Thick Film Ceramic PCB Design Guide

------Best Technology Co., Ltd.

When you design thick film ceramic board, please to be noted following:

A) About Substrate/Core Raw Material:

1) Substrate/Core raw material type: Alumina (96% Al2O3), BeO, AIN;
2) Substrate/Core raw material Thickness:
   0.25, 0.38, 0.50mm, 0.63mm(standard), 0.76mm, 1.0mm, and 1.27mm (only for AIN), and special thickness such as 1.6mm, 2.0mm need to be customized.

B) Conductor (metallization), Trace Layer

3) Conductor (metallization) material: Silver Palladium (AgPd), Gold Palladium (AuPd), Mo/Mu+Nickel plating (for Ozone).
4) Application type: SMD/SMT; Aluminum-Wire Bonding; Gold-wire bonding. Please advise that information so that different material and thickness will be adopted accordingly
5) Conductor (metallization) layer thickness: >=10um
6) Minimum (Min) Trace Space/Width for volume production: 0.30mm & 0.30mm, 0.20mm/0.20mm is also okay but cost will be higher, and 0.15mm/0.20mm only available for prototype.
7) Layers Number: 1L, 2L, Double sided (with PTH), 3L~10L with or without PTH

C) Conductor Resistivity

8) Different conductor material has different resistivity value.
9) The thicker conductor thickness is, the lower resistivity value will be.
10) Some famous & popular material value:
    Dupont 6177T (AgPd): <=18mOhm/square @ thickness 15um;
    Dupont 6179 (AgPd): 12~15mOhm/square @ thickness 12~15um;
    Dupont 5771 (AuPd): <=7.0mOhm/square @ thickness 6-9um;
    ESL 9562 (AgPd): 6mOhm/square @ thickness 12.5um;
    ESL 9562-G (AgPd): <=4mOhm/square @ thickness 12.5um;
    DHC-PF-8083D (AgPd): <=10mOhm/square @ thickness 10-15um;

D) Conductor Power Density

11) The power density for conductor itself should be limited to max 600 Watt/inch2 of conductor surface. And power density for an Al2O3 substrate should be limited to 8 Watts/in^2 (for the total of all conductors on top of it)
12) If you have a Ag conductor line of 0.3inch long, 0.010 inch wide (=30 square (0.3/0.01)), the surface area is 0.3 x 0.01 = 0.003 in^2. This means the carrying powder P is limited to 600 (power density) x 0.003 (area) = 1.8 watts.

13) Assume conductor resistivity is 6mOhm/sq / 12.5um (ESL9562), the resistance value R = 30 sq x 6mOhm = 0.18 ohm.
14) Power = I^2 x R, or I^2 =Power/R=1.8/0.18 = 10, so the carrying current limit I = 3.16 amps. Or in a short equation,

I (amps) = line width (inch) x (power density)$^{1/2}$ / (sheet resistance, ohm)$^{1/2}$

E) Surface finishing:

For conductor is AgPd or AuPd, then surface finishing is raw material itself, no extra finishing. For Mo/Mu, then Nickel plating.

F) Bonded Resistor

15) Different resistor value can be put on the same board, each different resistor period need to set up a new stencil, and can only be printed separately.
16) Resistor can be on the same layer/side, or different layer/side
17) Bonded resistor can support high temperature up to 600C
18) Please advise temperature coefficient

G) Soldermask:

19) It is glass glaze
20) Ceramic PCB can be either with or without soldermask
21) Color: transparent greenish

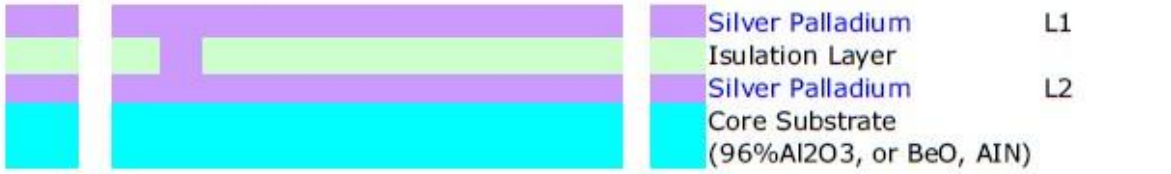
H) PTH (Plated Through Hole) & NPTH (Non-Plated Through Hole)

22) Both are available
23) Min NPTH: 0.10mm
24) Min PTH: 0.15mm
25) Maximum (Max): No limited
26) There's a special layer up for ceramic PCB more than 1L. See "Ceramic PCB Layer up_BestTech" separately.

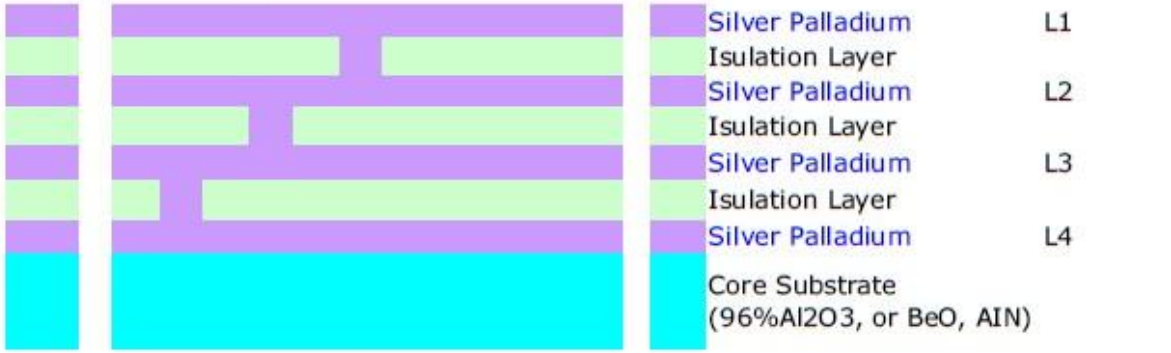
Thick Film Ceramai PCB Layer UP

1L Ceramic PCB

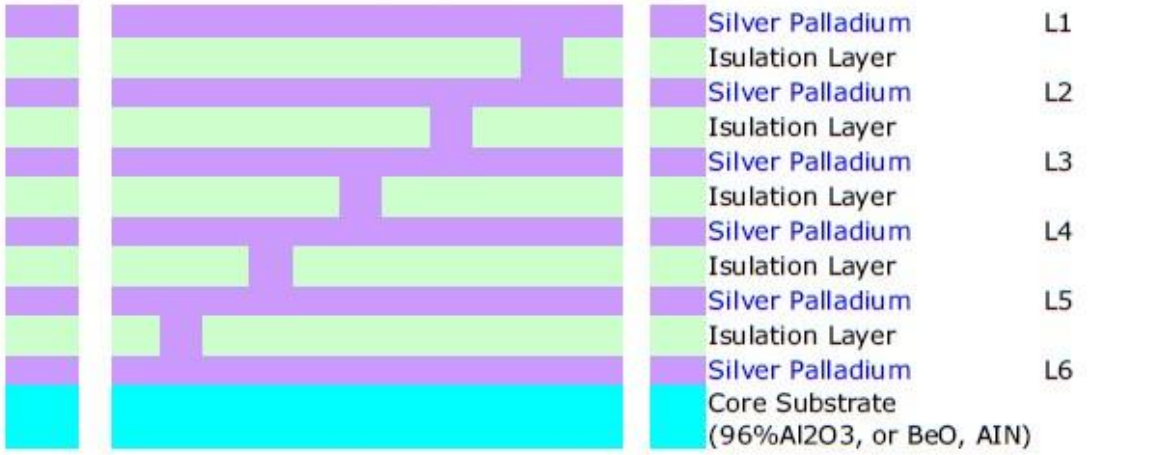
Double Sided Ceramic PCB



2L Ceramic PCB



4L Ceramic PCB



6L Ceramic PCB

I) Manufacturing Tolerance:

27) Board Thickness: +/-10%, Min: +/-0.08mm
28) Outline to Outline: +0.20mm/-0.05mm
29) NPTH: +/-0.05mm
30) PTH: +/-0.10mm
31) NPTH to NPTH: +/-0.05mm
32) PTH to PTH: +/-0.10mm
33) NPTH to edge: +0.15mm/0.05mm
34) PTH to edge: +0.20mm/0.10mm

J) Panel & Shipment:

35) Max panel size: 138*80mm, special size also available
36) If board shape is square, rectangle, it can be shipped via both panel and single piece; otherwise, has to be shipped via single piece
37) X-Out board should be allowed for panel delivery

K) Lead Time & Cost

38) Prototype: 2-4 weeks
39) Volume production: Volume production: 3.5-5 weeks for initial order, 2-3 weeks for repeated order, or 1-2 weeks if give us forecast.

Following elements will increased the cost:

40) More hole (PTH or NPTH)
41) Gold Palladium (AuPd) used
42) Different resistor value on same board
43) Big size
44) Big hole

45) PTH expensive than NPTH
46) 0.635mm raw material thickness is the cheapest

For any question or comments, please feel free to contact us:

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