PCBWay

PCB Prototype the Easy Way

SERVICES OFFICE (CHINA)
Room 1302, 13th Floor, Building A, Ruiqin Business Center, No. 223 Shenban Road, Shangtang Street, Gongshu District, Hangzhou, Zhejiang, China
Working hours (GMT+8): 9:00 am - 6:00 pm, Mon. - Sat. (12: 00 noon)
Tel: +86 571 85039969

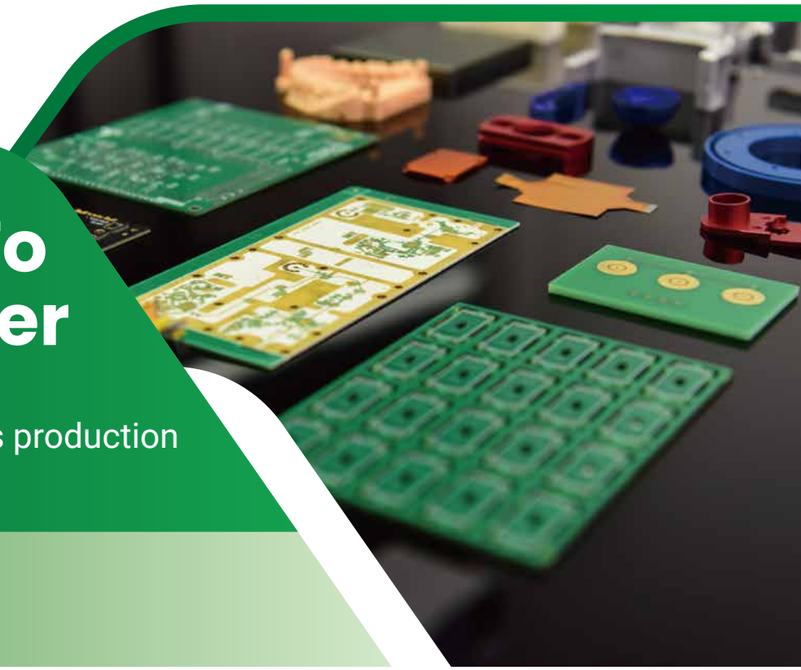
SERVICES OFFICE (FRANCE)
Parc des Varimonts, 10 Avenue de Thionville, 57140, Woippy, France
Working hours (CEST): 8:30 am - 5:00 pm, Mon. - Fri.
Tel: +33 (0)749781123

Multi-Language Customer Service:
English: service@pcbway.com
Français: fr-sales01@pcbway.com
Español: es-service@pcbway.com
Deutsch: fr-sales04@pcbway.com
日本語: jp-service@pcbway.com

After-sales/Complaint: feedback@pcbway.com
Complaint about Sales rep.: service@pcbway.com
Suggestions/Distributor: anson@pcbway.com
Cooperations: simon@pcbway.com
CNC/3D: 3dcnc@pcbway.com

www.pcbway.com

PCBWay



Your Go-To EMS Partner

From co-design to mass production

Full-Service Electronics Manufacturer

- PCB Fabrication
- PCB Assembly
- CNC | 3D Printing
- OEM | EMS

One-Stop Electronics Manufacturing

All done with PCBWay—from PCB fabrication, assembly, to CNC machining, 3D printing, and OEM.

2,800+
staff

256,000+
customers

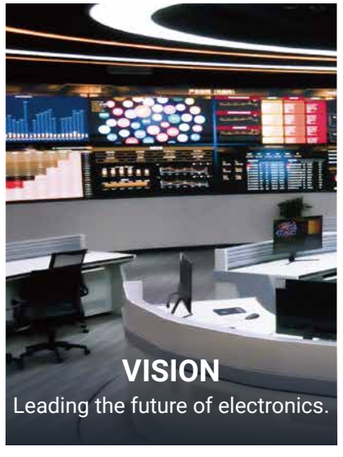
170+
countries and regions

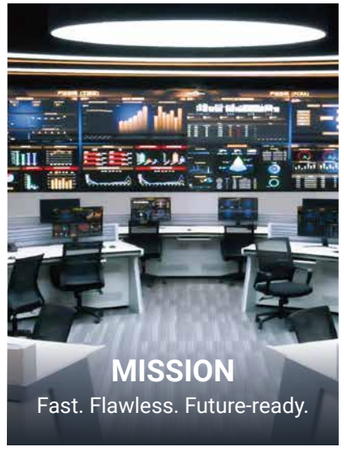
200,000 m²
factory area

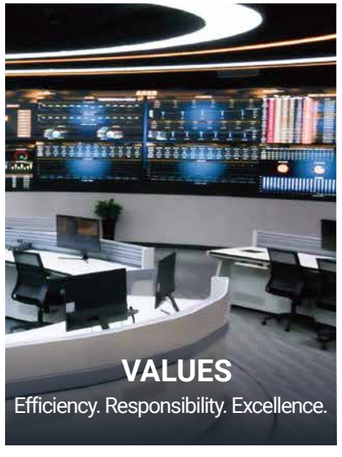
About PCBWay

Founded in 2014 and headquartered in Shenzhen, PCBWay is a leading one-stop PCB manufacturing and assembly provider. With over 2,800 employees and a global presence, including an office in France, we have partnered with more than 256,000+ engineers, startups, and established enterprises across 170+ countries and regions, serving industries from consumer electronics to medical.

Building on our global reach, PCBWay operates multiple factories in China with its Shenzhen facility spanning 200,000 m², producing multi-layer, HDI, flexible, and metal PCBs on fully automated lines. Through strict quality control and advanced technology, PCBWay holds key international certifications, including UL, ISO9001, ISO14001 and IPC, ensuring high-quality, reliable solutions for makers and businesses worldwide.







Strong Technical Advantages

Focusing on core technologies such as multi-layer, HDI, and rigid-flex PCBs, we provide powerful solutions for demanding applications.

Professional R&D Team

With our skilled team, advanced equipment and extensive patents, we continuously drive innovation in the PCB industry.

High Delivery Rate

With turnarounds as short as 12 hours and multiple express shipping options, PCBWay delivers products quickly and affordably.

24/7 Customer Support

Our customer service team works in shifts to provide 24-hour support, ensuring customers receive prompt assistance.

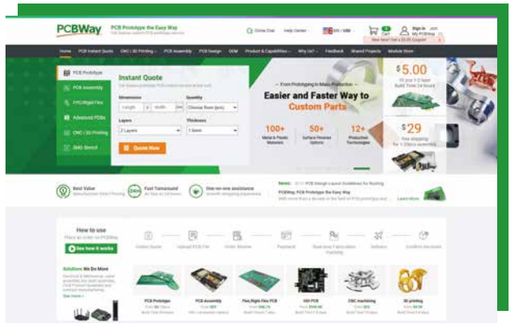
From Prototypes to Mass Production

PCBWay provides scalable and reliable manufacturing solutions.

High Standards & Reliable Quality

ISO 9001:2015 ISO 13485 IATF 16949 UL CE RoHS COMPLIANT REACH COMPLIANCE

Every product undergoes strict inspection, using advanced technologies (flying probe, AOI, X-ray, etc.) to ensure high quality. PCBWay also holds multiple internationally recognized certifications, such as ISO 9001, ISO 13485, IATF 16949, UL, RoHS, REACH, and ISO 14001, highlighting our commitment to quality and compliance.



Starting with Prototypes

Our online platform makes customized prototyping fast and simple, offering easy ordering and real-time production tracking. A wide range of materials and specifications ensures flexibility, while a quick turnaround time enables prompt delivery.

Trusted Mass Production

With advanced automated lines and a monthly capacity of manufacturing 60,000 m² PCBs and assembling 20,000 different designs, we deliver cost-effective high-volume production and a one-stop manufacturing solution.

Our Main Services

Your one-stop solution to engineering projects.

01 PCB Fabrication

Rapid PCB prototyping in 12 hours meets your urgent needs.
Most customization options can fully cover your possible requirements.

P6 – P18

02 PCB Assembly

We help you source components globally. A turnkey assembly service with a quick quotation makes the entire process seamless.

P19 – P22

03 CNC | 3D Printing

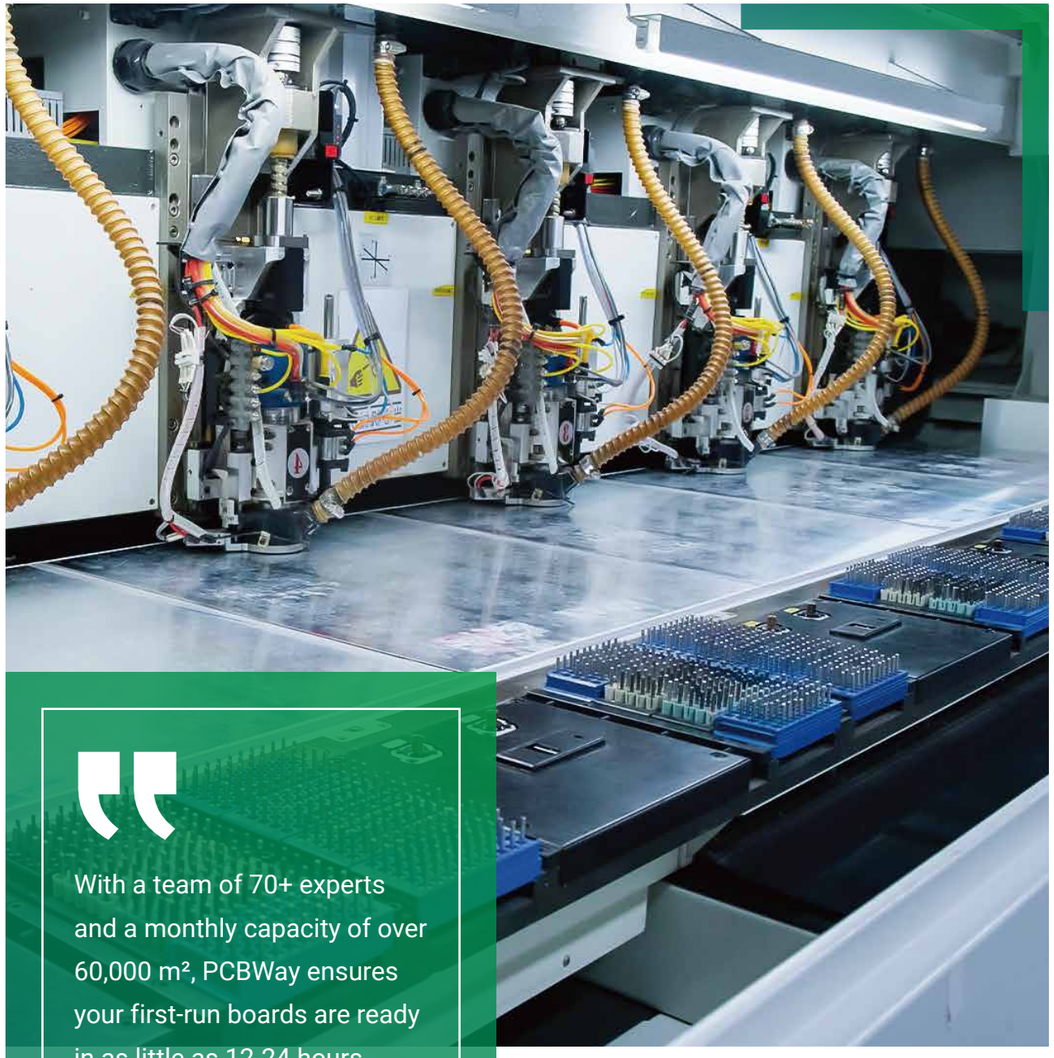
High-precision part production can be within hours.
Online quotation system speeds up the prototyping process.

P23 – P30

04 OEM | EMS

Our complete supply chain saves your time from design to final product.
Quality-assured mass production brings your product to market smoothly.

P31 – P33



With a team of 70+ experts and a monthly capacity of over 60,000 m², PCBWay ensures your first-run boards are ready in as little as 12-24 hours. Whether you're an engineer or innovator, PCBWay provides efficient, dependable, and cost-effective prototyping to bring your design to production faster than ever.

PART 01

COMPREHENSIVE PCB FABRICATION

PCB Materials

No.	Category	Material	Tg (°C)	Td (°C)	CTE Z (ppm/°C)	Dielectric / Df
1	FR-4	S1141	140	310	65 / 300	Df 0.015 at 1 MHz
2		S1000H	≥150	348	37 / 230	Dk 4.6, Df 0.011
3		S1000-2M	180	355	41 / 208	Dk 4.6, Df 0.018
4		S1000-2	180	345	45 / 220	Df 0.013 at 1 MHz
5		KB6160A etc.	—	—	—	—
6	FR-4 Halogen-free	S1150G	155	355	40 / 230	Df 0.009 at 1 GHz
7		S1170G	180	390	45 / 210	Dk 4.4, Df 0.010 at 1 GHz
8		S1151G (High CTI)	150	360	36 / 220	Df 0.010 at 1 MHz
9		S1165, TU-862 etc.	170	—	—	—
10	High-TG	IT180A	190	345	45	—
11		TU768	190	350	—	—
12		S1000-2, S1000-2B	185	345	45	—
13		S1170G / GB	180	390	45	—
14		Others IT180, VT47 etc.	≥170	—	—	—
15	Rogers	4003C	>280	425	46	Dk 3.38, Df 0.0027
16		4350B	>280	390	32	Dk 3.48, Df 0.0037
17	High-CTI	S1600	135	310	55 / 308	—
18		S1151G (Halogen-free)	150	360	36 / 220	Df 0.010 at 1 MHz
19		KB6160C	—	—	—	—
20	High Low Temperature	SH260	>250	429	45	Df 0.007 at 1 GHz
21		ARLON 85N	—	—	—	—

No.	Category	Material	Thermal Cond.	Breakdown Voltage	Peel Strength	Tg / Td (°C)
1	Aluminum-Core	AL-01-B10 (BOYU)	1 W/m·K	5.0 kV	≥8 Lb/in	Tg 110 / Td 380
2		AL-01-B15 (BOYU)	1.5 W/m·K	5.0 kV	≥8 Lb/in	Tg 110 / Td 380
3		AL-01-B20 (BOYU)	2 W/m·K	1.5-5.0 kV	≥8 Lb/in	Tg 130 /Td 380
4		AL-01-B30 (BOYU)	3 W/m·K	4.0-6.0 kV	≥8 Lb/in	Tg 150 / Td 380
5		GL12 / GL22 (GDM)	1.0-1.5 W/m·K	≥2 kV	≥6 Lb/in	AABUS
6		CS-AL-89 AD2, JQ-143	—	—	—	—

No.	Category	Material	Dk Range
1	High-Frequency PCBs	RO5880, TLY-5, SCGA-500, GF220, F4BK225, RO5870, TLY-3, TLX-0, TLT-0	2.2-2.45
2		AD250, TLT-9, TLY-9, SCGA-500, GF255, TLT-8, TLY-8, F4B255, TLT-7, TLY-7, TLT-6, TLY-6, SCGA-500, GF265, F4B265, AD270, TLC-27, RO6002, CLTE, AD295, TLE-95, SCGA-500, GF300, AR-320, TLC-30, RO3203, F4BK300, AD320, AR-320, TLC-32, TMM-3, 25N	2.5-3.2
3		25FR, RO4003, RO4350, RO4835, AR-350, RF-35, F4BK350, AD360, AR-450, TMM-4, AR-600, TMM-6, RO3006, RO6006, RO4360	3.37-6.0
4		TMM-10, TMM-101, AR-1000, CER-10, RO3010, RO3210, RO6010	9.2-10.2

No.	Category	Material	Frequency Range
1	High-Speed PCBs	MEG4, TU-862, TU-662, TU-872, N4000-13, M4, TU-863, Synamic4, EM-888, I-Speed, N4800-20SI, IT-958G	1-10GHz
2		MEG6, TU-883, Shengyi Synamic6, Meteorwave1000 / 2000 / 3000, EM-891, EM-888K, IT-968, I-Tera MT40	10-25GHz
3		MEG7, TU-933, Meteorwave4000, IT-988, Tachyon 100G	>25GHz

HDI PCB

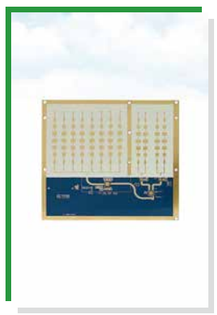
High-Density, Miniaturized

HDI PCB features fine lines and microvias for compact size and high-performance signals, used in smartphones, wearables, automotive, and medical devices.

- 7+N+7 staggered/stacked vias
- FR-4, HighTg, Halogen-free, PTFE
- Finished Copper: 1/3-8 oz
- Min. Track / Spacing (Inner): 2/2 mil (H/HOZ base copper)
- Min. BGA Pitch: 0.35 mm

High-Freq PCB

High-Speed, Low-Loss



High-Frequency PCB supports signals above 1 GHz, providing low-loss and high-speed performance, used in 5G, RF, microwave, and high-speed communications.

- RO4003C, RO4350B, RO3003, RO3010, RT5880
- Min. Track / Spacing: 2 mil
- Min. Hole Size: 0.15 mm
- Finished Copper: 1-2 oz
- Board Thickness: 0.2-3.2 mm

Metal Core PCB

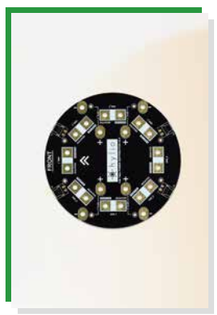
Thermal, Robust

Metal Core PCB has a metal base for superior heat dissipation and reliability, used in LEDs, power electronics, and high-heat applications.

- Aluminum core, Copper core
- Thermal Conductivity: 1.0 W/(m·K), 1.5 W/(m·K), 2.0 W/(m·K), 3.0 W/(m·K)
- Min. Track / Spacing: 4 mil
- Min. Hole Size: 1-layer (0.8 mm), 2-layer (0.2 mm)
- Board Thickness: 0.4-3.2 mm

Heavy Copper PCB

High-Current, Durable



Heavy Copper PCB features thick copper layers for high current and thermal performance, used in power electronics, automotive, and industrial fields.

- FR-4 Standard Tg 140°C, FR4-High Tg 170°C
- Min.Track / Spacing: 12 oz Cu, 20 mil / 32 mil
- Max Outer Layer Copper Weight: 15 oz
- Max Inner Layer Copper Weight:12 oz
- Board Thickness: 0.6-6 mm

Ceramic PCB

High-Temperature, Weather-Resistant

Ceramic PCB uses a ceramic substrate for high heat resistance and thermal conductivity, applied in high-power electronics, RF modules, LEDs, and aerospace.

- Aluminum Oxide, Aluminum Nitride
- Min. Track / Spacing: 100 µm / 80 µm
- Min. Hole Size: 80 µm
- Copper Thickness: 35-300 µm
- Board Thickness: 0.2-1.5 mm

Transparent PCB

See-Through, Integrated

Transparent PCB uses a clear substrate for visible circuits and aesthetic design, applied in wearables, displays, and decorative lighting.

- 1-6 layers
- Transparent FR-4 & Transparent Solder Mask
- Min.Track / Spacing: 4 mil
- Surface Finishing: Immersion Gold, ENEPIG, OSP
- Custom Color Silkscreen

Black Core PCB

Light-Tight, Long-Lasting

Black Core PCB features a black core for aesthetics and reliable performance, used in consumer electronics, LEDs, and automotive.

- Peel Strength (after thermal stress): 6.0-8.0 Lb/in
- Tg: ≥120°C
- Breakdown Voltage: 45 kV
- Dielectric Constant (at 1MHZ): 4.4-4.8
- Dissipation Factor (at 1MHZ): 0.018-0.032

Multi-Color PCB

Vivid, Customizable

Multi-Color PCB uses UV inks for durable and colorful graphics, applied in electronics, LEDs, and custom PCBs.

- UV-LED Instant Curing
- High Clarity, Fade-Resistant
- Survives SMT Reflow
- Multi-Color & High Precision
- VOC-Free Process

PCB Capabilities

No.	Category	Item	Parameter
1	Material & Structure	PCB Type	Single-Sided; Double-Sided; Multi-Layer (Through-Hole only); Multi-Layer (with Through, Blind, and/or Buried Vias)
2		Base Material	FR-4; Halogen-Free FR-4; High-CTI FR-4 (≥600V); Rogers Series; PTFE; Ceramic-Filled High-Frequency; Metal-Based (Al; Cu); Pure Ceramic; Rigid PI; Adhesiveless Flex; High-Speed; BT; High Thermal Conductivity; Semi-Flexible
3		Board Thickness	Supports Multilayer Boards: 0.2-8.0 mm
4		Number of Layers	1-60 Layers
5		Max Finished PCB Size	Single / Double: 1200 × 600 mm; Multilayer: 560 × 1150 mm
6		Panel Size	Max: ≤20 × 24 inch
7		Panelization Options	V-Scoring; Tab Routing; Both
8	Copper & Lamination	Base Copper Foil	1/3 oz (12 μm)
9		Max Finished Copper Thickness	Up to 20 oz
10		Bottom Copper Thickness	Inner & Outer Layers: 0.5-20 oz
11		Plating Thickness (μin)	ENIG Nickel: 200 μin, Gold: 1-4 μin; Full Board Gold Plating: Ni 100-500 μin, Au 1-50 μin; Gold Finger: Ni 120-400 μin, Au 1-50 μin
12		Hole Copper Thickness (μm)	Through Hole: 18-50 μm; Blind Hole: 18-50 μm; Buried Hole: 15-50 μm
13	Dimensions & Tolerances	Dimension Tolerance	±0.15 mm
14		V-Cut Angles	20°; 30°; 45°; 60°
15		V-Cut Types	Conventional; Skip; Single-Sided; Hand
16		Outline Profile	CNC Machining; V-Cut
17		Chamfer	Angle: 20°; 30°; 45°
18		Beveling for Gold Fingers	Angle: 20°; 30°; 45°; with precise angle and depth control
19		Board Thickness Tolerance	0.21-1.0 mm: ±0.1 mm; 1.0-2.5 mm: ±10%; 2.5-6.3 mm: ±10%
20		Finished Hole Size Tolerance	0-6 mm: ±0.08 mm; >6 mm: ±0.1 mm
21		Hole Position Tolerance	±0.05 mm
22		Hole Diameter Tolerance	PTH: ±0.075 mm; NPTH: ±0.05 mm; Special Holes (Press-Fit): ≤ ±0.05 mm; Countersink / Counterbore NPTH: <10 mm: ±0.2 mm, ≥10 mm: ±0.3 mm
23		Thickness Tolerance	T ≥1 mm: ±10%; T <1 mm: ±0.1 mm
24	Drilling & Holes	Drill Diameter	>6.0 mm requires special processes; Tolerance ≤ ±0.05 mm
25		Finished Hole Size (Mechanical)	Min: 0.15 mm
26		Finished Hole Size (Laser Microvia)	Min: 0.075 mm
27		Edge Plated / Castellated Hole	Min: 0.3 mm
28		Hole Size Tolerance	PTH: ±0.08 mm; NPTH: ±0.05 mm; Holes >6 mm: ±0.1 mm; Via: +0.08 / -hole diameter
29		Minimum Hole Size	0.15 mm (CNC); 0.1 mm (Laser Blind); 0.15 mm (Buried Vias)

PCB Capabilities

No.	Category	Item	Parameter
30	Drilling & Holes	Hole-to-Hole Spacing	Component Hole: 0.35 mm; Via (≤0.45 mm): 0.2 mm; Pad-to-Hole: 0.35 mm; Via Wall Spacing: same net 0.15 mm, different net 0.25 mm
31		Drilling Accuracy	±0.05 mm
32		Countersink	Hole Diameter: 3-10 mm; Angle: 82°, 90°
33		Slot (Cut-Out)	Plated Slot ≥0.3 mm; Non-Plated Slot ≥0.4 mm
34		Castellated Holes	Min Diameter: 0.3 mm; Spacing (Edge to Edge) ≥0.3 mm
35		Rectangular Holes / Slots	Available
36		Non-Plated Holes (Min)	0.4 mm
37		Plug Via Holes	Min Size: 0.15 mm (CNC), 0.1 mm (Laser Blind, Buried); Max Size: 0.7 mm
38		Resin Plugged Hole Diameter	0.08-1.0 mm
39		Via Process Options	Tenting Vias; Plugged Vias With Solder Mask; Vias Not Covered
40		Via Filling / Plugging Options	Copper Filled; Epoxy Filled & Capped (IPC4761 Type VII); Plugged With Solder Mask
41	Trace Width & Spacing	Min Width / Spacing - Inner Layer (Before Compensation)	18 μm Cu: ≥4/3.5 mil; 35 μm Cu: ≥4/4 mil; 70 μm Cu: ≥6/7 mil; 105 μm Cu: ≥8/10 mil
42		Min Width / Spacing Outer Layer (Before Compensation)	18 μm Cu: ≥4/4 mil (Parts 3.5/3.5 mil); 35 μm Cu: ≥5/5 mil; 70 μm Cu: ≥6/7 mil; 105 μm Cu: ≥8/10 mil
43		Grid Trace Width / Spacing	18 μm Cu: ≥6/8 mil; 35 μm Cu: ≥8/10 mil; 70 μm Cu: ≥10/12 mil; 105 μm Cu: ≥12/14 mil
44		SMT Line Width	6 mil
45		Track Width / Spacing (Min)	Portion: 2.5/2.5 mil; Overall: 3/3 mil (H/H OZ Base Copper)
46		Line Width (Min)	2.5 mil
47		Trace Coils	1 oz: 0.15 mm
48		Hatched Grid Width / Spacing	8/8 mil
49		Same-Net Track Spacing	1 oz: 0.15 mm (for Trace Coil Boards)
50		Min Trace Width / Spacing	Inner Layer: 3/3 mil (only portion); Outer Layer: 2.5/2.5 mil (only portion)
51		Minimum Spacing Line	Portion 2.5 mil - Inner 2.5 mil - Outer
52	Clearances & Annular Rings	Minimum Isolation Ring - Inner Layer	4L: 5-6 mil; 6L: 6-6.5 mil; 8L: 6-7 mil; ≥10L: 7-8 mil
53		Minimum Weld Ring - Outer Layer	Via Hole: 3-6 mil (depends on Cu thickness); Component Hole: 6-12 mil (depends on Cu thickness)
54		Min Annular Ring	Via: 3 mil; Component Hole: 5 mil
55		Pad Diameter (Min)	Standard: Inner PTH = Finished Hole + 0.3 mm, Outer PTH = Finished Hole + 0.35 mm; Advanced: Pad 0.15 mm, Laser 0.075 mm
56		Via to Inner Layer Copper / Trace Clearance	≤10 Layers: ≥0.15 mm; >10 Layers: ≥0.18 mm
57		Min Spacing - Hole to Inner / Outer Conductor	Inner: 4-6 mil; Outer: 4-6 mil
58		Via Hole-to-Hole Spacing	0.2 mm

PCB Capabilities

No.	Category	Item	Parameter
59	Clearances & Annular Rings	BGA Pads & Pitch	Min BGA Pad Diameter: 6 mil; Min BGA Pitch: 0.3 mm
60		IC Pads Min Distance (SM Bridge)	6 mil
61		Pad to Track Clearance	PTH: 0.3 mm; NPTH: 0.2 mm; SMD Pad-to-Pad (Diff Nets): 0.1 mm; Pad to Track: 0.075 mm
62		Line to Board Edge / Copper to Edge Clearance	CNC Milling: <0.2 mm; V-Cut: 0.4 mm
63	Surface Finish	Surface Coating	Immersion Gold (ENIG); Electroplated Hard Gold; Electroplated Soft Gold; Immersion Silver (IAg); Electroplated Silver; Lead-Free HASL; Lead-Based HASL; Immersion Tin (ISn); Electroplated Tin; OSP (Entek / Anti-Tarnish); Carbon Ink; Platinum Plating; ENEPIG; Heavy Hard Gold; Electroplated Ni / Gold
64		Plated Edges	Available
65		HASL Processing Capacity	Component Hole Diameter: ≥0.15 mm; Tin Thickness: 2-40 μm; Board Thickness: 0.6-3.5 mm (≤0.4 mm needs review)
66		Gold Thickness	ENIG: 1-3 μin (≥3 μin needs review); Soft Gold: Max 1-3 μin; Hard Gold: Max 75 μin
67	Solder Mask	Solder Mask Colors	Green; Red; Yellow; Blue; White; Black; Pink; Grey; Orange; Transparent; Purple; Matte Variants; None
68		Minimum Solder Mask Bridge	Green: ≥3 mil; Other Colors: ≥4 mil
69		Plug Hole Coverage	Full Hole Coverage; Supports Board Thickness 0.4-2.4 mm (Advanced: >2.4 mm)
70		Solder Mask Processing Method	Film; LDI
71	Silkscreen & Marking	Legend Type / Color	White; Black; Yellow; Blue; Grey; None
72		Minimum Text Height	White: 0.5 mm; Black: 0.6 mm
73		Character Width-to-Height Ratio	White: Line Width 0.075 mm, Height 0.5 mm; Black: Line Width 0.11 mm, Height 0.6 mm
74		Hollow-Carved Character Ratio	Width ≥0.2 mm; Height ≥1.25 mm (1:6.25)
75		Pad to Silkscreen Clearance	Pad to Silkscreen: 0.15 mm; Silkscreen to Solder Mask Opening: 0.1 mm
76		Product Number Removal	No; Yes; Specify Location
77		UV Printing Multi-Color	Max Size: 400 × 600 mm; Single-Sided Top / Bottom, Double-Sided
78		Laser Marking (QR Code Engraving) / UL Marking	Available
79	Reliability & Quality	Controlled Impedance Types	Supports various controlled impedance types, including surface, stripline, differential, and coplanar designs
80		Impedance Tolerance	Above 50 Ω: ±10%; 50 Ω and Below: ±5 Ω
81		Electrical Tests	Flying Probe Test; Fixture Test; Four-Wire Test
82		Bow and Twist Tolerance	Normal: ≤0.75%; Limit: ≤0.5%
83		Acceptance Criteria	IPC Level 2 Standard (normal); IPC Level 3 Standard (special)
84		Certificates	UL; ISO9001; ISO14000; RoHS; TS16949; ISO13485
85	Admin	RFQ	1-2 days
86		Build Time	1-20 days

Flex | Rigid-Flex PCB

PCBWay delivers high-quality flexible and rigid-flex PCBs with precision and reliability. From tight bends for wearable devices to complex multilayer designs for industrial electronics, our expert engineering team offers customizable solutions to bring your concept to production fast and reliably.

Feature Comparison	Flexible PCB (FPC)	Rigid-Flex PCB (RFPCB)
	 VS 	
Structure	Fully flexible, PI/PET substrate, optional stiffeners	Integrated rigid + flexible sections; flexible part bends, rigid part supports components
Applications	Wearables, phones, automotive wiring, portable medical devices	Foldable screens, laptops, drones, automotive radar, industrial instruments
Advantages	Flexible routing, lightweight, 3D layout, fewer connectors	Combines flexibility with rigidity, mounts heavy components, high integration, stable structure
Limitations	Cannot mount heavy components, limited temperature, multi-layer design challenging	Lower bending lifespan, complex design, thicker, repair harder
Assembly	Requires fixtures, connectors, multiple steps	Rigid parts mount directly, flexible parts bend to fit, fewer assembly steps, higher integration
Resilience	Moderate temp, vibration/shock resistance good	High temp, stable structure, superior vibration/shock resistance
Bendability	Multi-directional, small bend radius, long dynamic lifespan	Flexible sections bend; junction stress must be managed; medium lifespan

Flexible PCB Capabilities

No.	Category	Item	Parameter
1	Materials & Surface	Base Material	PI; Adhesiveless PI; Halogen-Free PI; No Flow PP; Polyimide Flex; PET; High-Frequency (Dk≤3.6)
2		Surface Finishes	ENIG; OSP; Hard Gold; Immersion Silver; Immersion Tin; ENEPIG
3		Coverlay Thickness	12.5-50 μm
4		Coverlay Opening	4 mil
5		Min Coverlay Overlap	0.3 mm
6		Solder Mask	Yellow; White; Black
7		EMI Shielding Film	Overlap: 0.25 mm; Registration Tolerance: 0.05 mm
8		Silkscreen	White; Black; None
9	Board Structure & Dimensions	Layer Count	Max 16; General 1-10
10		Max Finished Size	1200 × 238 mm (long format), over 1200 mm subject to review; 600 × 480 mm (square, L & W ≤480 mm)
11		Min Finished Size	2 × 2 mm (without bridge); 8 × 8 mm (with bridge)
12		FPC Thickness Options	0.025 / 0.05 / 0.06-0.30 / 0.33-0.40 mm+
13		Thickness Tolerance	Single Layer: ±1.0 mil; Double Layer ≤12 mil: ±1.2 mil; Multi-Layer ≤12 mil: ±1.2 mil; Multi-Layer 12-32 mil: ±8%; Including PI Stiffener: ±10%
14		Min Trace / Space	Inner / Outer: 0.06 mm
15		Trace Width Tolerance	±10%
16		Pad-to-Trace Clearance	0.1 mm
17		Min Hole	0.1 mm
18		Min Pad	0.25 mm
19		Castellated Holes	Available
20		Min Solder Bridge	0.2 mm
21		Min Finished Hole	0.1 mm
22		Min Mechanical Drill	6 mil
23		Smallest Laser Drill	0.1 mm
24	Copper, Conductor & Impedance	Base Copper Thickness	Min: 1/4 oz (9 μm)
25		Max Finished Copper	1-2.5 oz
26		Controlled Impedance	±10% (±5 Ω ≤50 Ω); ±10% (>50 Ω)
27		Cross-Hatched Copper Fill	Grid Line Width & Spacing ≥0.1 mm
28	Vias / Advanced Via	Via Hole	Min 0.1 mm

Flexible PCB Capabilities

No.	Category	Item	Parameter
29	Vias / Advanced Via	Via Land	Min 0.25 mm
30		Via-to-Via Spacing	Min 0.12 mm
31		Max Through Hole Aspect Ratio	10:1
32		Max Blind Via Aspect Ratio	0.75:1
33		Buried Vias / Blind Vias / Conductive Filled	Available
34		Via Covering	Recommended
35		Annular Ring	4 mil
36		Drilling Tolerance	±0.05 mm
37		BGA Pad Diameter	Min 8 mil
38	Precision & Registration	Silkscreen Capability	30 mil height; 5 mil line width
39		Character to Pad Clearance	6 mil
40		Min Route Cutter	0.8 mm
41		Laser Outline	Yes
42		Laser Accuracy	±2 mil
43		Punching Accuracy	±4 mil
44		Mechanical Routed Part Size Tolerance	0.1 mm
45		Solder Mask Registration	2 mil
46		Solder Mask Feature Tolerance	2 mil
47	Mechanical & Finishing	Processes	Dry Film with LDI; Routed Array; Milling; Edge Castellation; Edge Plating
48		Gold Finger Clearance	0.2 mm
49		Edge Connector	Available
50		Stiffeners	PI; FR-4; Black FR-4; Stainless Steel; Aluminum
51		Soft Bending Radius	Single Layer: 3-6 × board thickness; Double Layer: 7-10 × board thickness; Multilayer: 10-15 × board thickness
52	Quality & Certification	Electrical Test	100% E-Test
53		Certifications	UL 94V-0; IPC 6012 Class 1/2/3; ISO 9001:2015; ISO 13485:2016
54	Admin	Build Time	1-20 days
55		RFQ	1-2 days

Rigid-Flex PCB Capabilities

No.	Category	Item	Parameter
1	Materials & Surface	Base Material	Polyimide Flex + FR-4; Adhesive PI; Adhesiveless PI; Halogen-free PI; No-Flow PP
2		Laminate Materials	Standard High-Tg FR-4; ROGERS 4 Series + PI; High-Speed Laminates + PI; PTFE + PI
3		Surface Finishes	ENIG; OSP; Hard Gold; Immersion Silver; NiPdAu
4	Board Structure & Dimensions	Layer Count	2-32L
5		Max Rigid / Flex Layers	30L / 20L
6		Max Thickness	7 mm
7		Min Thickness (4-layer)	0.25 mm
8		Min Core Thickness	25 μm
9		Max Finished Dimensions	400 × 730 mm
10	Line & Hole Capability	Min Track / Spacing	0.065 mm
11		Min Trace Width / Space	Inner: 0.06 mm / 0.06 mm (1/3 oz Cu); Outer: 0.06 mm / 0.06 mm
12		Min Hole / Pad Size	0.08 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 mm
13		Min Drill Hole	CNC: 0.15 mm; Laser: 0.1 mm
14		Min Finished Hole	0.1 mm
15		Min Via Ring	5 mil
16		Min Pad Size for Test	0.2 mm
17		Min Wire Bond Pad	0.25 mm
18		Via-to-Transition Distance	Drill / Laser: 0.15 mm
19	Copper & Impedance	Base Copper Thickness	Min: 1/3 oz (12 μm)
20		Conductor Width / Spacing	≥0.075 mm
21		Impedance Control	±10% (Min ±8%)
22	Vias & Advanced Via Technologies	Max Through Hole Aspect Ratio	13:1
23		Max Blind Via Aspect Ratio	0.8:1
24		Buried / Blind / Stacked Vias	Available
25		Conductive Fill	No
26		Non-Conductive Fill	Available
27		PTH Hole Tolerance	±0.05 mm

Rigid-Flex PCB Capabilities

No.	Category	Item	Parameter
28	Precision & Tolerances	Layer Registration	±2 mil (LDI)
29		Solder Mask Registration	±2 mil (LDI)
30		Solder Mask Feature Tolerance	4 mil
31		Etched Feature Tolerance	±0.1 mm
32		Mechanical Routed Part Tolerance	0.1 mm
33		Min Route Cutter Diameter	0.6 mm
34		Bow & Twist	≤0.75%
35	Mechanical Processing	Milling / Routed Array /Countersink / Bevel / Edge Plating	Available
36		V-Score - Edge to Copper	0.4 mm
37		V-Score - Angles	30°; 45°; 60°
38	Flexible (FPC) Part	FPC Layers	1-10L
39		FPC Thickness	0.08-0.4 mm
40		Coverlay	Yellow; White; Black; None
41		Min Coverlay Overlap	0.3 mm
42		Finished Copper	0.5 / 1 / 1.5 / 2 oz
43		Silkscreen	White; Black; None
44		EMI Shielding Min Overlap	0.25 mm
45		EMI Overlap Registration Tolerance	0.05 mm
46	Rigid Part	Solder Mask	Green; Red; Yellow; Blue; White; Black; Purple; Matte Black; Matte Green
47		Silkscreen	White; Black; None
48		Finished Copper	1 / 2 / 3 / 4 oz
49	Quality & Certification	Electrical Test	100% E-test
50		Reports	Standard Inspection; Microsection; Solderability; Thermal Stress; Impedance; Humidity Cards
51		Certifications	IPC 6012 Class 1/2/3; ISO 9001; ISO 13485; UL 94V-0
52	Admin	Build Time	7-20 days
53		RFQ	1-2 days

Customized Services and Advanced Options

PCBWay delivers tailored PCB solutions with precision processes and advanced options, ensuring high-quality, reliable boards for every project.

01. Drilling & Hole Processing

- Half-cut / Castellated holes
- Countersink / Counterbore
- Press-fit holes
- Back drill PCB

02. Plating & Surface Finishing

- Edge plating
- Via filled with copper
- Leadless partially plated hard gold

03. Via Filling & Capping

- All vias filled with resin and capped
- Via in pad

04. High-Speed Signal & Layer Control

- Impedance control
- Custom stackup

05. Milling & Board Shaping

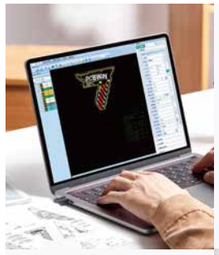
- Z-axis milling

06. Advanced PCB Structures

- Embedded / Buried Copper
- Cavity PCB

Quality Control

Our strict quality control spans every aspect of production to deliver high-standard PCBs.



Materials

Only premium materials from trusted suppliers are used.

Inspection

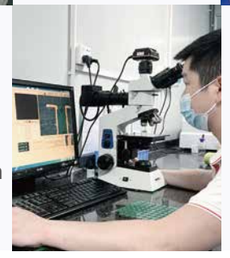
100% tested to IPC & ISO standards before shipment.

DFM

Engineers review every Gerber file to ensure production feasibility.

Equipment

World-class machines guarantee precision and reliability.



Management

Comprehensive QC system ensures every order is perfect.

PCBWay offers Integrated turn-key PCB assembly services, from prototypes and low-volume runs to full-scale mass production, providing seamless PCB fabrication and assembly solutions all under one roof to significantly shorten turnaround times, enhance efficiency, and ensure consistently high-quality results.

PART 02

HIGH-QUALITY PCB ASSEMBLY

PCB Assembly Capabilities

- Support NPI prototypes to mass production.
- Offer flexible turnkey solutions, including customer-supplied, partial, or full assembly.
- Specialize in SMT, Thru-Hole, and hybrid assembly for single- or double-sided boards.
- Provide leaded and lead-free (RoHS-compliant) soldering for reliable, long-lasting connections.
- Support ultra-small passives (01005, 0201, 0402) and fine-pitch parts (0.25 mm) with 24 high-speed SMT lines.
- Offer optional PCBWay European SMT assembly services for EU customers, providing greater flexibility in lead time, logistics, and local support.

BGA Assembly Capabilities

As a full-scale manufacturer of PCB fabrication and assembly, PCBWay offers professional BGA assembly services as part of our comprehensive solutions. We deliver high-quality, cost-effective BGA assembly with precision and reliability. Our capabilities accommodate BGA packages with minimum pitches of 0.25mm and 0.3mm.

We offer PCB fabrication & assembly for various BGA types, including:

- Plastic BGA (PBGA)
- Ceramic BGA (CBGA)
- Micro BGA
- Micro Fine Line BGA (MBGA)
- Stacked BGAs
- Leaded and lead-free (leadless) BGAs

PCB Assembly Capabilities

No.	Category	Item	Parameter
1	PCB Size & Type	Board Dimension	Min: 10 × 10 mm (<10 × 10 mm requires panelization); Max: 510 × 460 mm
2		Board Thickness	0.4-4.0 mm; Sample: unlimited
3		Board Shape	No limit, irregular shapes must be panelized
4		PCB Types	Rigid; Flexible; Rigid-Flex; MCPCB; Rogers
5	Component Placement	Min SMD Size	01005 (inch)
6		Max SMD Size	45 × 45 mm (connector length up to 150 mm); Sample: unlimited
7		Mini BGA Pitch	0.25-2.0 mm
8		Min IC Pin Pitch	0.3 mm
9		Min BGA Ball Pitch	0.4 mm (min distance 0.1 mm)
10		Special Components	Long-lead & odd-form supported
11		Types of Assembly	THD; SMT; Mixed; 2-sided assembly; Box Build; Cable / Electro-Mechanical; LED; Coating / Potting
12	Soldering	Types of Solder	Leaded; Lead-Free (RoHS)
13		Solder Alloy	High: Sn 96.5, Ag 3.0, Cu 0.5; Medium: Sn 64, Bi 35, Ag 1.0; Low: Sn 42, Bi 58; Lead: Sn 63, Pb 37
14		Reflow Temp	138-245°C (depends on solder type)
15		Assembly Flow	SMT first, followed by DIP (mixed-process capable)
16	Equipment & Accuracy	Main SMT Machines	Auto Solder Paste Printer; Reflow Oven; Pick & Place; 3D SPI; AOI; X-Ray
17		Placement Accuracy	±0.35 mm @ 3σ (XY / Z)
18		Production Capacity	SMT: 1,000K points/day; DIP: 500K points/day; Sample Orders: 200/day
19	Inspection & Quality	Testing	X-Ray; AOI; Functional Testing
20	Parts & Sourcing	Component Support	Passive components (01005+); Fine-pitch ICs; BGA / uBGA; QFN; PoP; Connectors; Terminals
21		Parts Source	Consigned / Kitted; Turnkey; Partial Turnkey / Combo
22		Component Package	Reels; Cut Tape; Tube & Tray; Loose Parts & Bulk
23	Design	File Format	Gerber RS-274X; BOM (.xls / .csv / .xlsx); Centroid (Pick & Place / XY)
24	Production & Delivery	Order Quantity	1-10,000,000+
25		Turnaround Time	PCB Assembly: 1-5 days; Turnkey Assembly: 10-16 days

Customized Services and Advanced Options

01 Testing & Verification

- X-Ray Inspection - Non-destructive check of solder joints and components.
- Flying Probe Testing (FPT) - Precise testing for prototypes and high-density boards.
- Functional Test (FCT) - Final verification of PCB functionality and spec conformance.

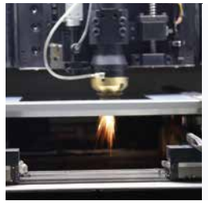
02 Firmware & Protection

- Firmware Loading - Pre-load chips with firmware to enable full functionality of your PCB.
- Conformal Coating - Protect against moisture, dust, chemicals, and temperature extremes.

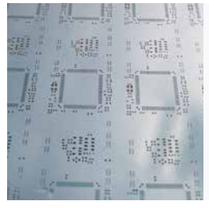
03 Assembly & Integration

- Box Build Assembly - Full system integration, including enclosure and PCBA installation.
- Electro-Mechanical Assembly - Integration of electronics, motors, and mechanical parts.
- Cable & Wire Harness Assembly - Custom harnesses for seamless device integration.
- Press-Fit Assembly - Precision solderless connections for automotive and industrial use.

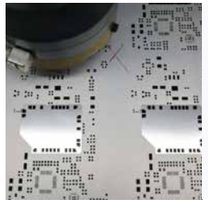
SMT Stencil



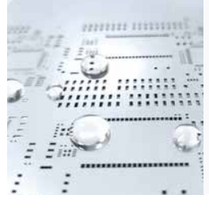
Laser-cut stainless steel stencils, available in framework or non-framework types.



Electropolished stencils provide smooth apertures for release on fine-pitch ICs/BGAs.



Fiducials with None, Half-Lasered or Lasered-Through options for precise positioning.



Optional nano-coating to effectively reduce clogging and boost printing precision.

To meet our customers' needs for customizing other components, we have expanded our service portfolio to include CNC machining, 3D printing, sheet metal fabrication, and injection molding. Combined with PCB production, this allows for seamless ordering of complete assemblies, saving time and speeding projects from concept to completion.

PART 03

HIGH-ACCURACY CNC | 3D PRINTING

CNC Machining

PCBWay offers high-precision CNC machining (metal and plastic parts). Our 3/5-axis milling + CNC turning handles complex geometries (±0.005"–±0.01" tolerances). Diverse materials and surface finishes ensure stable, consistent quality.

01 Quality Control

Pre-production Check
All designs are reviewed and optimized.

Material Assurance
Raw materials/surface treatments are tightly controlled.

Advanced Equipment
Modern machinery ensures precise manufacturing.

In-process Inspection
IPQC per ISO9001:2015; production after FAI approval.

Final QC
Every part is inspected; reports available on request.

Strict Management
Regular audits/testing ensure full compliance.

02 Advanced Equipment

CNC Machining Center
Model: Mazak VCN-530CL
Max Range/Travel:
1050 × 530 mm
Accuracy: ±0.003 mm

CNC Lathe
Model: Mazak QT150L-500
Max Range/Travel:
580 × 230 mm
Accuracy: ±0.005 mm

Wire-Cutting Machine
Model: Fangzheng DK7735
Max Range/Travel:
350 × 450 mm
Accuracy: ±0.015 mm

Laser Cutting Machine
Model: Bodor 3000 W
Max Range/Travel:
3000 × 1400 mm
Accuracy: ±0.1 mm

Bending Machine
Model: Suzhite 110T
Max Range/Travel: 3200 mm
Accuracy:
Length ±0.3 mm, Angle ±1°

Large Gantry CNC
Model: FOUR-STAR FD-1832
Max Range/Travel:
3000 × 1800 × 800 mm
Accuracy: ±0.02 mm

CNC Machining Metal Materials

No.	Metal Type	Tensile Strength	Yield Strength	Elasticity Modulus	Density	Temperature
1	Aluminum 6061	310 MPa	276 MPa	68.9 GPa	2.73 g/cm³	Melting: 580-650 °C
	Aluminum 7075	572 MPa	503 MPa	71.7 GPa	2.82 g/cm³	Melting: 475-635 °C
	Aluminum 5052	228 MPa	193 MPa	70.3 GPa	2.68 g/cm³	Melting: 607 °C
	Aluminum 2A12	470 MPa	205 MPa	68 GPa	2.8 g/cm³	Melting: 510-638 °C
2	Stainless Steel 304	515 MPa	205 MPa	193 GPa	7.93 g/cm³	Melting: 925 °C
	Stainless Steel 316/316L	620 MPa	310 MPa	205 GPa	8 g/cm³	Melting: 925 °C
	Stainless Steel 303	621 MPa	276 MPa	193 GPa	8.03 g/cm³	Melting: 1455 °C
	Stainless Steel 430	586 MPa	483 MPa	200 GPa	7.75 g/cm³	Melting: 870 °C
	Stainless Steel 201	685 MPa	292 MPa	197 GPa	7.86 g/cm³	Melting: 955 °C
3	Brass C360	140 MPa	165 MPa	97 GPa	8.5 g/cm³	Melting: 955 °C
4	Copper	200 MPa	880 MPa	115 GPa	8.96 g/cm³	Melting: 1084.5 °C
5	Titanium Gr5 (TC4)	950 MPa	880 MPa	113.8 GPa	4.47 g/cm³	Melting: 1600 °C
6	Mild Steel 1018	440 MPa	400 MPa	205 GPa	7.87 g/cm³	Melting: 1500 °C
	Mild Steel 1045	680 MPa	580 MPa	200 GPa	7.87 g/cm³	Melting: 1500 °C
	Mild Steel A36	550 MPa	290 MPa	200 GPa	7.85 g/cm³	Melting: 1500 °C
7	Alloy Steel 4140	1130 MPa	715 MPa	210 GPa	7.85 g/cm³	Melting: 1416 °C
	Alloy Steel 4340	820 MPa	525 MPa	213 GPa	7.85 g/cm³	Melting: 1427 °C
	Alloy Steel 1215	540 MPa	415 MPa	210 GPa	7.87 g/cm³	Melting: 1500 °C
8	Tool Steel D2	2500 MPa	2290 MPa	215 GPa	7.695 g/cm³	Melting: 195-245 °C
	Tool Steel A2	2360 MPa	2140 MPa	219 GPa	7.861 g/cm³	Melting: 195-245 °C
	Tool Steel O1	2360 MPa	2140 MPa	219 GPa	7.833 g/cm³	Melting: 165-215 °C
	Tool Steel A3	2380 MPa	2100 MPa	203 GPa	7.86 g/cm³	Melting: 1400 °C
	Tool Steel S7	2200 MPa	2050 MPa	215 GPa	7.833 g/cm³	Melting: 165-215 °C
	Tool Steel H13	1590 MPa	1380 MPa	215 GPa	7.8 g/cm³	Melting: 1400 °C
9	Spring Steel	980 MPa	785 MPa	207 GPa	7.8 g/cm³	Melting: 1400 °C

CNC Machining Plastic Materials

No.	Plastic Type	Tensile Strength	Yield Strength	Elasticity Modulus	Density(g/cm³)	Temperature
1	ABS	28.3 MPa	40 MPa	2.10 GPa	1.04	HDT: 81 °C (@264 psi)
	ABS Flame Retardant	37.9 MPa	45 MPa	2.28 GPa	1.04	HDT: 88 °C (@264 psi)
	ABS Transparent	37.9 MPa	45 MPa	2.28 GPa	1.04	HDT: 88 °C (@264 psi)
2	Polycarbonate (PC)	72.4 MPa	70 MPa	2.44 GPa	1.2	MCST: 144 °C
3	Nylon 6	79.1 MPa	63.8 MPa	1.97 GPa	1.084	MCST: 130 °C
	Nylon 12	31 MPa	50 MPa	1.6 GPa	1.01	HDT: 113 °C
4	Polypropylene (PP)	33 MPa	32 MPa	1.6 GPa	0.855	MCST: 130 °C
5	POM	89.6 MPa	72.4 MPa	4 GPa	2.2	MCST: 96.9 °C
6	PTFE (Teflon)	31 MPa	41.4 MPa	2.25 GPa	2.2	MCST: 270 °C
7	PMMA	83 MPa	80 MPa	3.3 GPa	1.2	MCST: 80 °C
8	Polyethylene (PE)	31 MPa	31 MPa	1.09 GPa	0.96	MCST: 129 °C
9	PEEK	103 MPa	95 MPa	3.95 GPa	1.3	MCST: 260 °C
10	Bakelite	50 MPa	70 MPa	3 GPa	1.3	MCST: 100-150 °C
11	FR4	415 MPa	400 MPa	24 GPa	1.850	MCST: 140 °C
12	Rubber	165 MPa	145 MPa	20 GPa	0.700 - 3.80	MCST: -50-120 °C
13	Carbon Fiber Plate	3000 MPa	500 MPa	200 GPa	1.6	MCST: 80-200 °C

* **Custom Sourced Materials:**
If your material is not listed, select "Custom" on the quote page and submit your requirements for expert review.

CNC Machining Standards

No.	Limits for nominal size	Plastics Coarse Class (c)	Metals Medium Class (m)
1	0.5-3 mm	±0.2 mm	±0.1 mm
2	3-6 mm	±0.3 mm	±0.1 mm
3	6-30 mm	±0.5 mm	±0.2 mm
4	30-120 mm	±0.8 mm	±0.3 mm
5	120-400 mm	±1.2 mm	±0.5 mm
6	400-1000 mm	±2.0 mm	±0.8 mm
7	1000-2000 mm	±3.0 mm	±1.2 mm
8	2000-4000 mm	±4.0 mm	±2.0 mm

Sheet Metal Fabrication

Sheet metal fabrication shapes metal into precise parts through bending, stretching, and cutting.
At PCBWay, we produce enclosures, brackets, assemblies, and other components with fast, reliable delivery for prototypes or bulk batches. Ideal when form, fit, and function matter.

01 Advantages

Fast Turnaround
Quotes and parts ready in as fast as 5 business days.

Wide Material Selection
Diverse options with varying strength, conductivity, weight, and more.

Durable & Reliable
Suitable for both functional prototypes and end-use products.

Scalable Production
From a single prototype to 10,000 parts for mass production.

Custom Surface Finishes
Anodizing, plating, powder coating, painting, and more.

Cost Effective
Low tooling and preparation costs for economical production.

Process	Sheet Thickness
Laser Cutting	0.5-10 mm
Bending	0.5-6 mm

Process	Tolerance
Cutting	±0.2 mm (0.0078")
Bend Angle	±1°
Bend to Edge	±0.254 mm (0.010")

Surface Finish	Description	Thickness / Notes	Color Options
Standard	Minimal post-processing or treatment	-	-
Bead Blast	Uniform matte surface	#120 grit	Material color
Anodized (Type II / III)	Matte finish	#120 grit	Material color
Bead Blast + Anodizing (Type II)	Matte + anodized	8-12 µm (clear), 4-8 µm (color)	Black, clear, or any RAL / Pantone
Powder Coat	Protective coating	18-72 µm	Black or any RAL / Pantone
Chem Film (Chromate Conversion Coating)	Corrosion resistance, good conductivity, base for paint	Very thin (~0.00001"-0.00004")	-

02 Leadtimes

- Prototypes: 1-50+ parts in ~4 days
- Low-Volume Production:
  50-1,000+ parts in ~10 days
- Multipart Assemblies:
  2-3 weeks, including custom/catalog parts

03 Industries

- Automotive
- Industrial Machinery
- Medical & Dental
- Aerospace & Aviation
- Consumer Electronics

3D Printing

PCBWay provides high-precision 3D printing with FDM, SLA, SLS, and SLM technologies, enabling complex geometries and custom designs. Engineering-grade plastics and metals allow strong, lightweight parts with tailored properties. CAD or STL files can be reprinted on demand, supporting fast iterations and consistent quality.

3D Printing Standards

No.	Process	Tolerance
1	SLA	L<100 mm, ±0.2 mm; L>100 mm, ±0.2%*L (mm)
2	DLP	L<100 mm, ±0.1 mm; L>100 mm, ±0.1%*L (mm)
3	SLS	L<100 mm, ±0.25 mm; 100< L<200 mm, ±0.3 mm; 200< L<500 mm, ±0.5 mm. L>500 mm, ±0.1%*L (mm)
4	MJF	L<100 mm, ±0.25 mm; L>100 mm, ±0.25%*L (mm)
5	SLM	L<100 mm, ±0.3mm; L>100 mm, ±0.3%*L (mm)
6	FDM	L<100 mm, ±0.2mm; L>100mm, ±0.2%*L (mm)

3D Printing Technologies & Materials

Tech	Type	Name	Tensile Strength	Bending Strength	Density / Bulk Density	Particle Diameter
SLM	Aluminum	Aluminum (AlSi10Mg)	330 MPa	245 MPa	1.45 g/cm³	15-53 μm
	Stainless Steel	Stainless Steel 316L	560 MPa	480 MPa	3.9 g/cm³	15-53 μm
	Titanium	Titanium TC4	600 MPa	540 MPa	2.5 g/cm³	15-53 μm
	Tool Steel	Tool Steel	1090 MPa	1000 MPa	4.3 g/cm³	15-53 μm

No.	Tech	Category	Name	Tensile Strength	Tensile Modulus	Break Elongation	Density	Temperature
1	FDM	ABS	ABS	28.3 MPa (4100 psi)	2096 MPa	20-25%	1.04 g/cm³	MCST: 71 °C
			Stratasys ABS-ESD7	36 MPa	2400 MPa	3%	1.3 g/cm³	HDT: 96 °C (@66 psi)
		PETG	PETG	34 MPa (XY) / 23MPa (Z)	1810 MPa(XY) / 1540 MPa(Z)	100-200%	1.28 g/cm³	HDT: 62 °C
			PETG-CF	35 MPa (X) / 29 MPa (Z)	2460 MPa (X) / 1340 MPa (Z)	1.5-3%	1.25 g/cm³	Melting: 225 °C
		PC	PC (Polycarbonate)	72.4 MPa	2440 MPa	50-120%	1.2 g/cm³	MCST: 144 °C
		PEEK	PEEK	118 MPa	3950 MPa	30-150%	1.3 g/cm³	MCST: 163 °C

3D Printing Technologies & Materials

No.	Tech	Category	Name	Tensile Strength	Tensile Modulus	Break Elongation	Density	Temperature
1	FDM	PPS	PPS-CF	87 MPa (X) / 24 MPa (Z)	8230 MPa (X) / 2850 MPa (Z)	0.8-1.5%	1.26 g/cm³	Melting: 284 °C
		TPU	TPU (FDM)	27 MPa (X) / 22 MPa (Z)	27-72 MPa (Flexural)	650% (X) / 480% (Z)	1.3 g/cm³	Melting: 180 °C
		PLA	PLA	40-60 MPa	3500 MPa	4-10%	1.3 g/cm³	Melting: 185 °C
			PLA-CF	38 MPa (X) / 26 MPa (Z)	2790 MPa (X) / 2160 MPa (Z)	4-10%	1.22 g/cm³	Melting: 165 °C
2	SLA	Resin	Standard white material (UTR 8360)	53.7 MPa	3160 MPa	5.10%	1.3 g/cm³	HDT: 59.1 °C (@0.45 MPa)
			UTR Imagine Black	53.7 MPa	3160 MPa	5.10%	1.3 g/cm³	HDT: 59.1 °C (@0.45 MPa)
			UTR-8100 (Transparent)	41.56 MPa	1740.56 MPa	9%	1.3 g/cm³	HDT: 52 °C (@0.455 MPa)
			PWR Dark Black	38-56 MPa	2589-2695 MPa	12-20%	1.3 g/cm³	HDT: 60-70 °C (@66 psi)
			UTR-8100 (Translucent)	41.56 MPa	1740.56 MPa	9%	1.3 g/cm³	HDT: 52 °C (@0.455 MPa)
			Somos® Ledo	52.3 MPa	2600 MPa	11%	1.3 g/cm³	HDT: 58 °C (@0.455 MPa)
			UTR 8220	51.21 MPa	2136 MPa	16%	1.3 g/cm³	HDT: 58 °C (@0.455 MPa)
			Somos® Taurus	46.9 MPa	2310 MPa	24%	1.3 g/cm³	HDT: 86 °C (@0.455 MPa)
			UTR 3000	45.1 MPa	2455 MPa	5.80%	1.3 g/cm³	HDT: 50.2 °C (@0.45 MPa)
			UTR Therm	47.2 MPa	3235 MPa	1.50%	1.3 g/cm³	HDT: 101.9 °C (@0.455 MPa)
			Somos® EvoLVe 128	35 MPa	2200 MPa	6-9%	1.3 g/cm³	HDT: 46 °C (@0.455 MPa)
			Somos® PerFORM	68 MPa	10000 MPa	1.10%	1.3 g/cm³	HDT: 276 °C (@0.455 MPa)
			Formlabs ESD Resin	44.2 MPa	1937 MPa	12%	1.3 g/cm³	HDT: 62.2 °C (@0.45 MPa)
3	DLP		TDS EvoDent	30 MPa	1255 MPa	25%	1.16 g/cm³	HDT: 90 °C (@0.45 MPa)
			UTR Flex	50 MPa	2880 MPa	25%	1.3 g/cm³	HDT: 90 °C (@0.45 MPa)
4	MJF	Nylon	HP-PA12	48 MPa (XY/Z)	1800 MPa (XY/Z)	20% (XY) / 15% (Z)	1.01 g/cm³	HDT: 175 °C(@ 0.45 MPa)
5	SLS		PA12	47 MPa	1900 MPa	19%	1.3 g/cm³	HDT: 150 °C
			Glass Fiber Nylon (PA12+35% GF)	45 MPa	2600 MPa	6.70%	1.3 g/cm³	HDT: 153 °C
		TPU	TPU	20 MPa (X) / 15 MPa (Z)	27-72 MPa (Flexural)	270% (X) / 130% (Z)	1.4 g/cm³	Melting: 180 °C

Injection Molding

Injection molding, with high precision, repeatability, and cost efficiency at scale, is used to make products ranging from tiny medical inserts to large automotive parts.

Advantages

- **Various Materials:** 100+ standard and customizable plastics.
- **Scalable Production:** Support for 1-500,000+ parts.
- **Rapid Turnaround:** Molds ready in 15 days, parts shipped in 1-15 days.
- **High Surface Quality:** CNC-milled and polished molds, customizable finishes.

Limitations:

- Less affordable small-batch startup cost vs. CNC/3D Printing.
- Interlocking and hollow structures: hard to one-piece produce.

Vacuum Casting

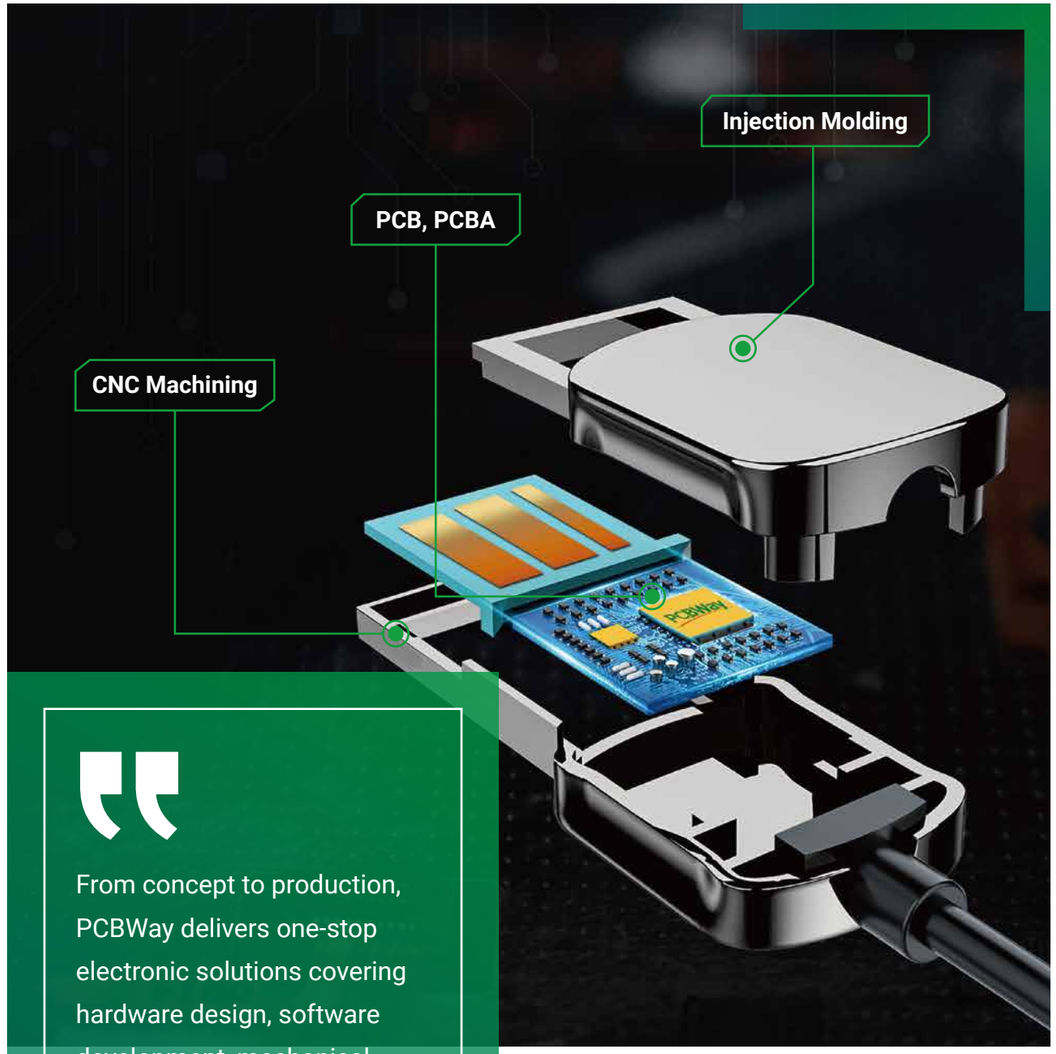
Vacuum casting uses a vacuum to fill elastomer molds, avoiding air entrapment and suiting intricate details/undercuts or fiber/reinforced wire molds.

Advantages

- **High Quality:** Flexible resin materials with excellent surface finish.
- **High Precision:** Captures complex geometries accurately.
- **Fast Turnaround:** ~50 parts in 7-10 days, great for tight deadlines.
- **Cost Efficient:** Lower expenses with affordable, high-yield silicone molds.

Limitations:

- Ideal for prototypes and small batches.
- Not suitable for mass production.



> From concept to production, PCBWay delivers one-stop electronic solutions covering hardware design, software development, mechanical design, product testing, and certification. With our “1+N” model of self-owned and partner factories, supported by a complete manufacturing and supply-chain system, you can enjoy consistent quality and on-time delivery.

PART 04

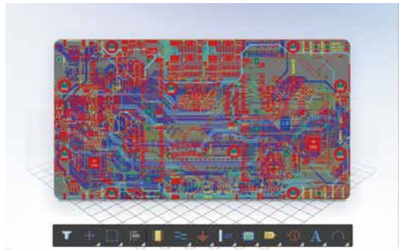
FULL-SCALE EMS | OEM

Turnkey Electronic Design

PCB Layout

Support 100,000+ pins layout design

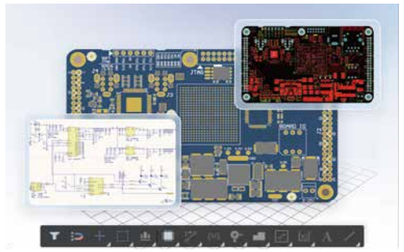
- Stack-up design
- Controlled impedance
- Rigid, Flex, HDI, High-speed, Power PCB design
- Up to 64 Layers



PCB Design

Electronic design, firmware development

- Professional engineer team
- From concept to product development
- Exceptional cost control
- End-to-end solutions from design to test



Mechanical & Enclosure Design

Professional mechanical design solutions

- Experienced engineering Team
- Rapid design turnaround
- End-to-End solutions
- Comprehensive production support

Our Design Service Workflow

1 Requirement Analysis
Understand customer needs (functions, cost, timelines, etc.) to develop a plan.

2 Schematic Design
Develop circuit schematics, perform simulations, and optimize circuit performance if needed.

3 PCB Layout
Design layout and routing, considering signal integrity, thermal management, and EMC compliance, etc.

4 Review & Optimization
Conduct design reviews, refining the design based on review results.

5 Prototyping & Testing
Build prototypes and perform functional, performance, and reliability tests.

6 Support & Maintenance
Provide production files, technical support, and assist customers with mass production.

OEM Success Cases

“ Fengmi Stepless Frequency Conversion Intelligent Fan ”

Scope of Contract:
Appearance design, structural design, case design, mold and substrate manufacturing, parts distribution, harness processing, assembly, and final inspection.

From R&D to mass production, this fan took **just 5 months**. As a strategic partner of the Fengmi brand, PCBWay not only handles the fan's **material procurement and overall production,** but also manages its **intelligent upgrading**.

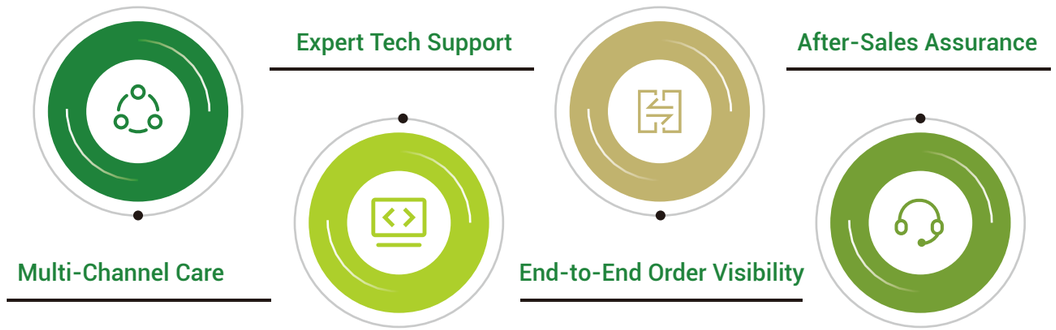
“ PCB + PCBA Solution for Single Phase Smart Electric Meter ”

Scope of Contract:
Design, board manufacturing, mounting, parts procurement, assembly, inspection, technical advice.

PCBWay successfully **addressed the global chip shortage** by redesigning and adapting TI chips to YAGEO equivalents, **reducing PCB and PCBA costs by 20% while meeting the project deadline**. We delivered 10 fully functional samples to the client within 30 days.

Customer Support & After-Sales Service

PCBWay delivers high-quality products backed by reliable and efficient customer service, ensuring a seamless experience for engineers and enterprise clients.



01 Multi-Channel Care

- 24/7 Online Assistance:
  Real-time support for design, manufacturing, and order inquiries.
- Multilingual Service:
  Multilingual support available in English, Spanish, French, and Japanese.
- IP Protection:
  NDA options are available to safeguard your intellectual property and confidential designs.

02 Expert Tech Support

- Free DFM:
  Professional engineers identify manufacturability risks before production.
- Engineering Guidance:
  Practical recommendations to improve product reliability and production feasibility.

03 End-to-End Order Visibility

- Instant Online Quotes:
  Upload your design to receive pricing and lead-time information instantly.
- Real-Time Tracking:
  Full order production status visible online, with total transparency guaranteed.

04 After-Sales Assurance

- Customer Remedies:
  Returns or refunds are available for problematic orders.
- Fast Response:
  All after-sales inquiries are addressed within 24 hours.
- Customer Satisfaction First:
  Continuous feedback collection and improvement for seamless customer experience.

Green Development Commitment

As sustainability becomes a core responsibility in PCB manufacturing, PCBWay embraces a green philosophy, applying eco-friendly practices to create a better future for both customers and the planet.

01 Green Factory

- Automation and smart inspection improve efficiency and reduce waste.
- Lead-free soldering and eco-friendly solder mask inks comply with RoHS/REACH.
- Uses halogen-free materials and flame retardants, reducing harmful gas emissions.

02 Zero Wastewater Discharge

- Over 80% of production water is reused.
- Copper, nickel, and gold recovered from wastewater for reuse.
- RO, ultrafiltration, and nanofiltration ensure the discharge meets standards.

03 Emission Control

- Eco-friendly solder mask and UV curing inks reduce harmful gas emissions.
- Activated carbon combined with plasma treatment achieves over 95% VOC removal efficiency.
- Residual heat from emissions is recovered for factory heating, lowering energy consumption.

04 Zero Solid Waste

- High-purity copper recovered from etching waste is reused.
- Waste boards converted into composite materials through high-temperature pyrolysis and mechanical grinding.

05 Eco-Friendly Logistics

- Optimized routes and DHL GoGreen (since 2025) reduce supply-chain carbon emissions.