Special PCB Product Introduction

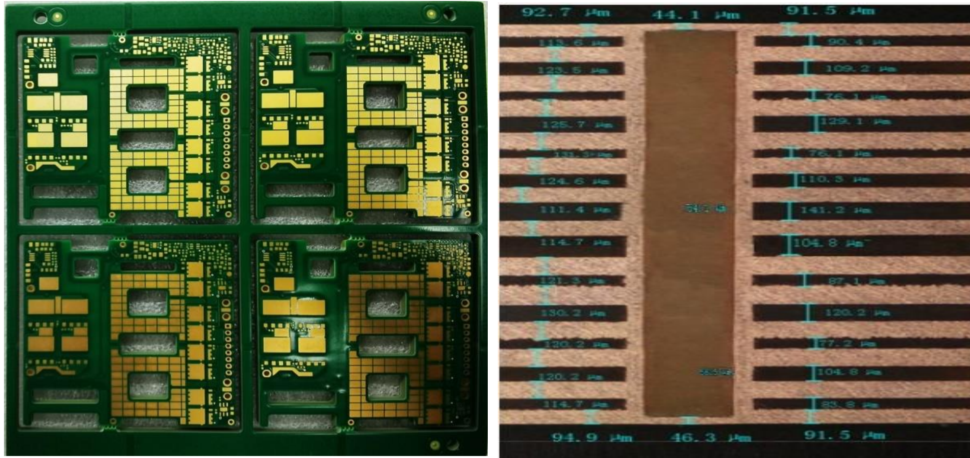
2024.12

UG PCB/PCBA

1. Heavy Copper
2. Inlaid Coin
3. Optical Module
4. Millimeter Wave
5. High Speed
6. HDI
7. Step Board
8. Rigid & Flex
9. Buried Resistor
10. Buried Capacitor
11. Step Copper Thickness
12. Backdrill
13. Multi-color SM
14. Oversize
15. Wafer Plate
16. Partial Heavy Gold Plating
17. Special Impedance Tolerance
18. High-frequency Mixed-pressure Half-inlaid Coin

01 Heavy Copper

Heavy Copper



Multilayer +Heavy copper+50um Hole wall copper

- Twice lamination, Inner Layer with 4oz, Blind via resin filling
- Blind via & through via +wall copper 53um min
- Inner layer Hole to trace 8mil, outer layer line width/space: 10mil/8mil
- Board thickness 3.9mm, Minimum hole 0.4mm, Aspect Ratio 9.8:1

Production Challenges

- Inner Layer + Lamination alignment accuracy control
- Lamination dielectric thickness control, voltage endurance measurement control
- POFV via wall copper thickness uniformity control
- Press-fit hole, Back drilling precision control
- Etching Impedance line width precision control

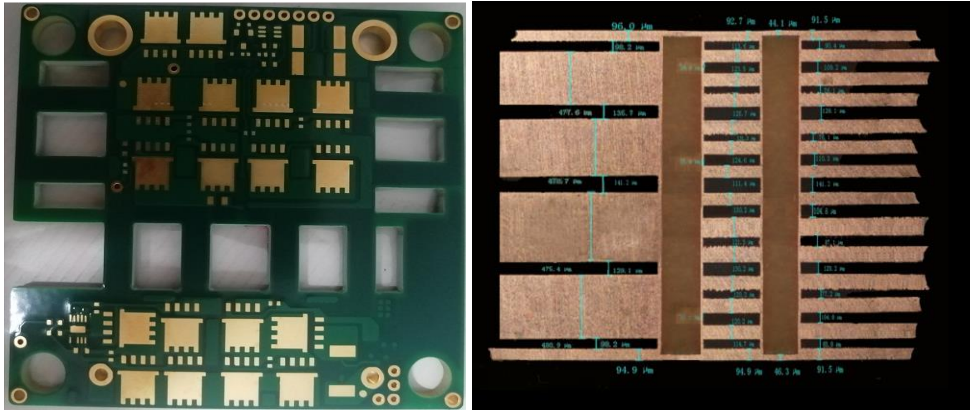
Technical Capability

Cu	3OZ	4OZ	5OZ	6OZ
Batch (W/S) mil	8/8	10/10	13/13	16/16
Sample(W/S) mil	7.5/7.5	9.5/9.5	12/12	15/15

Ultimate Capability 12 oz max;
Above 12oz, the resin filling process is used.

02 Inlaid Coin

Inlaid Coin

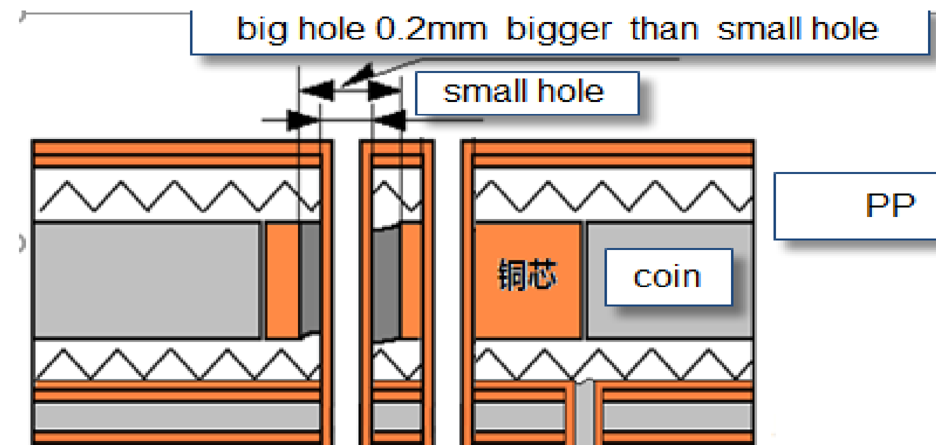


Production Challenges

- Accuracy of the second lamination and riveting
- Control of drilling expansion and shrinkage ratio
- Fullness of copper paste
- Attention to positioning of Inlay coin and drop after Inlay
- Electroplating control parameters using low current plating and confirmation with cross-section analysis

14-layer partial inlay with 0.5mm thickness coin

- 4OZ for inner layer, 2OZ for outer layer
- Twice lamination
- Minimum hole 0.4mm, copper paste filling
- Inlaid with 0.5mm thick coin between layers L2-L4, L5-L7, L8-L10, L11-L13
- POFV via hole wall copper 25um min, through via hole wall copper 30um min

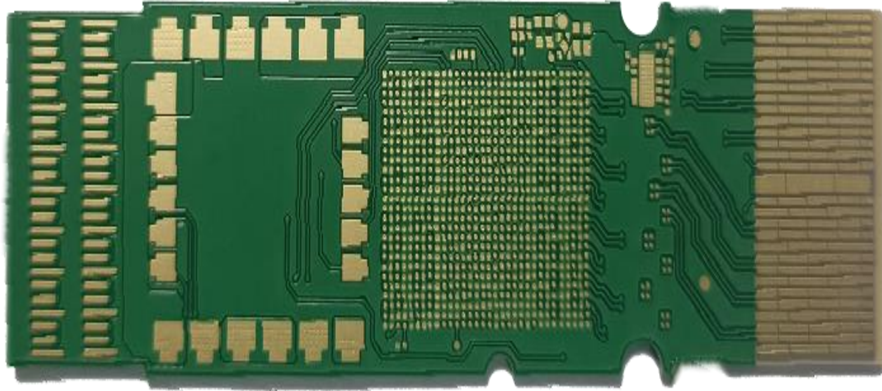


UG PCB/PCBA

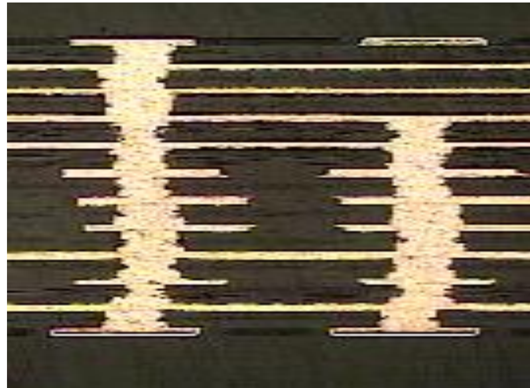
03 Optical Module

UG PCB/PCBA

Optical Module



Material	IT988GSE
Trace Width/Space	4/3mil
Hole to Line	6mil
Minimum Hole	0.15mm



Cross-section for HDI Stacked microvias

Segmented fingers

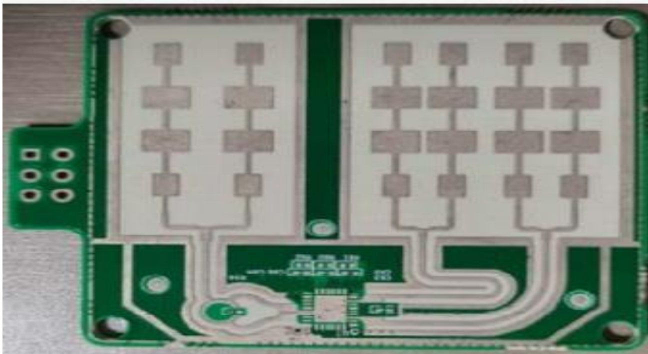
Aspect Ratio	5.4:1
Finish	ENIG + Plating Gold
Others	5 step HDI POFV Segmented fingers

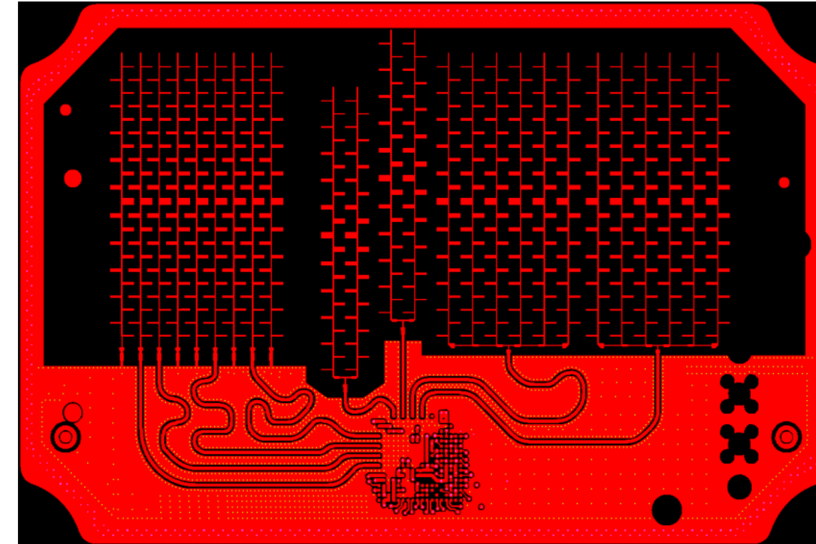
04 Millimeter Wave

Millimeter Wave

Applications: Inductive automatic control
Distance measurement and collision avoidance

Emission frequency: 24GHz
Beam width: 97°*44°
Detecting Distance: 20m
Pin: UART
Size: 35X30X1.2(LxWxH) mm





Product Application: Rear-mounted Radar for Large Vehicles
Layer: 6L
Material: RO3003G2+FR4
Structure : Buried via L3-L6, laser via L1-2 & L5-6
Laser via: 6mil (0.15mm)
Space between laser via: 3.64mil (0.092mm)
Finish: OSP
Special Technique: Partial thin copper technology
Detecting Distance: 70m

UG
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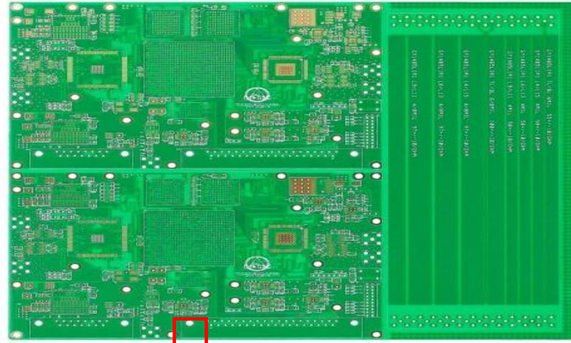
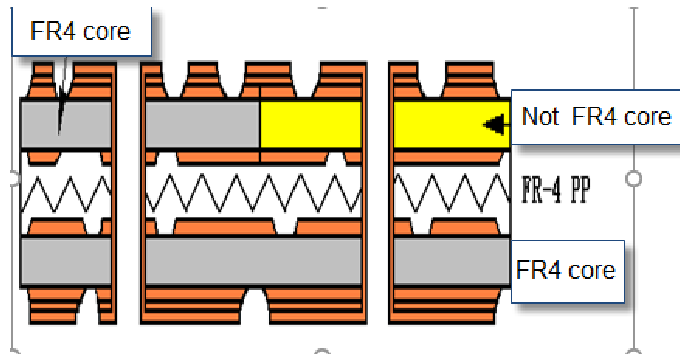
05 High-frequency Mixed-pressure Half-inlaid Coin

High-frequency Mixed-pressure Half-inlaid Coin

Front



Side



4L Partial Mixed Pressure

Material: FR4+R04350
Board Thickness: 1.6 MM
Difficulty: Lamination resin filling, Joint flatness

主要材料信息 Primary material		
类型 kind	型号 type	供应商 supplier
特种材料（高频）High-frequency	S7136	广东生益 Shengyi
	RO3003	Rogers
	RO3010	
	RO4003	
	RO4350	
	RO5880	
	RO6002	
	RO6010	
	RF35	Taconic
	TLX-7	
	TLX-8	
	TLX-9	
	TLY-5	

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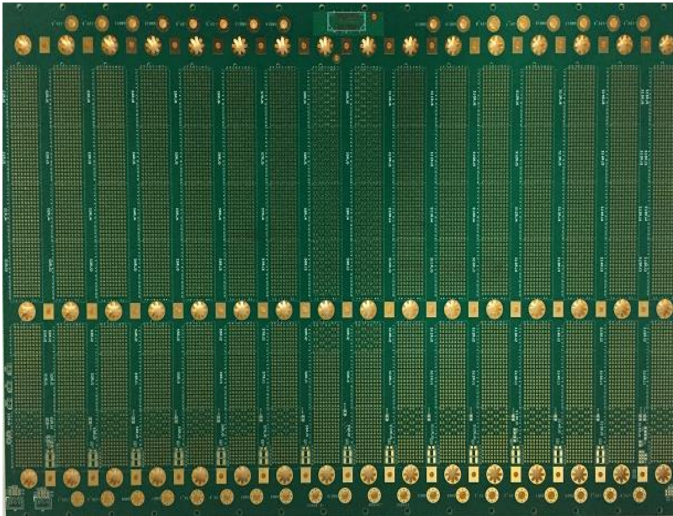
06 High Multilayer Backdrill

UG PCB/PCBA

High Multilayer Backdrill



Backdrill Capability

Item	Sample	Batch
Board Thickness(mm)	10	6
Layer	32	30
Accuracy (mm)	+/-0.05	+/-0.075
Max Dimension (mm)	600*1200	600*800
Aspect Ratio	10: 1	8:1

Layer: 24

Board Thickness: 5.4mm

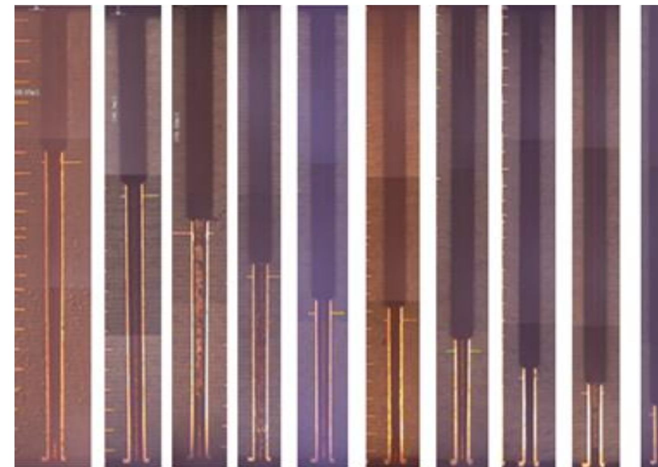
Dimension: 415X 362mm

Minimum Hole: 0.45mm

Aspect Ratio: 12： 1

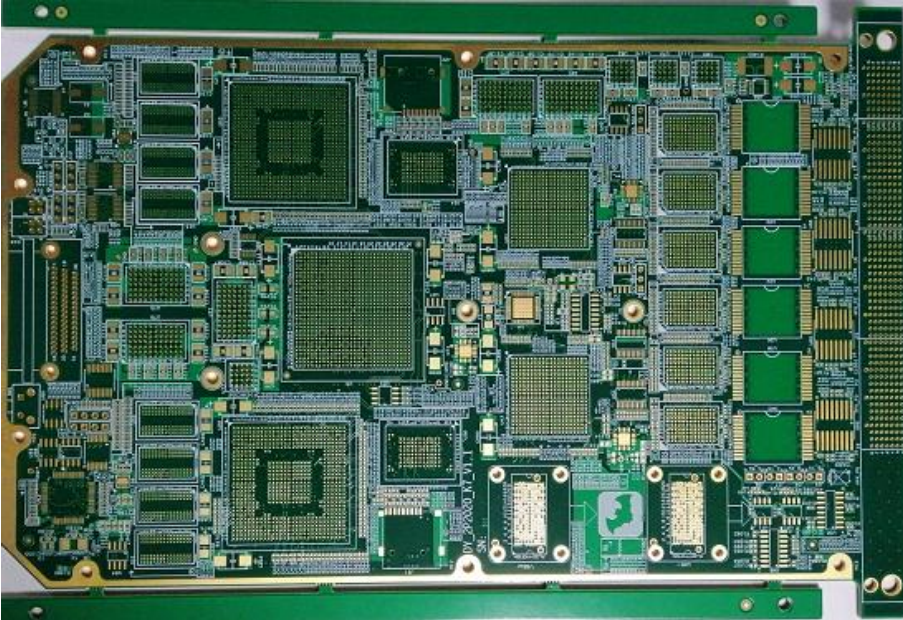
Backdrill Capability: ±0.10mm (Limit +/-0.05mm)

Others: Backdrill, POFV



07 High Speed Board

High Speed Board



Technology Characteristic

Layer: 24
Material: TU872SLK
Line Width /Space: 4/3.5mil
Minimum Hole: 0.25mm
Board Thickness: 3.0mm
Aspect Ratio: 12 : 1
Inner Hole to Line: 6.8mil
Other Technology: Backdrill, Press-fit (Tolerance :+/-0.04mm)

High Speed Board

To ensure the integrity of high-speed signal transmission on the transmission lines, the PCB fabrication process, including material selection, stack-up matching, routing, and impedance control, all require strict control.

08 HDI Board

HDI Board

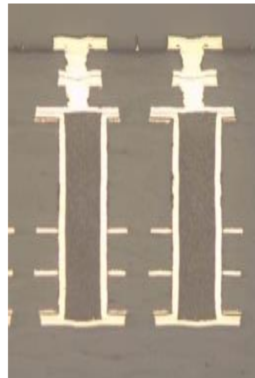
10L HDI

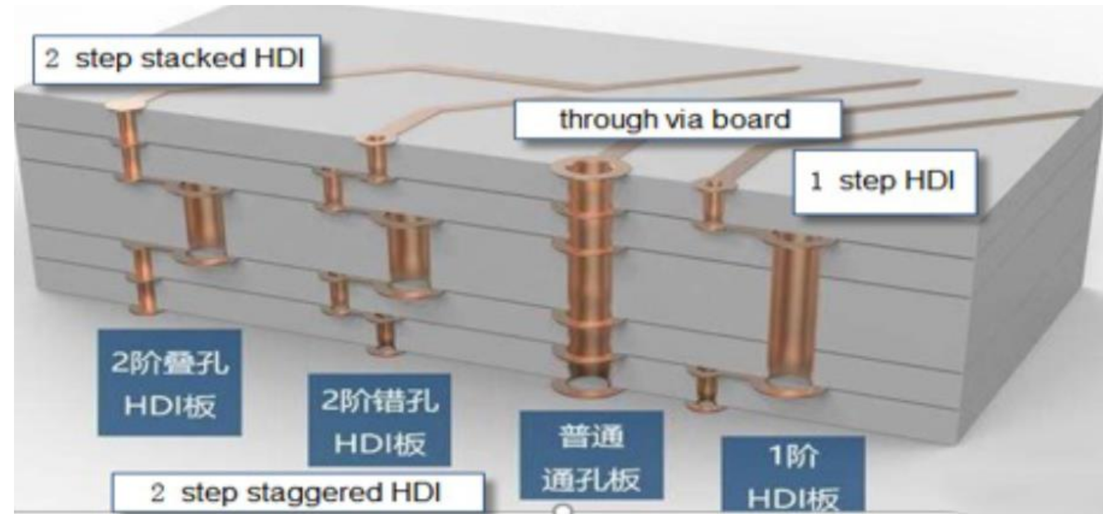
Material: FR4+RCC

Board Thickness: 1.6mm

Laser Dielectric Layer: 70um (1080*1)

Laser Via: 4 mil



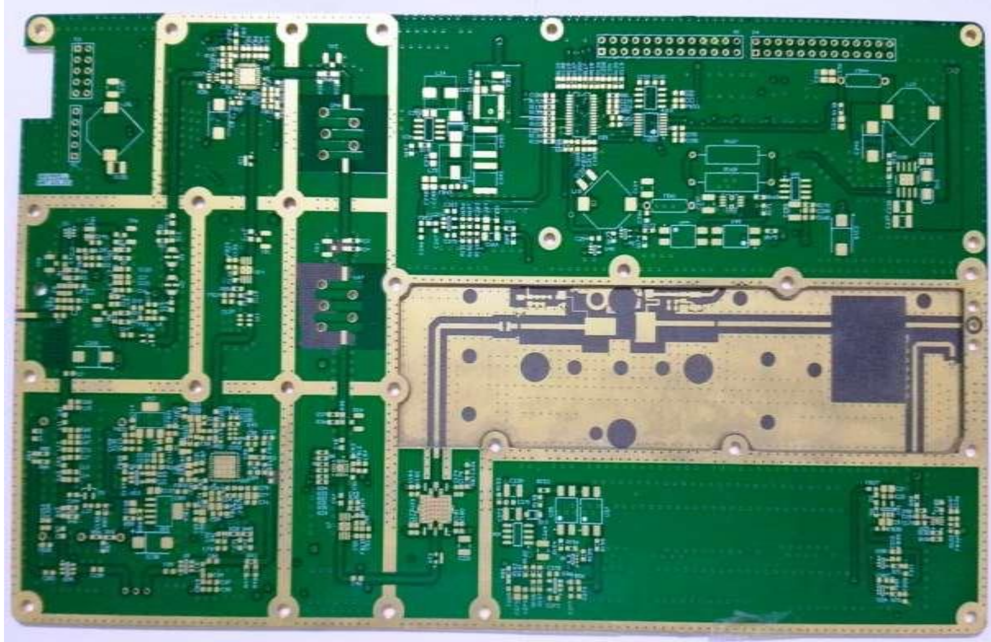


Each additional step of microvias adds an extra cycle of copper reduction, resin filling, and lamination, which increases the process complexity and production cycle.

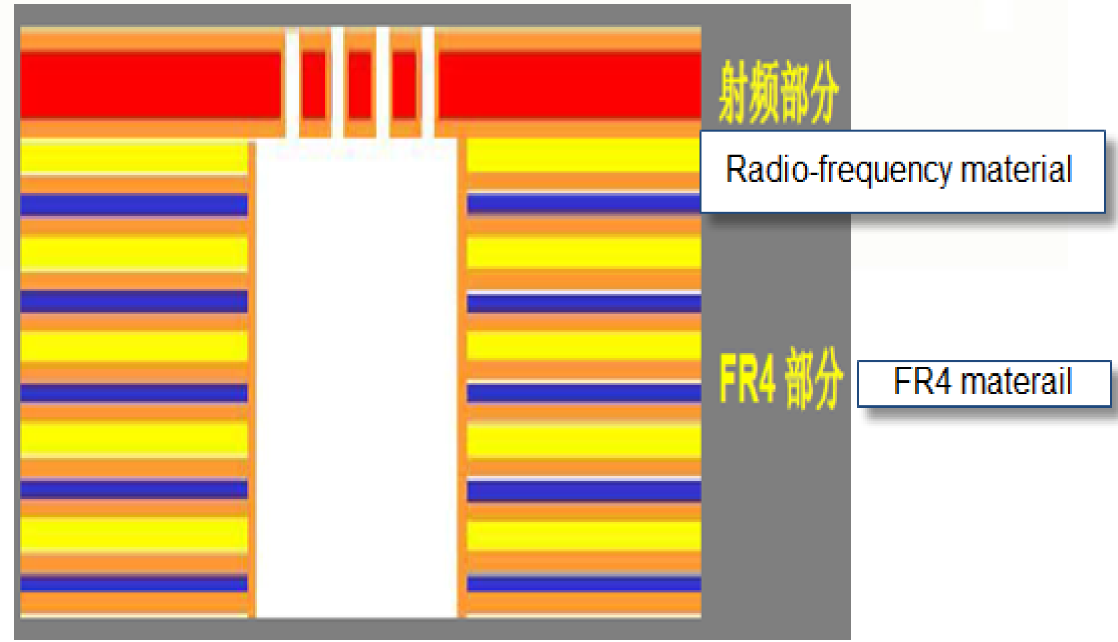
- Accumulated alignment errors between layers can lead to interlayer short
- Uneven copper thickness due to multiple copper reduction processes can affect the quality of the circuit etching
- Technical Capability: 1 step hole to line 8mil min; 2 step hole to line 10 mil min; 3 step hole to line 12 mil min; we can do batch with max 3 step HDI. It is not recommended to design for 4 step HDI

09 Step Board

Step Board



Radio-frequency material +FR4 with step

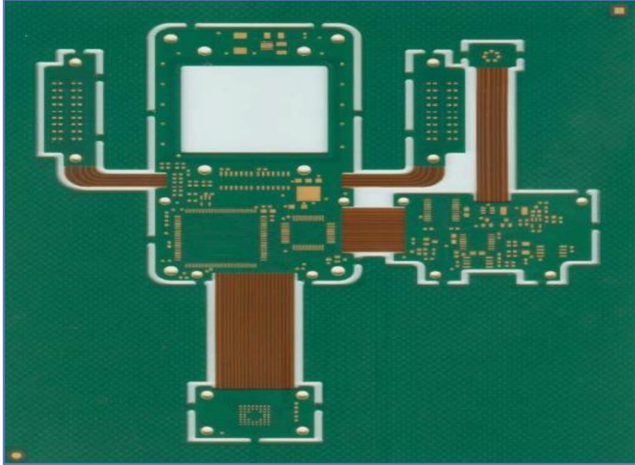
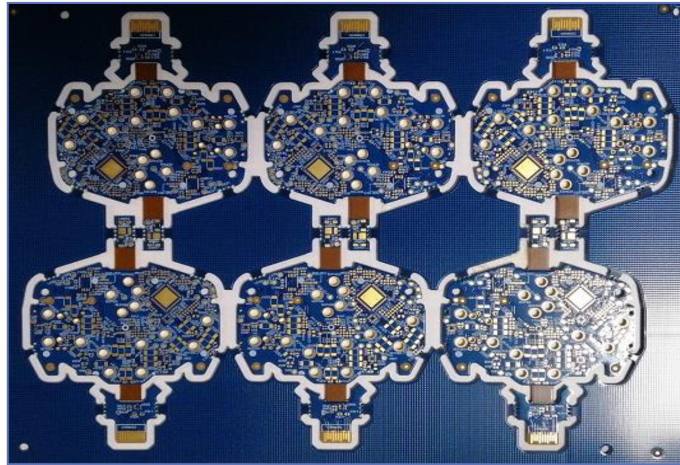
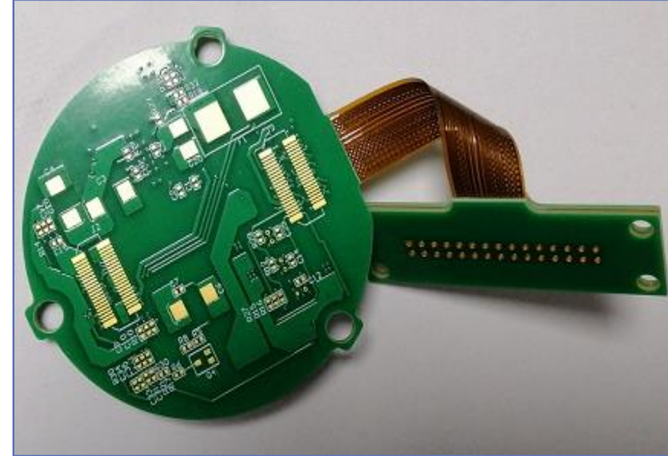
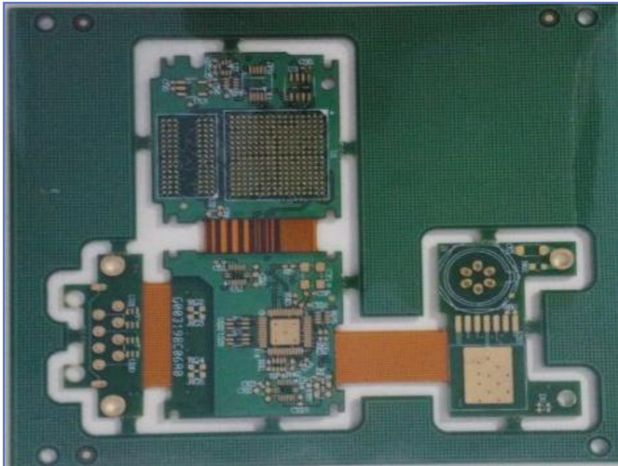
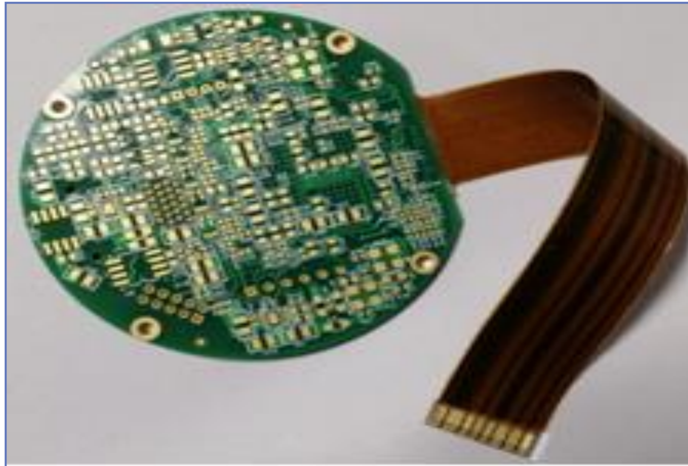
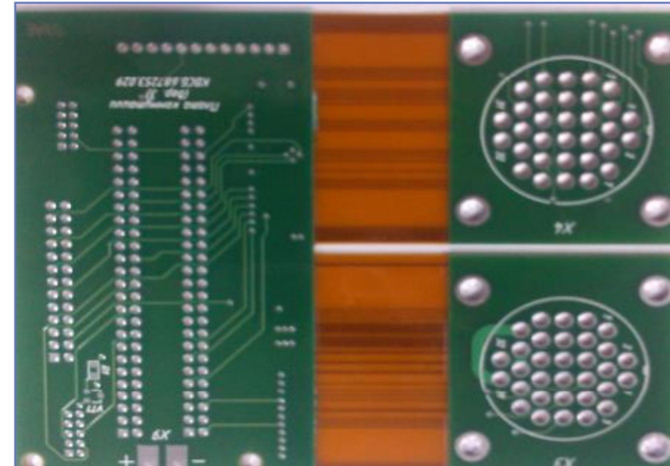


Technology Characteristic

- Mixed-pressure
- Depth rout & drill
- Positive and reverse routing
- Resin flow control

10 Rigid & Flex

Rigid & Flex

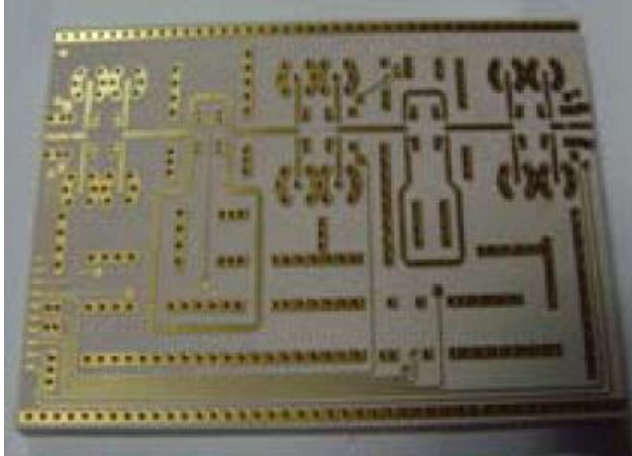







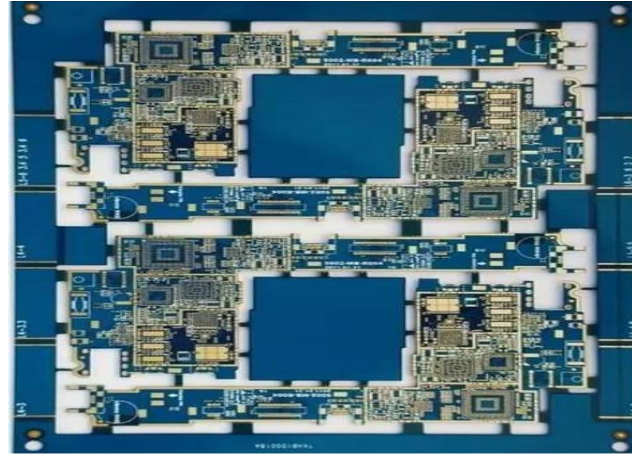
The rigid-flex board is a system module composed of rigid circuit boards connected by flexible boards. It not only replaces the wire and cable connections between endpoints of rigid circuit boards but also can carry the functionality of components with rigid circuits.

UG PCB/PCBA

11 Buried Resistor

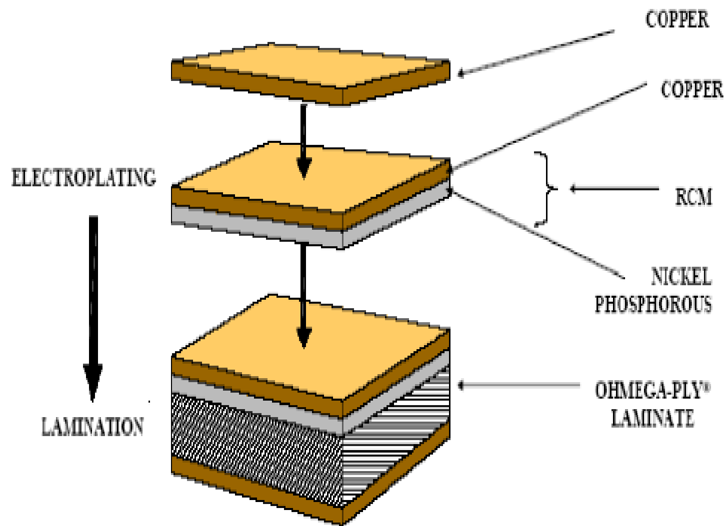
Buried Resistor





Buried Resistor PCB

Layer: 8
Board Thickness: 1.6mm
Surface Finish: ENIG



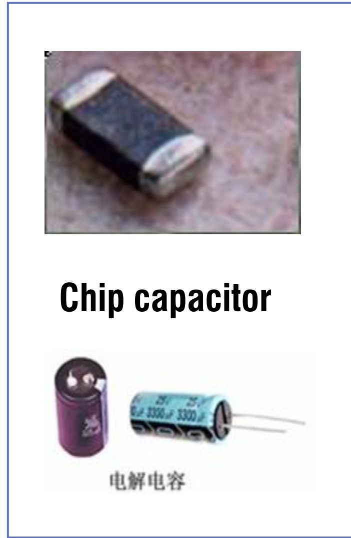
Ohmega-ply (Ni\P)

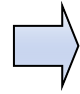
Sheet Resistance	Thickness of Resistor Layer	Thickness of Copper (OZ)
25 Ω	0.4 µm	0.5 1 2
50 Ω	0.2 µm	0.5 1 2
100 Ω	0.1 µm	0.5 1 2
250 Ω	0.05 µm	0.5 1 2

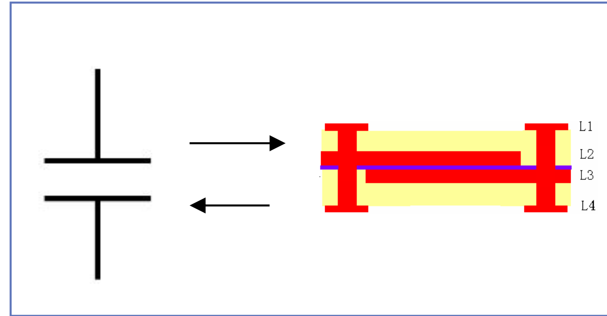
UG PCB/PCBA

12 Buried Capacitor

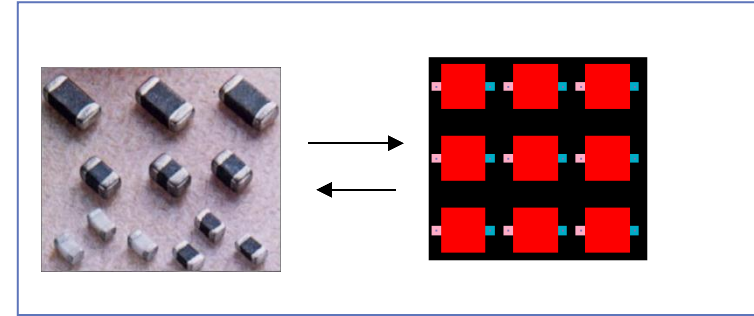
Buried Capacitor







Individual buried capacitor

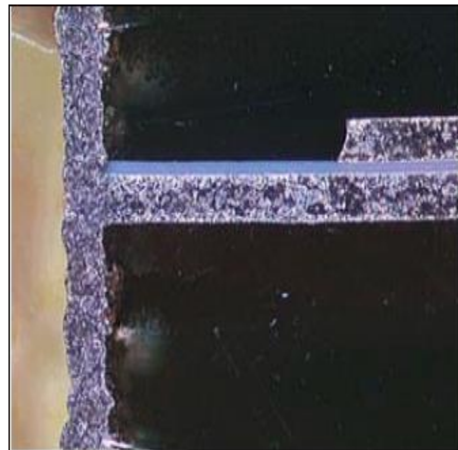


Capacity group buried capacitor

Plug capacitor

Capacitor Material

生产商	OAK-MITSUI	SANMINA	3M	DUPONT	Gould
商品名	FaradFlex	BC2000	C-Ply	Lnterra HK	TCC
介电材料	Epoxy/Y5V ceramic	Epoxy FR-4	Epoxy/Barium Titanate	Polyimide	Polyimide
电容范围(nF/in²)	0.9～4.5(11)	0.5	10～30	0.8～3.4	0.78～1.45
厚度(um)	8,12,16,24	50	7～25	25	12.5, 25
损耗因子@1MHz[GHz]	0.015～0.19,[0.06]	0.02	0.1	0.01	0.009
介电常数@1MHz	4.4～10(30)	3.9	22	3.5, 10	3.2

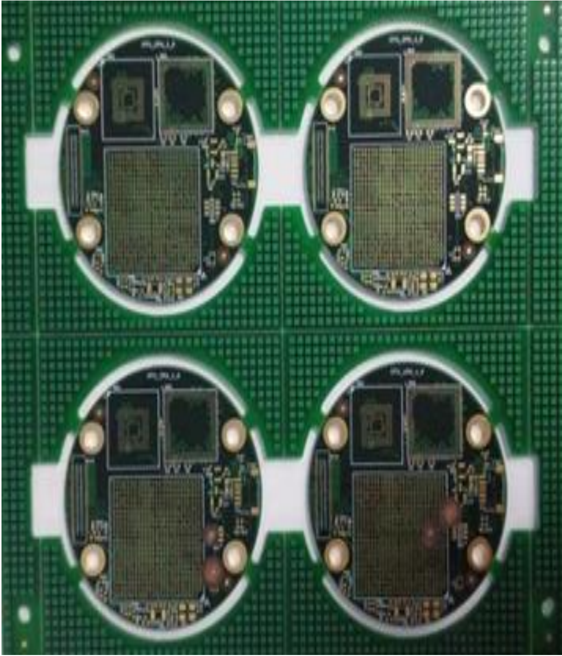


Product Display

UG PCB/PCBA

13 Special Impedance Tolerance

Special Impedance Tolerance



Process Characteristics

Layer: 10

Material: SY, TUC

Impedance Value Tolerance: +/-8%

Line Width/Space: 3.5/4mil

Board Thickness: 2.2mm

Aspect Ratio: 10： 1

Other technology: POFV

Difficulty

- **Control of dielectric thickness uniformity**
- **Copper thickness uniformity control**
- **Line width accuracy control**

Applications

For some communication products, the control of impedance accuracy is higher than that of conventional products.

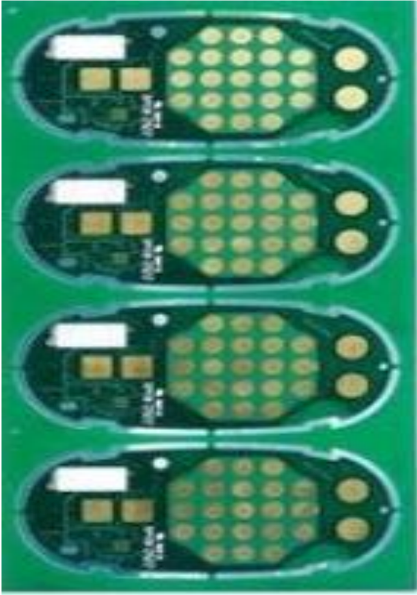
The consistency control of impedance ensures that each part of the system has the same impedance value, achieving the best signal transmission effect.

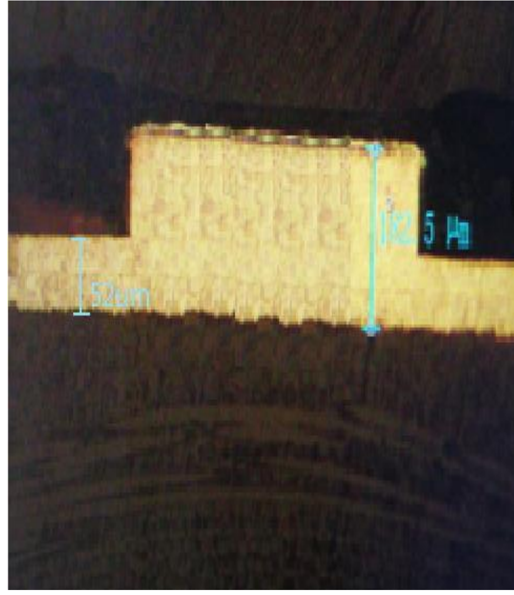
This is mainly used for high-speed materials.

UG PCB/PCBA

14 Step Copper Thickness

Step Copper Thickness





Process Characteristics

Layer: 8

Line Width/Space: 6/5.5mil

Minimum Hole: 0.2mm

Board Thickness: 2.0mm

Aspect Ratio: 10：1

Other Technology: Twice dry film & plating

Applications

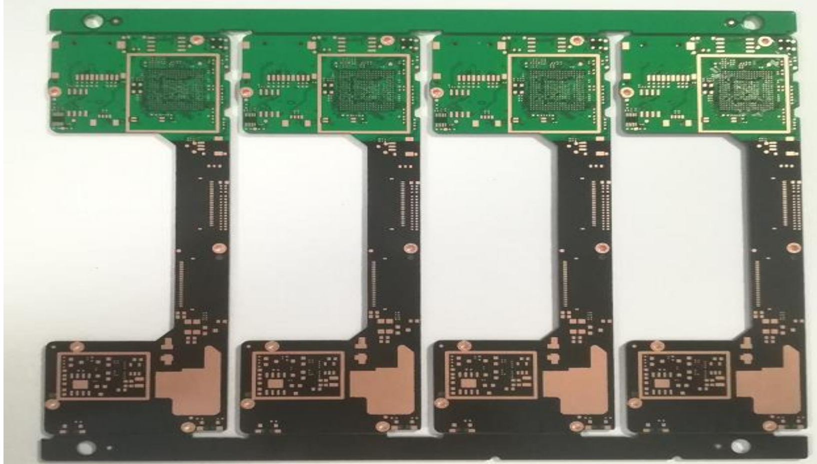
With the increasing integration of chip processes, there is a constant demand for PCBs to evolve towards being lighter, thinner, shorter, and smaller.

To combine the advantages of both, stepped copper thickness PCBs have emerged. They are mainly applied in power supplies and power controllers for electric vehicles, hybrid vehicles, robots, as well as in power switches, motor circuits, and fuses.

UG PCB/PCBA

15 Multi-color for SM

Multi-color for SM



Process Characteristics

Layer: 8L

Line Width/Space: 4/4mil

SM Color: Green + Black

Board Thickness: 1.6mm

SM dam: 4mil

Other Technology: CSP\ Multi-print SM

Introduction to Multicolored Solder Mask Boards

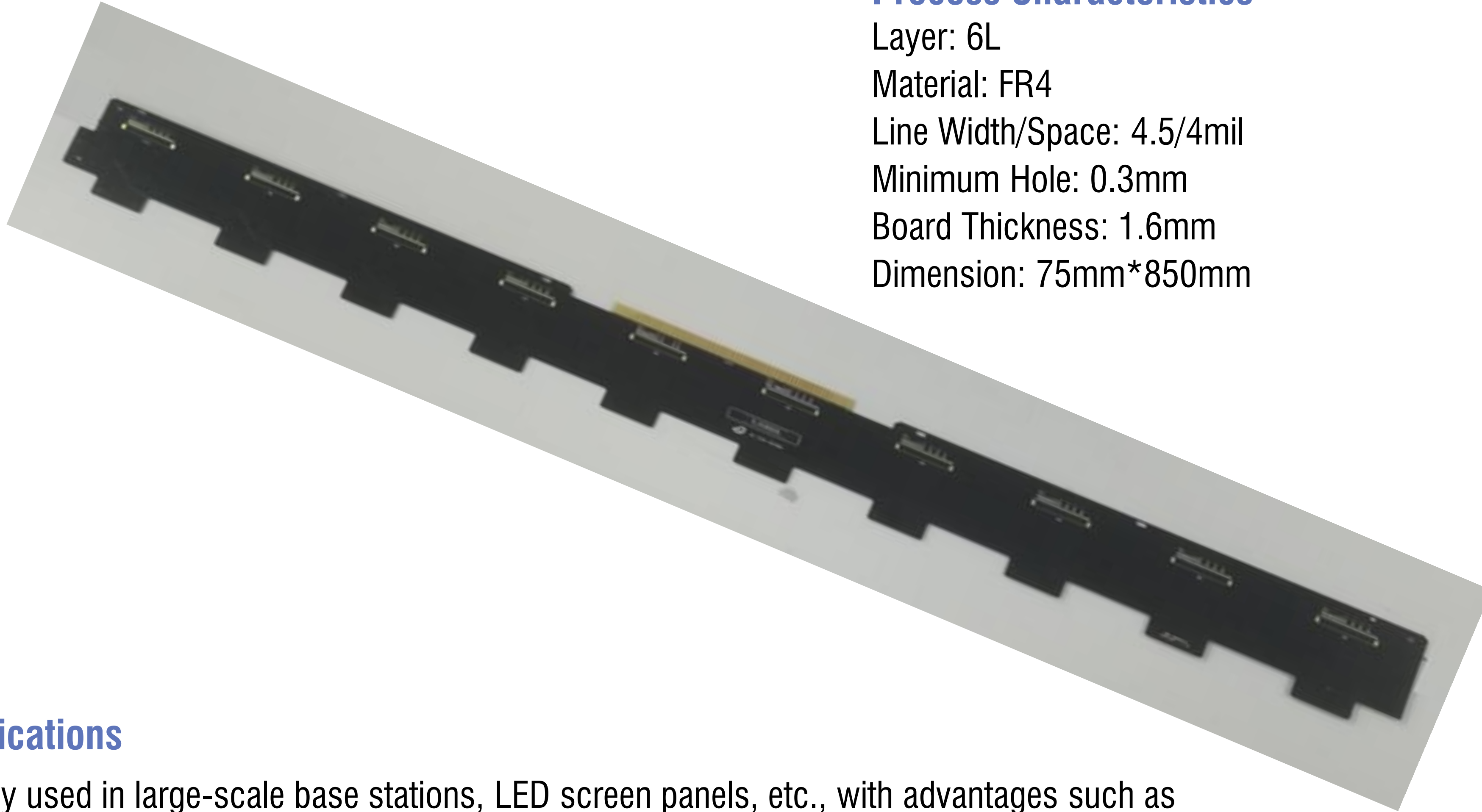
The feature lies in the circuit board being coated with a solder mask layer that contains at least two colors.
The advantage is that different areas on the front and back surfaces of the circuit board can be distinguished by the colors of the solder mask layers; the division of areas on the front and back surfaces is independent of each other, does not affect one another, thereby enriching the significance of the solder mask layer colors on the circuit board.

UG PCB/PCBA

16 Oversize Board

UG PCB/PCBA

Oversize Board



Process Characteristics

Layer: 6L

Material: FR4

Line Width/Space: 4.5/4mil

Minimum Hole: 0.3mm

Board Thickness: 1.6mm

Dimension: 75mm*850mm

Applications

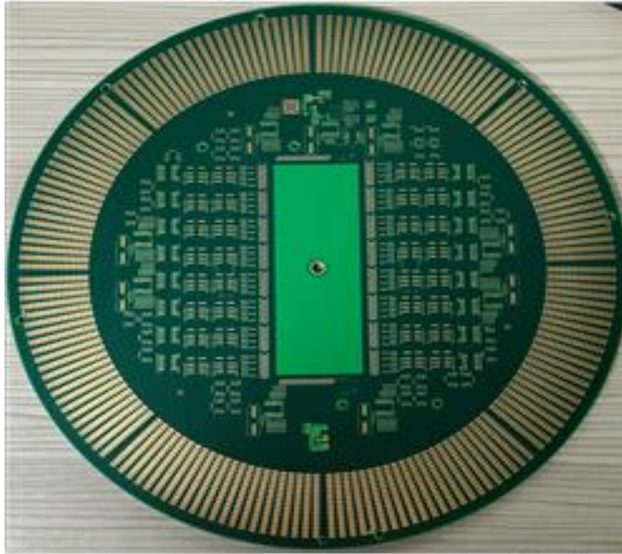
Widely used in large-scale base stations, LED screen panels, etc., with advantages such as large size and effective heat dissipation.

UG
PCB/PCBA

17 Wafer Plate

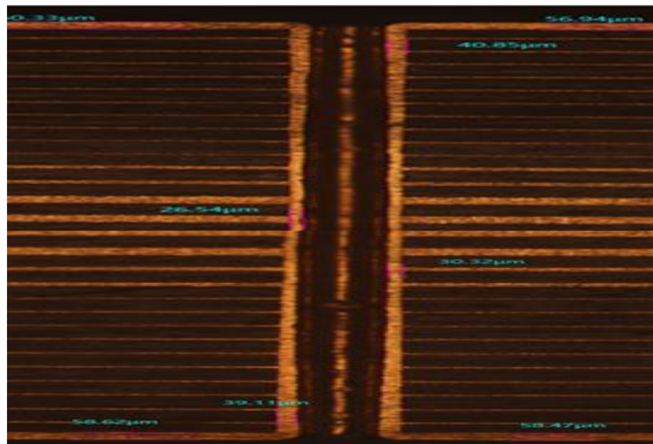
UG PCB/PCBA

Wafer Plate



20L Semiconductor Test Board

- 7mil inner hole to line 7mil
- High compaction flatness requirements
- Aspect Ratio: 15.8: 1
- Plating gold 30u for whole board
- Finish board thickness 6.35mm



Production Challenges

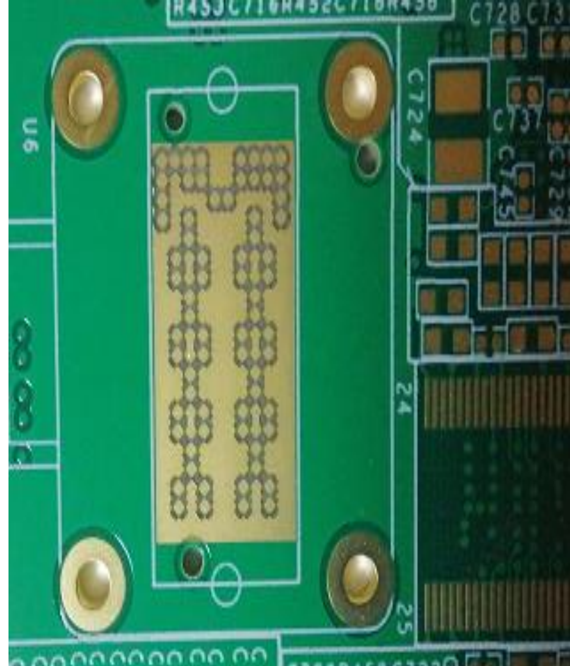
- Pressing fusion + rivet control precision
- Engineering design to ensure flatness
- Electroplating control for gold and nickel thickness
- Etching line width accuracy control
- Solder mask alignment accuracy control

UG PCB/PCBA

18 Partial Heavy Gold Plating

UG PCB/PCBA

Partial Heavy Gold Plating



Process Characteristics

Layer: 10
Material: TU-872SLK
Line Width/Space： 3.5/4mil
Board Thickness： 2.5mm
Aspect Ratio: 10:1
Partial gold plating: 30u” gold

Difficulty

- Line width/space 3.5/4mil
- Resin filling
- Multiple copper reduction processes
- Partial heavy gold plating
- Negative film process
- High etching difficulty

Applications

Boards with partial gold plating are those on which a layer of gold is applied to specific areas of the surface through special techniques. Because gold has extremely strong antioxidation properties and also excellent conductivity, it is mainly utilized in the connector points of high-performance servers/workstations, computer memory modules, graphics cards, and their slots, allowing for multiple repeated contacts or insertions and removals.