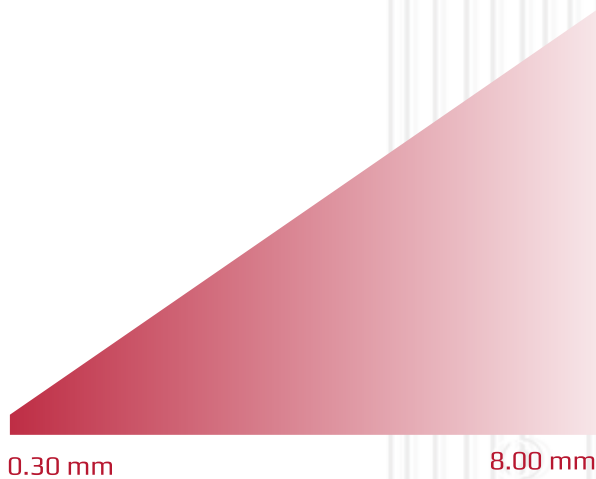


TECHNOLOGICAL NORMS OF MULTILAYER PRINTED CIRCUIT BOARDS TOPOLOGY

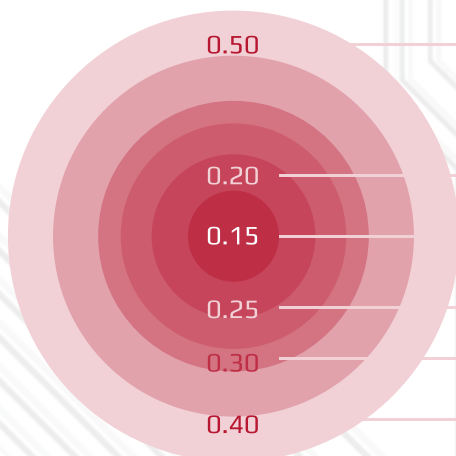
PCB THICKNESS:



MAXIMUM SIZE:



MINIMAL DIAMETER OF HOLES, mm:



for holes with reverse drilling technologies for backplanes

serial production

samples production

for PCBs based on PTFE and APPE

min. diameter of half-holes at the edges of the board

maximum diameter of the holes to be filled with resin

BOARD THICKNESS TO DRILLING DIAMETER RATIO:

Hole diameter	Samples and Prototypes	Serial production
0,20mm and less	10 :1	8 :1
0,30mm and less	12 :1	10 :1
0,80mm and less	16 :1	12 :1
more than 0,80mm	20 :1	15 :1
for backplanes		30 :1
for technology of filling vias with resin		8 :1
for PCBs based on PTFE and APPE		8 :1

TECHNOLOGICAL CAPABILITIES

Accuracy of hole sizes:

- \emptyset of plated holes - $\pm 75 \mu\text{m}$
- \emptyset of non-plated holes - $\pm 50 \mu\text{m}$
- \emptyset of plated holes for press-fit - $\pm 50 \mu\text{m}$
- size of grooves, countersinks and slots - $\pm 150 \mu\text{m}$

Accuracy of holes positioning $\pm 75 \mu\text{m}$

Accuracy of blind holes and notches $\pm 100 \mu\text{m}$

Minimum spacing from plated wall of drilling channel to copper in power layers:

- in prototypes and samples for boards with number of layers 8 and less - $140 \mu\text{m}$
- in prototypes and samples for boards with number of layers 14 and less is $170 \mu\text{m}$
- in prototypes and samples for boards with number of layers more than 14 - $180 \mu\text{m}$
- in serial production PCBs with number of layers 8 and less - $180 \mu\text{m}$
- in serial production PCBs with number of layers more than 8 - $200 \mu\text{m}$

• for laser micro-holes - $125 \mu\text{m}$

Minimum radius of grooves and slots milling - 0.30 mm

Minimum dielectric thickness

for V-CUT processing:

- 0.40 mm for one side scribing
- 0.60 mm for both sides scribing

Maximum dielectric thickness

for V-CUT processing - 3.20 mm

Scribing accuracy:

- application and alignment of lines - 0.10 mm
- scribing angle - $\pm 5^\circ$

Possible colors for silkscreen printing:

- white, yellow, black

Minimum size of silkscreen elements:

- in prototypes - not less than 0.70 mm
- in serial production - not less than 1.00 mm

Minimum width of solder mask bridges between pads:

- for green mask when using base foil $18 \mu\text{m}$ or less - $100 \mu\text{m}$
- for a different color mask when using base foil $18 \mu\text{m}$ or less - $125 \mu\text{m}$
- for mask of all colors when using base foil $35 \mu\text{m}$ - $150 \mu\text{m}$
- for mask of all colors when using base foil $75 \mu\text{m}$ and more - $200 \mu\text{m}$

Track width and spacing between them:

Foil thickness	Samples and Prototypes	Serial production
in inner layers, mm		
$12\mu\text{m}$ (1/3 oz)	0,075/0,075	0,075/0,075
$18\mu\text{m}$ (1/2 oz)	0,075/0,075	0,075/0,075
$35\mu\text{m}$ (1 oz)	0,075/0,100	0,075/0,100
$70\mu\text{m}$ (2 oz)	0,100/0,125	0,100/0,140
$100\mu\text{m}$ (3 oz)	0,125/0,200	0,125/0,200
$200\mu\text{m}$ (6 oz)	0,200/0,400	0,200/0,400
$300\mu\text{m}$ (9 oz)	0,280/0,610	0,280/0,750
in outer layers, mm		
$12\mu\text{m}$ (1/3 oz)	0,075/0,075	0,075/0,100
$18\mu\text{m}$ (1/2 oz)	0,085/0,085	0,100/0,150
$35\mu\text{m}$ (1 oz)	0,115/0,125	0,120/0,140
$70\mu\text{m}$ (2 oz)	0,150/0,175	0,150/0,200
$100\mu\text{m}$ (3 oz)	0,175/0,250	0,175/0,300
$200\mu\text{m}$ (6 oz)	0,255/0,470	0,255/0,540
$300\mu\text{m}$ (9 oz)	0,330/0,760	0,330/0,840

Tracks manufacture accuracy:

- for tracks with width 0.25 mm or less in prototypes and samples - $\pm 25 \mu\text{m}$
- for tracks with width more than 0.25 mm in prototypes and samples - $\pm 38 \mu\text{m}$

In serial products manufacturing precision is

regulated by IPC-A-600G standards and

is less than $\pm 20\%$

Min. size of pads

for BGA chips:

- HASL SnPb - not less than 0.250 mm
- HASL Pb free - not less than 0.350 mm
- Immersion surface finishes - not less than 0.175 mm

Minimum spacing

between adjacent pads:

- in samples of boards with immersion finish when using base foil of $18 \mu\text{m}$ or less - $90 \mu\text{m}$
- in serial boards with immersion finish when using base foil of $18 \mu\text{m}$ and less - $100 \mu\text{m}$
- in prototypes with HASL finish when using base foil of $18 \mu\text{m}$ and less - $175 \mu\text{m}$
- in serial boards with HASL finish when using base foil of $18 \mu\text{m}$ and less - $200 \mu\text{m}$

Minimum size of topology elements

not connected to circuits - 0.20 mm