

PCB trace

From HwB

According to recommendations in IPC-2221 (formerly IPC-D-275, MIL-STD-275) on how to calculate minimum PCB (printer circuit board) trace width.

Below table is valid for:

- PCB material FR-4
 - Board thickness=1.6mm (0.063")
 - Trace thickness=35µm (1 oz)
- Allowed temperature rise=10 °C

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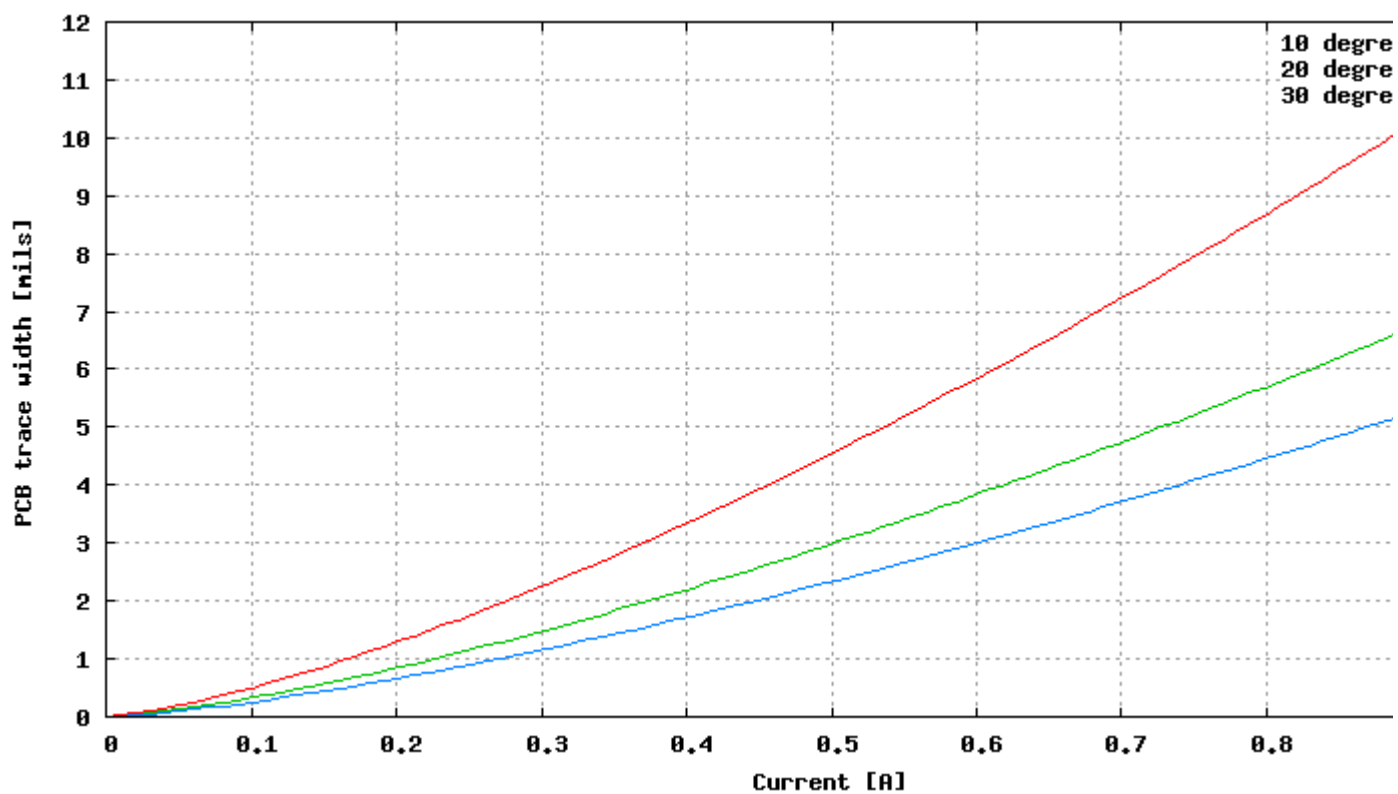
Table

Current	Width (inner)	Width (outer)
A	mils	mils
0.01	0.308	0.118
0.05	1.54	0.591
0.1	3.08	1.18
0.2	6.15	2.37
0.4	12.3	4.73
0.4	12.3	4.73
0.5	15.4	5.91
0.6	18.5	7.1
0.7	21.5	8.28
0.8	24.6	9.46
0.9	27.7	10.6
1.0	30.8	11.8

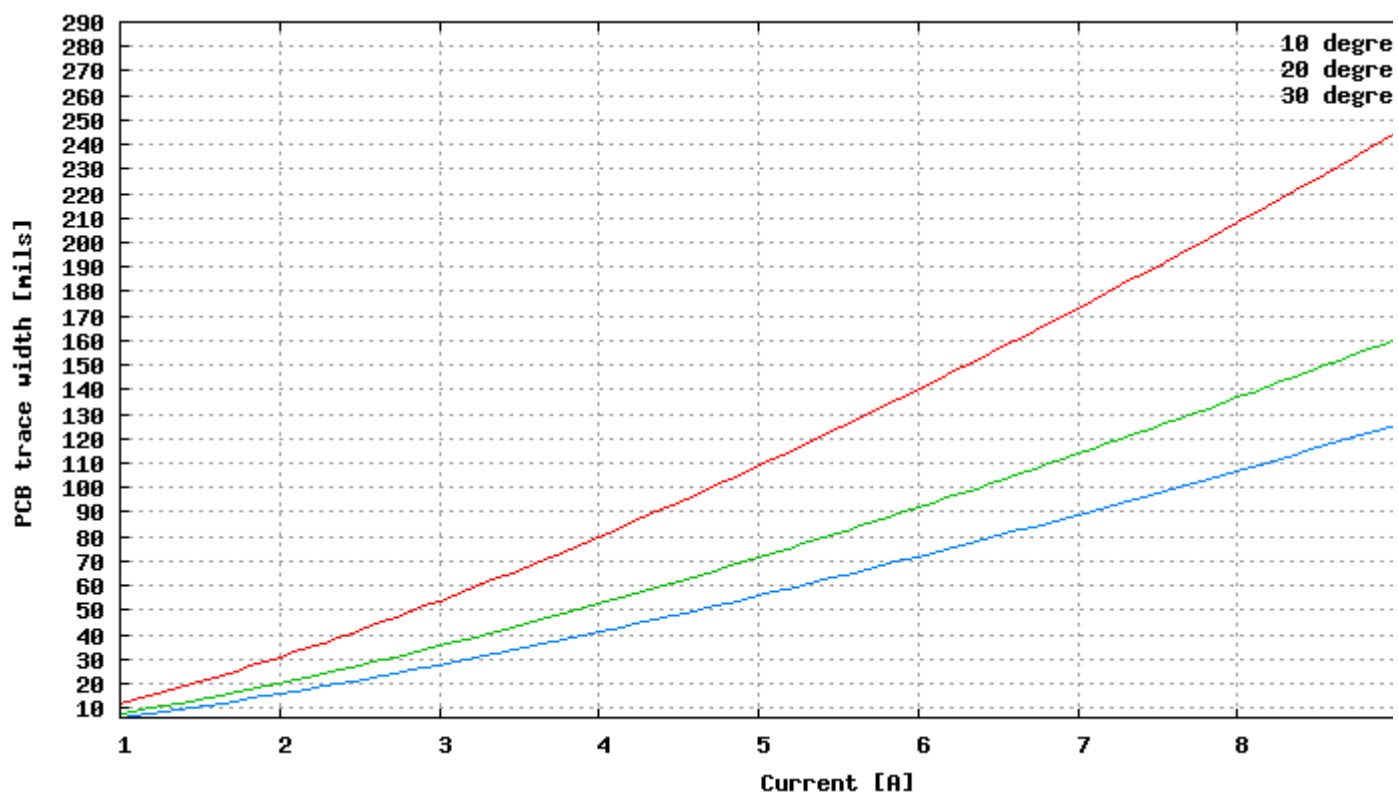
Note: 1 mil = 1/1000" = 0.0254 mm

Graph

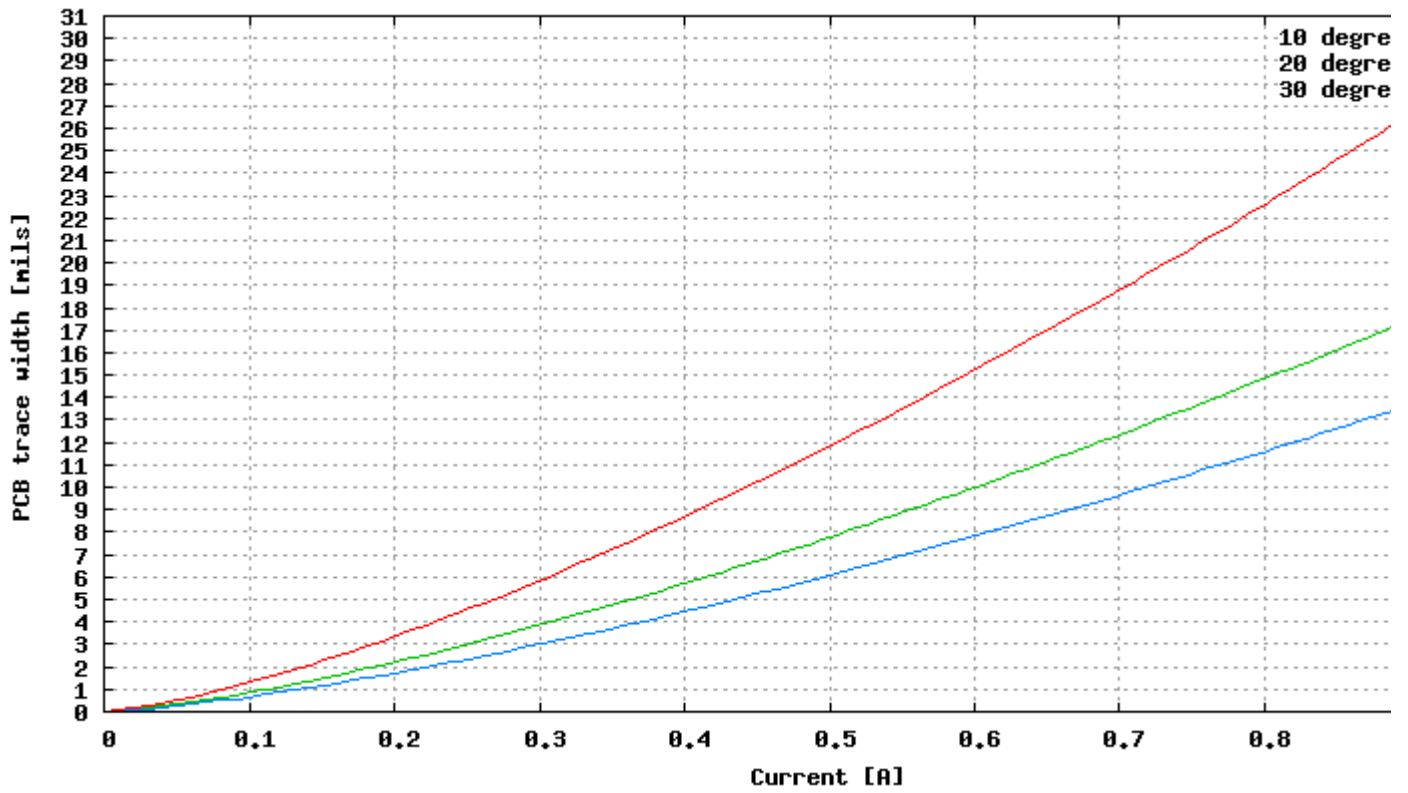
Outer traces (0-1 A)



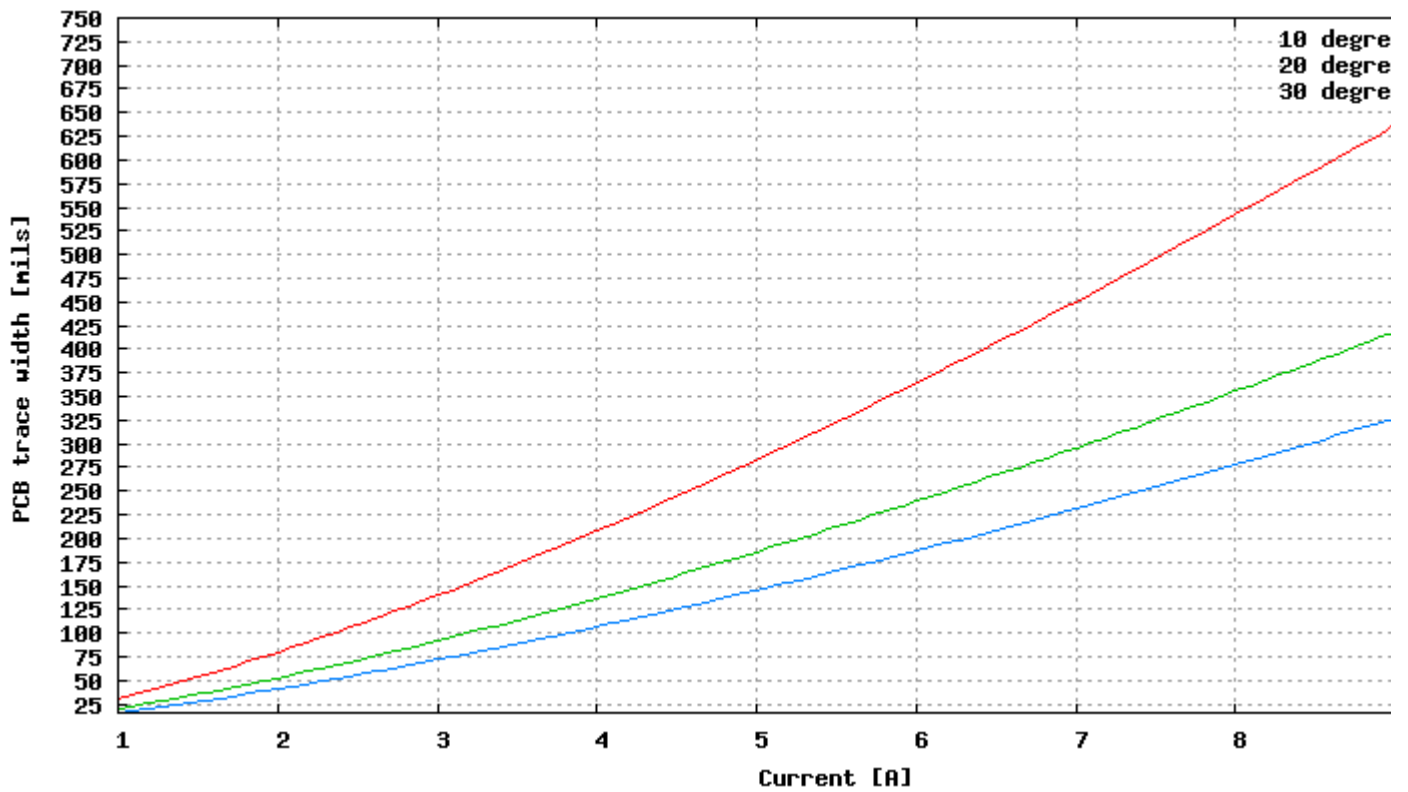
Outer traces (1-10 A)



Inner traces (0-1 A)



Inner traces (1-10 A)



Formula

Given:

- I [A] (Current)

- T [°C] (*Temperature rise*)
- m [oz] (*Mass of PCB trace*)

Constants:

- $y = 1.378$ [*mils/oz*] for copper
- $b = 0.44$
- $c = 0.725$
- $k = 0.048$ (*for outer layers*)
- $k = 0.024$ (*for inner layers*)

Formulas:

- $A \text{ [mils}^2\text{]} = \left(\frac{I}{kT^b} \right)^{\frac{1}{c}}$ (*PCB trace area*)
- $l \text{ [mils]} = \frac{A}{my}$ (*PCB trace width*)

Links

- UltraCAD article: Current Carrying Capacity of Vias (<http://www.ultracadm.com/articles/viacurrents.pdf>)
- PCB Trace Width Calculator (<http://circuitcalculator.com/wordpress/2006/01/31/pcb-trace-width-calculator/>) by Brad Suppanz
- New Correlations Between Electrical Current and Temperature Rise in PCB Traces (http://www.flomerics.com/flotherm/technical_papers/t341.pdf) by Johannes Adam at Flomerics Ltd.

Retrieved from "http://www.hardwarebook.info/PCB_trace"

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