

# X2Y<sup>®</sup>



## Technology In Balance

Speeding Edge “Current Source”

Article by John Zasio Vol. 1, Issue 4

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# Article Summary

- Article expresses an obvious negative bias with openly derisive language. Article purports to address:
  - “...information floating around the electronics industry regarding the “magic” of the X2Y® capacitor in terms of its decoupling capabilities.”
- Article claims interest in describing / characterizing X2Y® versus conventional 0402 capacitors.
- Article concludes that X2Y®s only slightly outperform 4 via 0402s, and actually require more vias to do the same job.
- Article was produced without any consultation with X2Y®
- This presentation debunks the article.
  - Article based on disastrously bad footprints for X2Y®

# Speeding Edge Test Footprints

- What's wrong with this picture?

Capacitor PCB Footprints

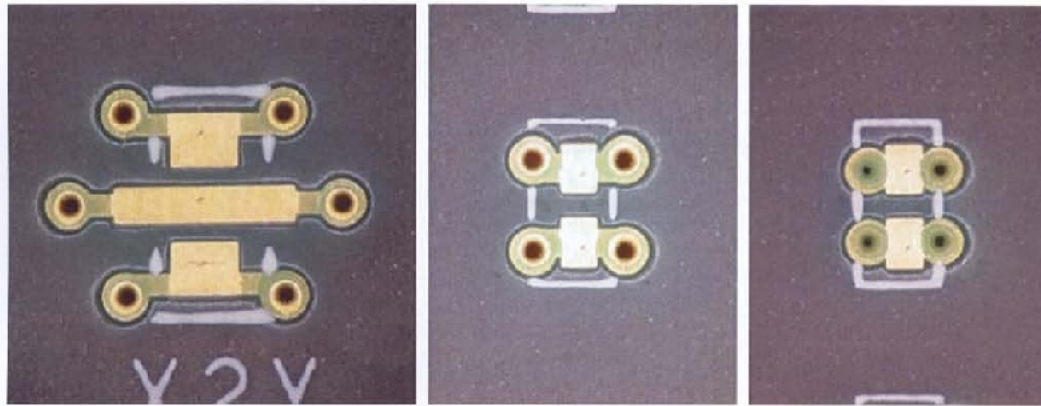
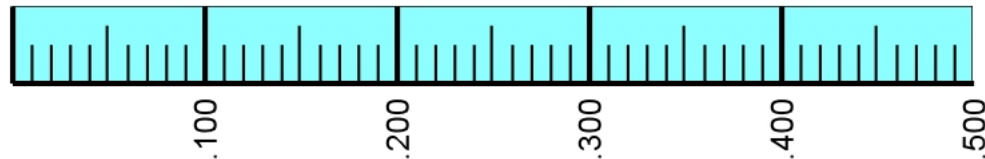


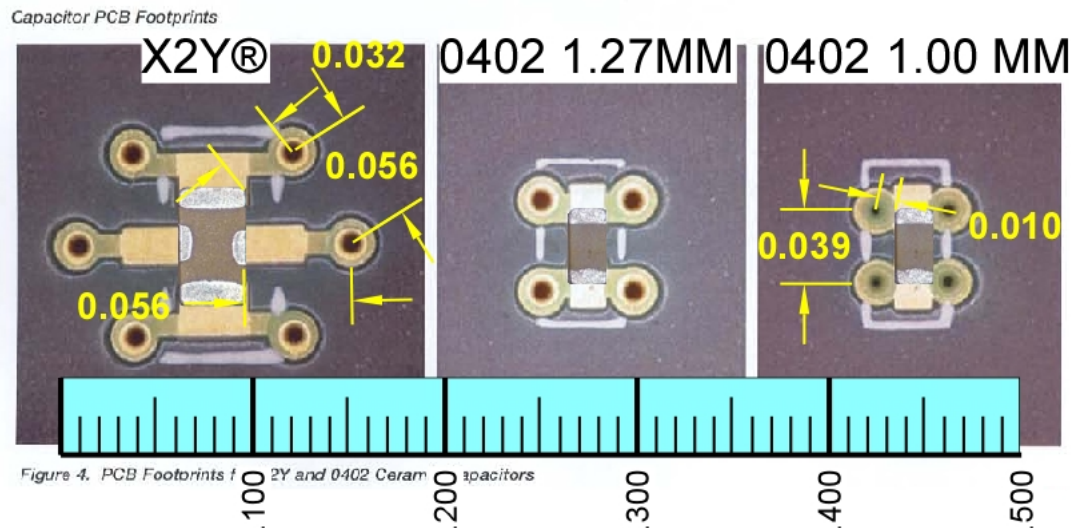
Figure 4. PCB Footprints for X2Y and 0402 Ceramic Capacitors



- “The footprints shown in Figure 4 were designed for low inductance.”
  - John Zasio on the test layouts used by Speeding Edge to compare X2Y® and 0402 capacitors.

# Speeding Edge Test Footprints

- X2Y® layout is a very poor design
  - Vias located far from component
  - Vias widely separated from each other
- 0402 layouts very different
  - Vias annular rings directly abut device terminals
  - Vias tightly spaced



# Speeding Edge Test Footprints

- Zasio X2Y® layout is **THREE** times the area of recommended X2Y layout.
- Zasio X2Y® layout actually has room for **FIVE** X2Y® caps.

Capacitor PCB Footprints

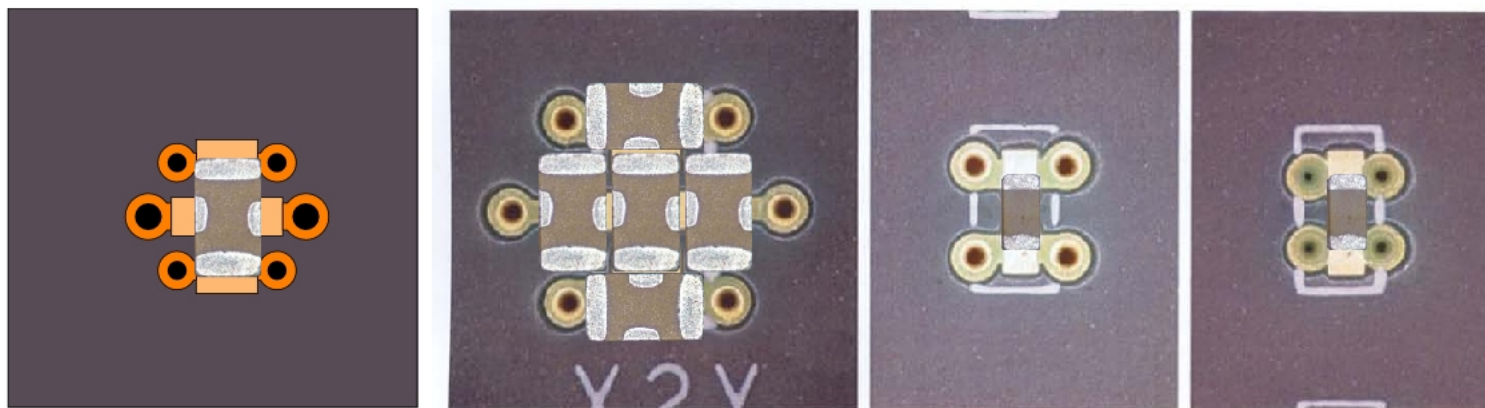
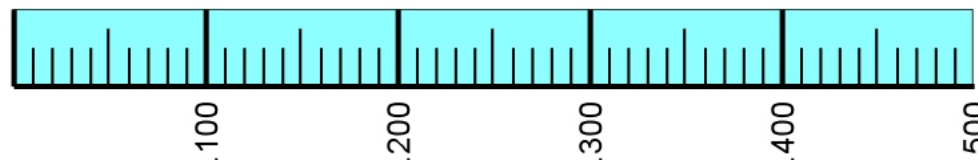


Figure 4. PCB Footprints for X2Y and 0402 Ceramic Capacitors

X2Y RECOMMENDED  
REFLOW  
LAYOUT



“The footprints shown in Figure 4 were designed for low inductance.”

# Impact of Via Locations on Inductance

- Numerous citations are available demonstrating the relation of via placement and geometry to bypass capacitor inductance
  - [www.sigcon.com/Pubs/news/6\\_09.htm](http://www.sigcon.com/Pubs/news/6_09.htm)
  - [www.sigcon.com/Pubs/edn/ParasiticInductance.htm](http://www.sigcon.com/Pubs/edn/ParasiticInductance.htm)
    - Published EDN July 2000
  - “Right the First Time”, 2003 pp 140 **John Zasio**
    - “Smaller length conductors and **close spacing between the conductors decreases the inductance.**” Zasio on bypass capacitor via geometry.
- The high influence of via location and geometry was clearly well known to Zasio when he devised the very poor X2Y® footprint used for his tests

# Summary

- Footprint area **3X** vs recommended.
- Via centers located **3X** as far from component terminals vs recommended.
  - Capacitor ESL to planes high in the board  $\approx$  **2X** value with recommended footprint
- Vias spaced **1.8X** vs recommended.
  - Expected in-cavity inductance  $\approx$  **1.5X** value with recommended footprint
- Artificially poor layout used for X2Y® capacitors severely skewed obtainable results