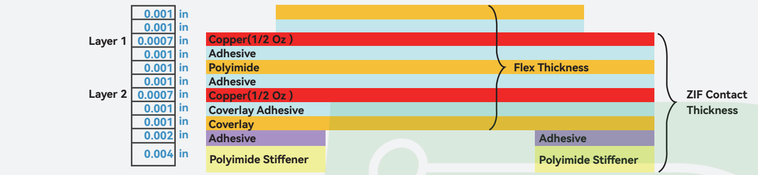
Note: For high-difficulty FPC flexible circuit boards and HDI Rigid-Flex boards, technical evaluation is required based on the documentation.

Common Stackup For Rigid-Flex PCB

1-layer-flex-with-optional-fr4-stiffeners-and-psa:



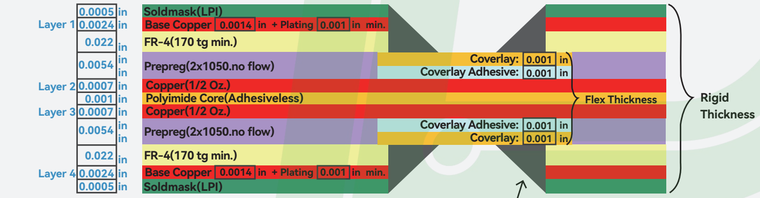
2-layer-flex-with-zif-contact-fingers:



Flex Thickness: 0.038 in Spec: 0.008 in +/- 0.002 in

ZIF Contact Thickness: 0.005 in Spec: 0.012 in +/- 0.002 in

4-layer-rigid- flex-stackup:



Rigd Thickness: 0.038 in Spec: 0.062 in +/- 0.006 in

Flex Thickness: 0.005 in Spec: 0.006 in +/- 0.002 in

Why Us?

- We are an ISO 9001:2015 Certified PCB assembly company committed to upholding rigorous quality standards.
- With over 20 years of experience in both fabricating and assembling high-quality rigid-flex printed circuit boards, we ensure precision and reliability.
- Our state-of-the-art manufacturing facilities are equipped to handle any custom and complex board requirements efficiently.
- Our highly qualified team adheres to industry best practices, offering cost-effective solutions tailored to your needs.
- Whether you need prototypes or full production runs, you can rely on our comprehensive PCB fabrication services.

Conclusion:

Rigid-Flex PCBs are revolutionizing electronics by enabling smaller, lighter, and more reliable products. Whether for wearables, automotive tech, or aerospace systems, they offer cost-effective, high-performance solutions that traditional PCBs can't match.

At POE, we specialize in high-quality rigid-flex PCB prototyping and assembly, with over 20 years of experience serving global clients. From low-volume prototypes to mid-volume production, we offer reliable and cost-effective solutions.

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YOUR GLOBAL TECHNOLOGY
PARTNER

Floor 3, Jinyuan Industrial Park, No.56 Tangtou Avenue, ShiyanTown, Bao'an, Shenzhen

+86-755-2531-2250 sales@poe-pcba.com / orders@pcbamake.com

www.poe-pcba.com / www.pcbamake.com

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