Capacitive Coupling for Gigabit Ethernet

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Title

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Article URL

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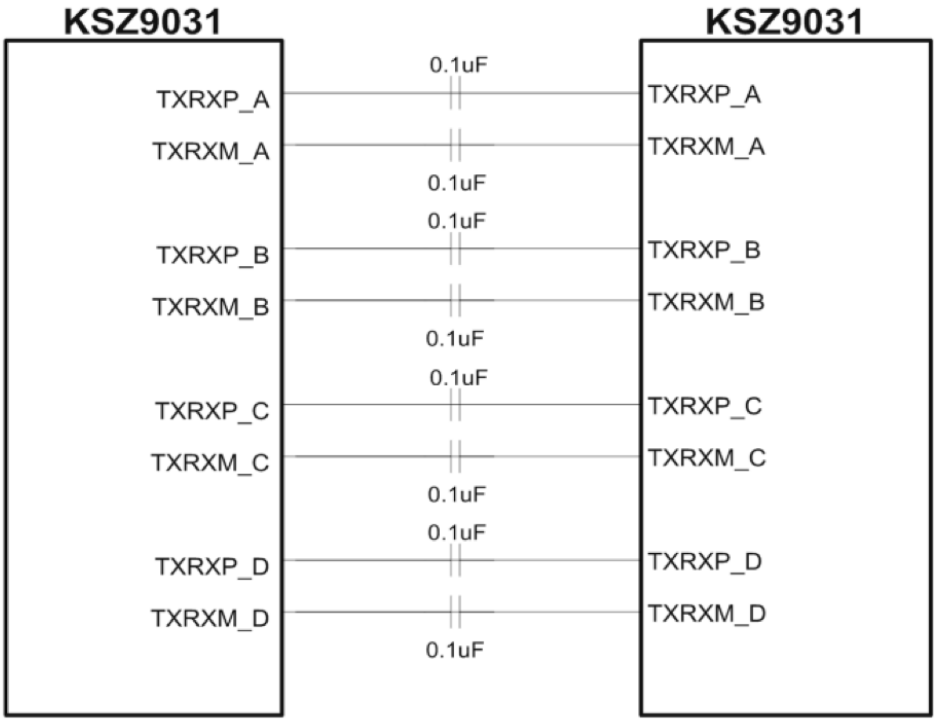
Question

If I have two 1000BASE-T Ethernet PHYs on the same board, can I connect them using capacitive coupling instead of transformers?

Answer

All Microchip 1000BASE-T switches and PHYs have voltage-mode interfaces and on-chip termination, making them well suited to capacitive coupling when the two connected chips share the same ground and they are connected by PCB traces rather than a cable.

The figure below shows how two KSZ9031 PHYs are connected using capacitive coupling. No additional components are needed. The same connections are used when connecting any two 1Gbps Microchip devices, whether they are PHYs or switches, or whether the part number prefix is KSZ, LAN or VSC.



When connecting to a non-Microchip device, the user must check with the other manufacturer for their recommendations. If the other device uses a different I/O architecture, it may be necessary to add components to that side of the capacitors, or to use a transformer to isolate the two devices.

No special register configurations are required for the PHYs. Auto-negotiation must be enabled for 1000BASE-T connections. This is different from 10BASE-T and 100BASE-TX transformerless connections, where it is sometimes suggested to disable auto-negotiation for transformerless applications.

For VSC SimpliPHY devices, also refer to application note ENT-AN0114.
For KSZ 10/100 Mbps PHYs, refer to application note ANLAN120.

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