

Design rules for Headpcb's laserdrilled HDI-PCBs

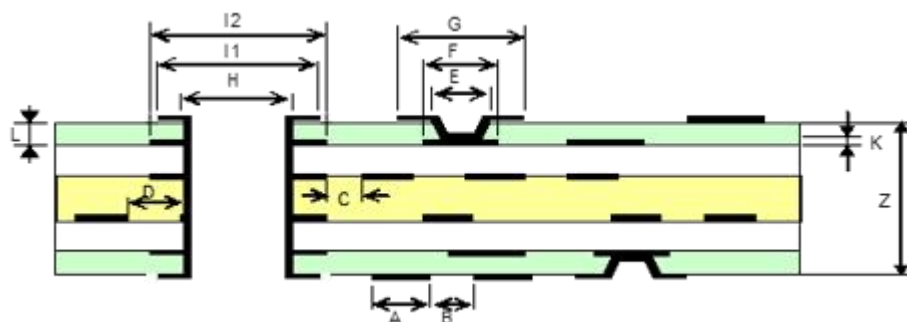
Properties:

- Base material: FR4 or higher grade
- max. 18 layers
- PCB thicknesses from 0,6 mm to 3,2 mm
- final layer with signature printing
- peelable ink
- copper thickness from 0,012 mm to 0,090 mm

Application:

Control units for cars, consumer- and communications-electronics, Industrial electronics.

Design rules for MicroviaLayer - MVL:



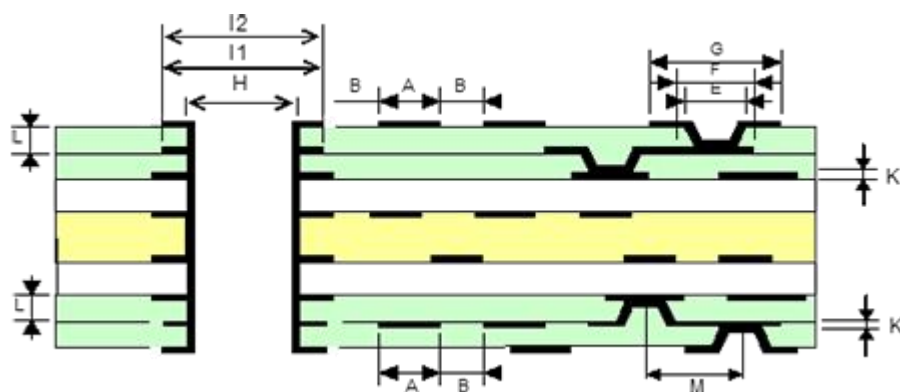
Symbol	Description	HDI ⁽¹⁾	High End ⁽²⁾
A	Line width at copper thickness of ≥ 36 μm Cu	100 μm	80 μm
A 1	Line width at copper thickness of 25 – 35 μm Cu	90 μm	75 μm
A 2	Line width at copper thickness of 10 – 18 μm Cu	75 μm	50 μm
B	Spacing at copper thickness of ≥ 36 μm Cu	125 μm	100 μm
B 1	Spacing at copper thickness of 25 – 35 μm Cu	100 μm	85 μm
B 2	Spacing at copper thickness of 10 – 18 μm Cu	75 μm	75 μm
C	Distance line to pad on inner layer	100 μm	85 μm
D	Insulation spacing line to pth-drilling	300 μm	< 200 μm

E	Drill size laser drilling on outer layer	125 µm	< 100 µm
F	Pad size diameter landing pad on inner layer	330 µm	250 µm
G	Diameter capture pad outer layers	330 µm	250 µm
H	Diameter CNC-hole	250 µm	150 µm
I 1	Diameter Pad CNC-hole outer layers	350 µm	250 µm
I 2	Pad diameter CNC-hole inner layers (annular ring > 0 µm)	450 µm	350 µm
K	Base copper outer layer	max. 18 µm	max. 12 µm
L / E	Aspect ratio microvia	1 : 2	1 : 1,5
Z / H	Aspect ratio pth-holes	6 : 1	10 : 1

(1) process capability (CpK > 1,33)

(2) realisation after clarification

Design rules for two and more microvia layers – MVL, staggered vias:



Symbol	Description	HDI ⁽¹⁾	High End ⁽²⁾
A	Line width at copper thickness of ≥ 36 µm Cu	100 µm	80 µm
A 1	Line width at copper thickness of 25 – 35 µm Cu	90 µm	75 µm
A 2	Line width at copper thickness of 10 – 18 µm Cu	75 µm	50 µm

B	Spacing at copper thickness of ≥ 36 $\mu\text{m Cu}$	125 μm	100 μm
B 1	Spacing at copper thickness of 25 – 35 $\mu\text{m Cu}$	100 μm	85 μm
B 2	Spacing at copper thickness of 10 – 18 $\mu\text{m Cu}$	75 μm	75 μm
E	Drill size laser drilling on outer layer	125 μm	< 100 μm
F	Pad size diameter landing pad on inner layer	330 μm	250 μm
G	Diameter capture pad outer layers	330 μm	250 μm
H	Diameter CNC-hole	250 μm	150 μm
I 1	Diameter Pad CNC-hole outer layers	350 μm	250 μm
I 2	Pad diameter CNC-hole inner layers (annular ring > 0 μm)	450 μm	350 μm
K	Base copper outer layer	max. 18 μm	max. 12 μm
M	Hole to hole distance laservia	350 μm	250 μm
L / E	Aspect ratio	1 : 2	1 : 1,5

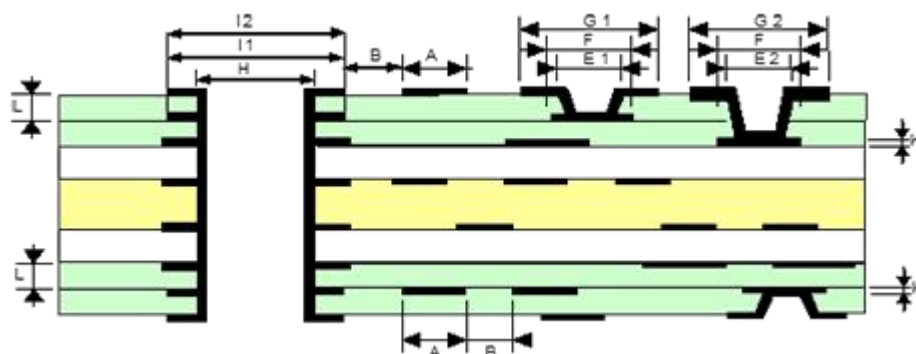
(1) process capability (CpK > 1,33)

(2) realisation after clarification

Microsection of a staggered via HDI:



Design rules for skipped vias:



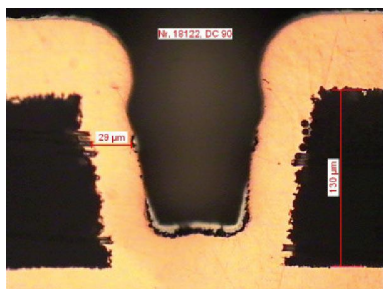
Symbol	Description	HDI ⁽¹⁾	High End ⁽²⁾
A	Line width at copper thickness of $\geq 36 \mu\text{m Cu}$	100 μm	80 μm
A 1	Line width at copper thickness of 25 – 35 $\mu\text{m Cu}$	90 μm	75 μm
A 2	Line width at copper thickness of 10 – 18 $\mu\text{m Cu}$	75 μm	50 μm
B	Spacing at copper thickness of $\geq 36 \mu\text{m Cu}$	125 μm	100 μm
B 1	Spacing at copper thickness of 25 – 35 $\mu\text{m Cu}$	100 μm	85 μm
B 2	Spacing at copper thickness of 10 – 18 $\mu\text{m Cu}$	75 μm	75 μm
E 1	Diameter of microvia	125 μm	< 100 μm
E 2	Diameter of microvia	200 μm	125 μm
F	Pad size diameter landing pad on inner layer	330 μm	250 μm
G 1	Diameter capture pad outer layers	330 μm	250 μm
G 2	Diameter capture pad outer layers	330 μm	250 μm
H	Diameter CNC-hole	250 μm	150 μm
I 1	Diameter Pad CNC-hole outer layers	350 μm	250 μm

I 2	Pad diameter CNC-hole inner layers	450 μm	350 μm
K	Base copper outer layer	max. 18 μm	max. 12 μm
L / E	Aspect ratio	1 : 2	1 : 1,5

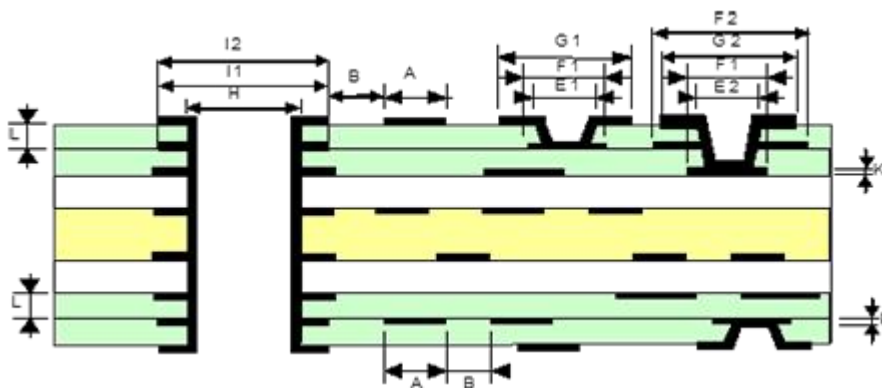
(1) process capability (CpK > 1,33)

(2) realisation after clarification

Microsection of a skipped via HDI:



Design rules for stacked vias:



Symbol	Description	HDI ⁽¹⁾	High End ⁽²⁾
A	Line width at copper thickness of $\geq 36 \mu\text{m Cu}$	100 μm	80 μm
A1	Line width at copper thickness of 25 – 35 $\mu\text{m Cu}$	90 μm	75 μm
A 2	Line width at copper thickness of 10 – 18 $\mu\text{m Cu}$	75 μm	50 μm

B	Spacing at copper thickness of $\geq 36 \mu\text{m}$ Cu	125 μm	100 μm
B 1	Spacing at copper thickness of 25 – 35 μm Cu	100 μm	85 μm
B 2	Spacing at copper thickness of 10 – 18 μm Cu	75 μm	75 μm
E 1	Diameter of microvia	125 μm	< 100 μm
E 2	Diameter of microvia	200 μm	125 μm
F 1	Pad size diameter landing pad on inner layer	330 μm	250 μm
F 2	Microvia Landepad (Verbindungsstelle)	425 μm	< 375 μm
G 1	Diameter capture pad outer layers	330 μm	250 μm
G 2	Diameter capture pad outer layers	330 μm	250 μm
H	Diameter CNC-hole	250 μm	150 μm
I 1	Diameter Pad CNC-hole outer layers	350 μm	250 μm
I 2	Pad diameter CNC-hole inner layers	450 μm	350 μm
K	Base copper outer layer	max. 18 μm	max. 12 μm
L / E	Aspect ratio	1 : 2	1 : 1

(1) process capability ($CpK > 1,33$)

(2) realisation after clarification

Microsection of a stacked via HDI:

