

Lattice Automotive

Accelerated Time-to-Market with Low-Cost Programmable Logic

The growing popularity of in-car navigation, multimedia and drive-by-wire systems is spurring rapid growth in automotive electronic content. To keep pace in a highly competitive marketplace, auto makers must add new and innovative electronic features each model year. Traditionally, ASICs were used for automotive electronics applications. But, as process technologies change, ASICs are becoming increasingly cost prohibitive, due to skyrocketing NRE charges. As ASIC costs rise, programmable logic devices (CPLDs and FPGAs) are becoming less expensive on a cost per logic element basis.

Solutions With Flexibility

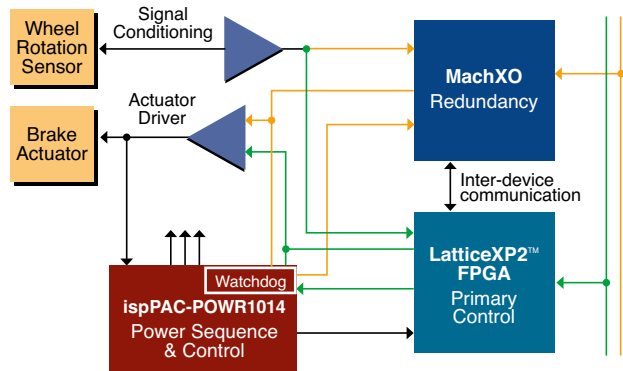
- Lattice's ISP™ (In-System Programmable) logic devices can be reconfigured during the design process as well as in the field
- Lattice's innovative ISP products can be easily and inexpensively upgraded after the automobile has shipped
- Lattice's PLDs offer the low-cost and flexibility needed to rapidly design the next generation of automotive electronics systems

Broad Range of Programmable Devices

Lattice products are available in commercial and industrial temperature grades. Select product families are also available as AEC-Q100 qualified or extended temperature grade.

Device Family	AEC-Q100 Qualified	Extended Temperature
LA-MachXO™	✓	✓
LA-ispMACH 4000V	✓	✓
LA-ispMACH 4000ZC	✓	✓
ispMACH™ 4000ZC		✓
ispMACH 4000V		✓
LA-ispPAC®-POWR1014/A	✓	✓
ispPAC®-POWR604		✓
ispPAC-POWR1208		✓

Lattice Programmable Solutions in Brake-by-Wire Application



Key Features and Benefits

- **AEC-Q100 Qualified**
 - LA-ispMACH 4000V & LA-ispMACH 4000ZC CPLD
 - LA-MachXO Crossover PLD
 - LA-ispPAC-POWR1014/A Programmable Power Manager
 - Supports Customer Specific Requirements (CSR)
 - Standard PPAP (Production Part Approval Process) Documentation
- **Extended Temperature Devices (-40°C to 125°C T_{AMBIENT})**
 - ispMACH 4000V & 4000Z
 - MachXO
 - ispPAC-POWR604, 1208 & 1014/A
- **Lowest Cost for Most Automotive Applications**
 - Lowest price per macrocell
 - ASIC replacement without NRE charges
 - Lowest cost prototyping
- **System-Level Integration**
 - Reduce part count and board size
 - Advanced, space-saving packages; migration options
 - 256 to 2280 LUT4s
 - 32 to 256 macrocell CPLDs
 - 32 to 271 I/Os
 - 5, 3.3, 2.5, 1.8, 1.5, 1.2V power supply operation
 - Programmable support for up to 21 I/O standards, including LVDS, SSTL and HSTL
 - Low voltage I/Os are 5V tolerant (LA-ispMACH 4000V/Z)
- **Flexible and Easy-to-Use**
 - Reprogrammable in the field
 - Reduced time-to-market
 - Industry standard third-party design tools
 - IP cores that can be quickly reconfigured
- **Low Power CMOS Operation**
 - Lowest dynamic power consumption
 - Lowest static power consumption (10µA static I_{cc})
 - Standby power to <100µA (LA-MachXO)

Lattice Automotive AEC-Q100 Qualified and Extended Temperature Products

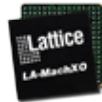
Device	Description	AEC-Q100 Qualified	Supply Voltage (V _{CC})	5V Tolerant I/O	Package Options
Crossover Logic (CPLD/FPGA) Products					
LA-MachXO	256 to 2280 LUTs, Performance to 4.9ns Pin-to-Pin, Standby Power to <100µA	✓	3.3/2.5/ 1.8/1.5/ 1.2	–	100, 144 TQFP ¹ 256, 324 ftBGA ¹
Complex PLDs (Programmable Logic Devices)					
LA-ispMACH 4000V	32 to 128 Macrocells, t _{PD} as Low as 7.5ns (168MHz), Low Power	✓	3.3	✓	44, 48, 100, 128, 144 TQFP ¹
LA-ispMACH 4000ZC	32 to 256 Macrocells, Zero Standby Power, t _{PD} as Low as 7.5ns (168MHz)	✓	1.8	✓	48, 100, 176 TQFP
ispMACH 4000V	32 to 256 Macrocells, t _{PD} as Low as 7.5ns (168MHz), Low Power	–	3.3	✓	44, 48, 100, 128, 144, 176 TQFP
ispMACH 4000ZC	32 to 256 Macrocells, Zero Standby Power, t _{PD} as Low as 7.5ns (168MHz)	–	1.8	✓	48, 100, 176 TQFP
ispPAC Power Manager Family – Programmable Power Supply Sequencing & Monitoring					
LA-ispPAC-POWR1014/A	Power Supply Sequencing and Monitoring: Total Power Management for up to 10 Power Supplies on Multi-voltage Circuit Boards.	✓	2.8 to 3.96	✓	48 TQFP
ispPAC-POWR1208	Power Supply Sequencing and Monitoring: Total Power Management for up to 12 Power Supplies on Multi-voltage Circuit Boards.	–	2.25 to 5.5	✓	44 TQFP
ispPAC-POWR604	Power Supply Sequencing and Monitoring: Total Power Management for up to 6 Power Supplies on Multi-voltage Circuit Boards.	–	2.25 to 5.5	✓	44 TQFP

1. Pb-free/RoHS package only.

Note: All Lattice programmable products are also available in Industrial temperature range versions. Please consult Lattice's web site for details.

LA-MachXO Crossover PLD

The LA-MachXO family of non-volatile, infinitely reconfigurable Programmable Logic Devices (PLDs) is well suited for applications using CPLDs or low-capacity FPGAs. This family provides the high pin-to-pin performance and instant-on capability associated with CPLDs, with the flexibility of FPGAs, all in a low-cost device.



- Performance to 4.9ns pin-to-pin
- TransFR™ technology allows easy field upgrades
- Up to 27.6Kbits sysMEM™ Embedded Block RAM
- Flexible I/O buffer
- Up to two analog PLLs per device
- Standby power to <100µA

High Speed and Zero Power CPLDs

Lattice delivers the world's fastest and lowest power CPLDs for automotive applications. The ispMACH 4000 device architecture offers pin-to-pin delays down to 7.5ns. The ispMACH 4000Z consumes only 10µA of standby current – the industry's lowest!



- 7.5ns t_{PD}, 168 MHz Fmax
- 10µA Static I_{CC} (ispMACH 4000Z)
- 5V Tolerant I/O for LVCMOS3.3 interface
- Lowest price per macrocell
- Space saving TQFP package options
- Lead-free/RoHS package options
- Easily interfaces with standard 1.8, 2.5, 3.3 and 5V I/O
- Hot-socketing capability
- Non-volatile, IEEE 1532 compliant
- AEC-Q100 qualified (LA-ispMACH 4000V & LA-ispMACH 4000Z)



ispPAC Power Manager

Lattice delivers its first AEC-Q100 programmable mixed signal PLDs for automotive applications. LA-ispPAC-POWR1014 and LA-ispPAC-POWR1014A devices make board power supply management easy.

- Ruggedized CPLD for sequencing, monitoring and supervisory signal generation
- Programmable precision threshold comparators to monitor up to 10 power supply voltages
- Programmable delay timers plus internal oscillator for flexible timing control
- Programmable high voltage MOSFET driver outputs control supply ramp rate

Lattice Quality and Reliability

Lattice is committed to providing the highest quality and most reliable products in the industry. The first major PLD manufacturer to complete ISO9000 registration, Lattice has been registered to the ISO9001 standard since 1993 and earned TS16949 certification in 2006.

Lattice ispLEVER® Design Tools & IP

Lattice's ispLEVER development tools are a comprehensive design environment for all Lattice programmable logic products. ispLEVER tools include everything you need for design entry, synthesis, map, place and route, floorplanning, simulation, project management, device programming, and more. Lattice offers an expanding range of reusable IP cores (ispLeverCORE™ IP modules) that allow customers to easily integrate many common functions into their Lattice programmable devices. For more information on Lattice's design tools and IP Cores, visit www.latticesemi.com.

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