



32-bit Power Architecture® MCUs

# MPC564xL Family

## Target Applications

- Electric power steering
- Short- and mid-range adaptive cruise control (up to 100m), RADAR and LIDAR
- Vehicle dynamic and chassis control
- ABS braking systems
- Electronic stability program (ESP)
- Blind spot detection
- Pre-crash detection
- Hybrid electric vehicles

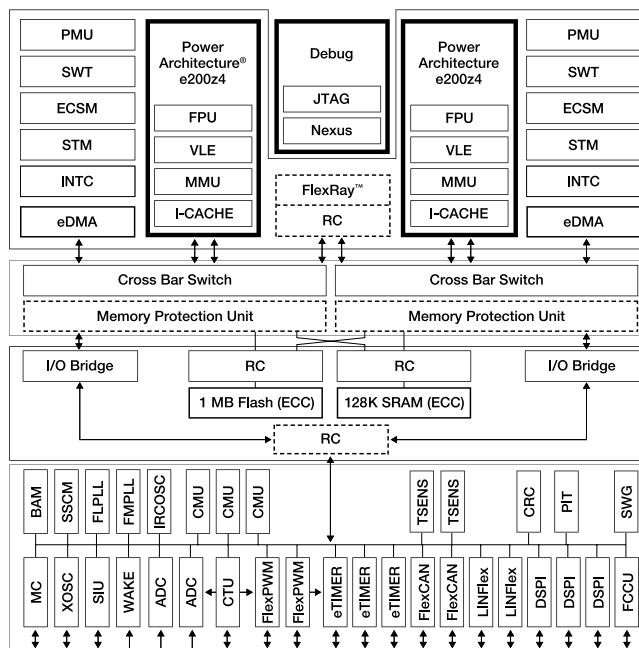
## Overview

The Qorivva MPC564xL family of MCUs is part of the SafeAssure program and is designed to specifically address the required IEC61508 (SIL3) and ISO26262 (ASILD) safety standards. It reduces design complexity and component count by putting key functional safety features on a single chip with a dual-core, dual-issue architecture.

In lockstep mode it provides an environment for redundant processing and calculations. Common cause failure countermeasures targeting power, clock and error propagation are implemented to detect various failure modes.

## Safety with flexibility

### MPC564xL Block Diagram



The MPC564xL's dual-core, dual-issue architecture can be statically switched from lockstep mode to decoupled parallel mode (independent core operation) for those applications needing maximum performance or software diversity. With dual-issue technology, the cores can process two instructions per clock cycle, enabling more performance and using less power.

The MPC564xL family is specifically designed to support actuator control applications for vehicle electrification. Enabled by the new cross-triggering unit, the device allows control of up to two brushless DC motors or multiple valves with only minimum interrupt load. Additional features include the fault collection unit, FlexRay™ protocol, two 12-bit ADCs, eTimer units and a built-in hardware self test.



## SafeAssure Program: Functional Safety. Simplified

The Freescale SafeAssure functional safety program is designed to help system manufacturers more easily achieve system compliance with functional safety standards: International Standards Organization (ISO) 26262 and 61508. The program highlights Freescale solutions—hardware and software—that are optimally designed to support functional safety implementations and come with a rich set of enablement collateral. For more information, visit [freescale.com/SafeAssure](http://freescale.com/SafeAssure).

## Development Tools

### Compilers

- Freescale CodeWarrior IDE, visit [freescale.com/CodeWarrior](http://freescale.com/CodeWarrior) for more information
- Green Hills
- Wind River Diab

### Debuggers

- P&E Micro
- Lauterbach
- Green Hills

### Runtime Software

- Flash and FEE drivers
- Software Core Self Test
- AUTOSAR MCU Abstraction Layer
- AUTOSAR OS

Package Options	
Temp Ranges (Ta)	Package
-40°C to +125°C	144 LQFP

System Challenges	MPC564xL Solution
Reduce system costs and simplify design	<ul style="list-style-type: none"> <li>• Reduces design complexity and component count by putting key functional safety features on a single chip</li> <li>• Dual processing spheres, including CPU, DMA, interrupt controller, crossbar and MPU for logic level fault detection</li> <li>• Dual z4 CPU architecture provides performance to address real-time applications and cross-checking functions common in many safety strategies, which reduces hardware and software complexity used in multiple MCU designs. The architecture can be run in two statically configurable modes of operation               <ul style="list-style-type: none"> <li>◦ Lockstep operation provides a software environment for redundant processing and calculations</li> <li>◦ Independent core operation (dual parallel mode) provides a software environment for diverse processing and calculations to increase performance or to cross check for reliable operation</li> </ul> </li> <li>• Built-in flexible hardware self-test capabilities provide diagnostic coverage both at logic and memory level</li> <li>• Fault collection and control unit manages MCU behavior in the event of internal MCU logic faults and signals these to external system components</li> <li>• FlexRay protocol and safety ports for robust communications</li> <li>• Probability of undetected failure per hour (PFH) = 0.1 FIT (one failure per every 10 billion hours)</li> <li>• Designed to address safety requirements outlined in IEC61508 and ISO26262, which reduces system cost and effort</li> </ul>
Precise and deterministic control timing for real-time applications, such as motor control	<ul style="list-style-type: none"> <li>• e200 dual-issue z4 CPU at 120 MHz provides computational performance targeted at vector-oriented control of motor applications</li> <li>• Dual-core architecture provides computation ability for complex applications or cross-checking requirements of safety applications</li> <li>• Precise control of integrated electric motor control periphery               <ul style="list-style-type: none"> <li>◦ Advanced PWM for specialized multi-phase motor control requirements</li> <li>◦ Configurable alignment</li> <li>◦ High frequency above 100 MHz</li> <li>◦ Dead time insertion</li> <li>◦ Skew correction</li> <li>◦ Cross-triggering unit coordinates ADC, timer and PWM generation and minimizes CPU interrupt load</li> <li>◦ eTimer units handle rotor position and speed acquisition and offer six dual-action IC/OC channels with incremental/quadrature encoder mode</li> <li>◦ Two 12-bit ADCs offer precise conversion for improved driving experience</li> </ul> </li> <li>• FlexRay protocol for fault tolerant communications with other networked modules within the vehicle</li> <li>• Up to 1 MB flash</li> <li>• Up to 128K SRAM</li> <li>• Motor control library of common functions</li> <li>• Ability to control two 3-phase motors, ideal for electrical steering applications</li> </ul>
Low-cost package is easy to solder and inspect	<ul style="list-style-type: none"> <li>• QFP package option               <ul style="list-style-type: none"> <li>◦ Cost effective</li> <li>◦ Low power</li> <li>◦ Exposed leads</li> </ul> </li> </ul>

Learn more at [freescale.com/Qorivva](http://freescale.com/Qorivva)

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