

Ten Points to Consider When Using Logic in Your Next Automotive Design

Quick Tips

- Flash is green technology—ultra-low power, minimal part count, and lowest total system cost.
- Need lightning fast response time? Choose an FPGA over a microcontroller.
- Firm errors affect the quality of your end product. Know your exposure to neutron-based firm errors.
- FPGAs enable platform-based designs, reducing qualification costs across multiple programs.
- Look for a low-power FPGA to support high-temperature, system-critical automotive applications.
- Add in the cost of all support devices when evaluating FPGA technology—total system cost matters.
- Nobody wants to wait for their car to boot—select live-at-power-up technology for a clean getaway.



Automotive electronics designers have been turning more frequently to programmable logic solutions to meet the needs of their next-generation designs. FPGAs offer time-to-market benefits along with simplified qualification and greater flexibility in comparison to historic ASIC-based solutions.

Actel is a leading supplier of FPGAs to the automotive industry. Actel parts are being used in the most demanding mission-critical systems, such as powertrain and safety subsystems, in addition to infotainment and body electronics designs.

Actel FPGAs are found in automotive applications as diverse as engine control modules (ECM), blind spot vehicle detection, collision avoidance, adaptive cruise control (ACC), rearview back-up assistance vision systems, power steering control, personnel

occupancy detection systems (PODS), and video and on-screen text display multiplexing. A combination of firm-error immunity, ultra-low power, extended temperature range, single-chip, and live-at-power-up operation all make Actel the high-reliability choice for under-the-hood, safety, and telematics applications.

Offering a broad range of products with junction temperatures up to 135°C (AEC-Q100 grade 1), densities up to 1 M system gates, and low-cost, single-chip, flash-based technology, Actel has the programmable logic solution for your next design.

With Actel, you work with a partner, not a supplier. Actel is committed to supporting your most demanding designs, providing Production Part Approval Process (PPAP) documentation, and access to a dedicated team of support engineers.

Ten Considerations for Designing Your Next Automotive Application



1 Programmable Logic or ASIC?

Programmable logic is increasingly finding a home in automotive applications. Programmable logic devices have lower risk, shorter design cycles, and no non-recurring engineering costs (NREs) associated with them. Although FPGAs have historically been used in infotainment and telematics applications, nonvolatile FPGAs are also suitable for use in system-critical powertrain and safety applications.

2 Zero Defects

Actel nonvolatile FPGA products are firm-error immune and eliminate the failure in time (FIT) rate associated with SRAM-based programmable logic solutions. In addition to being a safety concern, firm errors in SRAM-based FPGAs lead to high field defect rates and are a quality concern.

3 Qualification

Programmable logic devices have the benefit of being standard products that are customizable. Many automotive companies have already taken advantage of this by creating product platforms that can be qualified once and then used on multiple projects. This saves the time and cost associated with qualification and also provides time-to-market benefits over alternative solutions.

4 FPGA versus CPLD?

Low-cost flash FPGAs offer CPLD-like costs with FPGA functionality. Actel's low-cost, flash-based, feature-rich families, such as ProASIC[®]3, allow for single-chip, low-power, cost-effective logic integration.

5 Less is More

True flash-based FPGAs offer single-chip operation. Because the flash benefits are superior, they are often imitated. Only Actel offers true flash-based FPGAs. Actel devices are not hybrids, stacked die, or flash-on-the-side-based technology. True flash devices are the only flash FPGAs that are firm-error immune and live-at-power-up Class 0, offering extended temperature operation to 135°C junction temperature for automotive applications.

6 Beginning-of-Life

Everybody has questions. Actel offers industry-standard PPAP documentation for its automotive devices and also has a dedicated team of engineers and support staff to address all questions that arise when designing for the most demanding applications. Actel is with you all the way from first ideas to end-of-life.

7 End-of-Life

FPGAs typically have much longer life cycles than ASSPs and ASICs. Many Actel FPGA families are still in volume production 15 years after they were first introduced. Securing a long-term supplier is key to reducing total cost of ownership for automotive applications.

8 Low Power Makes a Difference

Actel offers the lowest power FPGA technology available, which allows for high temperature operation without the risk of thermal runaway due to power-based self-heating. Only Actel ProASIC3 flash-based FPGAs offer AEC-Q100 Grade 1 (135°C junction temperature) support. High-temperature support also makes Actel devices appropriate for use in poorly ventilated, space-constrained systems such as powertrain and safety-based subsystems.

9 Speed Matters

Unlike microcontrollers and microprocessors, flash FPGAs have lightning fast response times. This enables rapid decision and response for system-critical applications. Additionally, high throughput FPGAs can run at lower clock speeds and accomplish the same data processing as a microcontroller, saving power and increasing reliability.

10 Heritage

Pick an FPGA supplier with a long heritage of high reliability product support and development. Actel FPGAs are used in space, aerospace, and automotive applications. If it moves, there is a good chance Actel FPGA devices ensure it does so safely.

For more information regarding Actel's automotive product offering, please contact your local Actel sales representative.



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