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Ultra High Density Interconnects (UHDI)

Ultra HDI - Beyond the Traces - UHDI for High-Reliability Applications

What are High Reliability products?

- Anything that can impact human life: medical, defense, communication, transportation
- Parts that must function for a long time where there is no access to repair,notably in space and remote locations
- Critical to infrastructure: finance, energy, communications

How can Ultra HDI work in High Reliability Applications?

Any design where the BGA component pitch is 0.5 mm or smaller should utilize UHDI technology: to avoid reliability issues with the high layer counts, sub-assemblies, and stacked microvias – and to route out of these tighter pitch devices.

- SWaP (Size, Weight and Power)
- Improved Performance - less variation in impedance
- Smaller devices- ease of portability
- Less density for more functionality
- Reduction of stacked microvias/layers/elimination of sub assembly
- Better reliability materials- thinner dielectrics and lower CTE/High Tg

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Microvias allow for stacked and staggered connections across multiple layers of the PCB, enabling high wiring density in a smaller footprint. This reduces the overall size of the board making it ideal for compact applications like aerospace and consumer electronics.

Ultra HDI technology allows boards to be built using thinner layers and advanced substrates like polyimides, which are lighter and more flexible. These PCBs achieve finer lines and spaces enabling advanced functionality without increasing board dimensions. Innovations like stacked and staggered microvias allow for multi-layered connections in a smaller footprint.

Applications – Examples

Satellites/ Spacecraft, Aircraft

- A satellite integrator saved 1.5 kg per unit by transitioning to Ultra HDI boards made with LCP (Liquid Crystal Polymer) materials, enabling compact payload designs while reducing launch costs significantly.
- Aerospace-grade avionics modules achieved 25% space savings by replacing traditional vias with stacked microvias, enabling modular upgrades in compact systems.
- An unmanned aerial vehicle (UAV) designer used Ultra HDI PCBs to cut wiring harness weight by 30%, increasing flight range by 10%.

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Communication and Consumer Electronics

Ultra HDI fabrication improves power efficiency in devices by shortening signal paths and reducing parasitics. It reduces the distance signals must travel, improving energy efficiency and minimizing energy loss. Lower parasitic capacitance and inductance enhance signal integrity,further reducing power consumption. With smaller interconnect distances, devices consume less power for signal transmission.

- Ultra HDI PCBs in a 5G base station reduced power consumption by 15%, allowing for more efficient deployment in remote areas.
- A smartphone manufacturer reduced motherboard size by 20% using Ultra HDI, allowing more room for larger batteries and advanced cameras.
- Thermal issues are historically one of the biggest headaches for designers. Ultra HDI PCBs integrate advanced thermal vias and conductive materials, improving heat dissipation.

A high-performance gaming laptop manufacturer used Ultra HDI to manage heat effectively, leading to a 20% increase in GPU performance without additional cooling costs.

Automotive Electronics

The automotive industry relies on Ultra HDI PCBs to reduce the size of control units and battery management systems. This reduces the total weight, which extends vehicle range. Electric vehicles (EVs) especially rely on Ultra HDI PCBs, which directly improve vehicle efficiency.

- Advanced driver-assistance systems (ADAS) and electric vehicles leverage Ultra HDI for compact control units.

With Ultra HDI technology, a luxury EV manufacturer reduced its battery management weight by 12%, extending vehicle range.

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Ultra HDI is not just an advancement: it is a necessity for high-reliability products. This technology lives up to its promises.

ADDITIONAL RESOURCES FOR YOU
OUR WEBSITE:
UHDI NEWSLETTER:
UHDI TECHNOLOGY, ADVANTAGES, DESIGN PARAMETERS AND FAQS IN A BROCHURE: