

# CoolRunner CPLDs Beat the Heat

The disadvantages of high power components...

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Conventional thinking assumes that high performance requires high power consumption, but the Xilinx XPLA3 CoolRunner CPLD family defies convention. In both ultra-low standby and total current consumption modes, Xilinx XPLA3 complex programmable logic devices consume less power than any other CPLDs in the world.

By consuming the least amount of power, CoolRunner CPLDs radiate the least amount of heat. Devices that emit excessive heat can cause serious problems, such as:

- Higher FIT (Failures In Time) rates.
- Intermittent field failures.
- Higher cabinet or enclosure design and manufacturing costs.
- Increased risk of EMI/RFI leakage (caused by extra cooling vents).
- Mechanical stress to package parts.
- Printed circuit board layout concessions.
- Design compromises that affect the overall size and appeal of the end product.

## The High Costs of High-Power Components

In addition to radiating destructive heat, devices that consume high amounts of power also generate extra costs. For instance, when you buy power supplies, the more power output you need to run the system, the higher the cost. Many designers accept the high costs of power supplies-without ever questioning the efficacy and efficiency of the devices demanding all that power.

Furthermore, a device that consumes a lot of power may require the addition of another physical component, such as a larger cooling fan or a heat sink. Adding to

the BOM (bill of materials) can be expensive. Besides the cost of the component itself, additional expenditures of time and money can be incurred:

- Locating and ordering the component.
- Shipping and delivery costs and delays.
- Controlling inventory.
- Dealing with the availability of the physical device.

Availability can be a real budget-buster; if that one single component cannot be obtained or delivered in a timely fashion, the entire system cannot be shipped to the customer. Assembly costs continue to rise until all components are delivered, installed, and shipped. Such a delay can turn a company's bottom line upside down.

## The CoolRunner Reliability Advantage

Heat plays an enormous role in determining the reliability of your designs in the field. Because most semiconductor devices are tested for hot temperature operating life (HTOL), it is easy to compare how long a product would last under high temperature conditions.

Consider how well a CoolRunner XPLA3 256-macrocell device performs in a Thin Quad Flat Package. The TQFP has the worst thermal characteristics of any available CPLD package. A worst-case analysis shows a CoolRunner XPLA3 256-macrocell device would run for 107 years at a constant 145 degrees Celsius!

As shown in Table 1, all other CPLD products, even in their low-power modes, radiate more heat than CoolRunner CPLDs. (For more information on how these measurements were obtained, see the Xilinx Thermal Emissions Web page at: [www.xilinx.com/products/cpldsolutions/techtopic/thermaling.htm](http://www.xilinx.com/products/cpldsolutions/techtopic/thermaling.htm).)

## Conclusion

Xilinx CoolRunner XPLA3 CPLDs are designed for high-performance, low-power products such as portable PCs, PDAs, and handheld wireless devices where heat can be a critical factor in form, fit, and function. If heat is the problem, CoolRunner CPLDs are the solution.

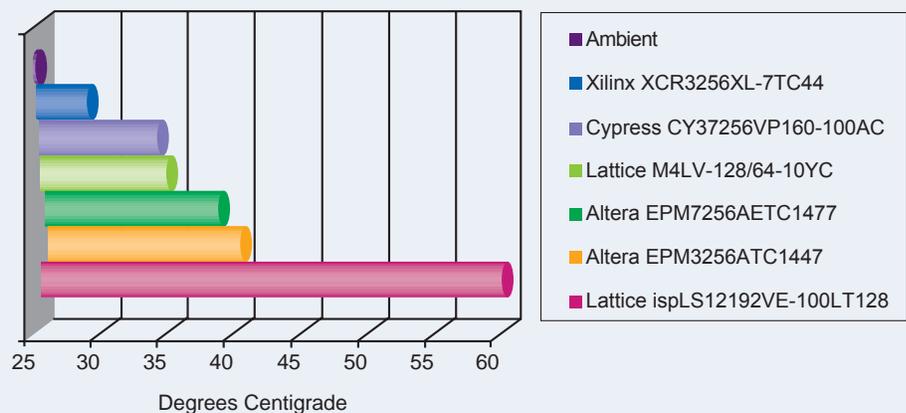


Table 1 - CPLD thermal emissions