

PIC64GX Product Family

PIC64GX1000 Series



Summary

The PIC64GX microprocessor (MPU) is a 64-bit Linux[®] Operating System (OS)-capable processor that provides an innovative, mid-range, embedded compute platform that is based on the RISC-V[®] Instruction Set Architecture (ISA).

The PIC64GX MPU's micro-architecture implementation is a simple, five-stage, single-issue, in-order pipeline that is not vulnerable to the Meltdown and Spectre exploits that frequently occur in common, out-of-order machines. The PIC64GX has five RISC-V cores which are coherent with the memory subsystem, allowing a versatile mix of deterministic real-time systems and Linux in a single, multi-core processor cluster. With integrated secure boot, Linux and Real-Time modes, a large and flexible L2 memory subsystem and a rich set of embedded peripherals, the PIC64GX MPU provides new choices for developing secure and power-efficient embedded compute platforms.

Deterministic Asymmetric Multiprocessing (AMP) Linux Applications

Safety-critical, system control and security applications need the flexibility of the Linux OS and the determinism of real-time systems to control hardware. Typical Symmetric Multiprocessing (SMP) implementations may offer the flexibility of a rich operating system but are terrible for running real-time systems that need deterministic performance. The PIC64GX MPUs feature a multi-core Linux-OS-capable processor that is coherent with the memory subsystem, allowing a versatile mix of deterministic real-time systems and the Linux OS in a single multi-core CPU cluster. PIC64GX MPUs enable you to create high-performance and hard real-time systems.

Application Compute Complex With Real-Time Support

The PIC64GX family of MPUs provides multi-core 64-bit RISC-V processing. Highlights of the core complex include:

- Four U54 64-bit RISC-V CPU cores
- Linux capable with AMP and deterministic latencies
- Simultaneous Linux and RTOS/bare metal in conjunction with E51 monitor processor
- Five-stage, single-issue, in-order pipeline
- Operates at up to 625 MHz
- Physical Memory Protection (PMP) unit
- Memory Management Unit (MMU)
- L1 memory subsystem with Single-Error Correct, Double-Error Detect (SECEDED)
 - 32 KB eight-way instruction cache or optional 28 KB tightly integrated memory
 - 32 KB eight-way data cache
- 5K DMIPS performance

Integrated Monitor Processor

- The on-board monitor processor is an additional 64-bit RISC-V CPU core (E51) operating at 625 MHz
- 16 KB memory subsystem with SECEDED configurable as two-way L1 instruction cache or as an instruction tightly integrated memory
- 8 KB data tightly integrated memory
- PMP unit

Video Subsystem

- The PIC64GX MPU integrates MIPI CSI-2[®], HDMI[®] 1.4 and a video pipeline.
- Two lanes MIPI CSI-2 at 1 Gbps for connection to cameras and sensors
- Dedicated I²C, reset and standby signals for MIPI CSI-2 camera interfaces
- HDMI 1.4 output with dedicated I²C and HPD signals for line drivers
- Video pipeline with debayer, automatic white balance and color correction

Memory Interfaces

- The DDR interface controller supports DDR4-1333 or LPDDR4-1333
- Up to 32 Gb per DDR interface

On-Chip Memory

- 2 MB embedded SRAM for scratchpad memory
- 128 KB of user Nonvolatile Memory (NVM) for boot Flash
- 56 KB of secure NVM for user data and key storage
- Coprocessor/Accelerator Interfaces
- PCIe® Gen 2 x4 (FCV) or x1 (FCS) root ports
- Peripheral Interfaces
- Two SPI, five multi-mode UARTs, two I²C, 32 GPIOs, two CAN, MIPI CSI-2, HDMI 1.4, timers and watchdogs

Defense-in-Depth Security

- Dedicated secure enclave to support secure boot and platform root of trust
- Full support for AES, SHA, HMAC, ECDSA, RSA, DSA and DRBG
- Extensive anti-tamper detection and response capabilities

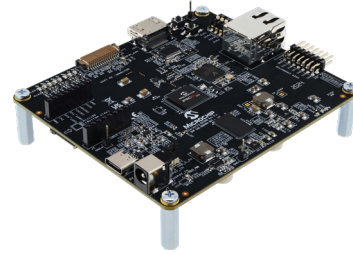
Tools



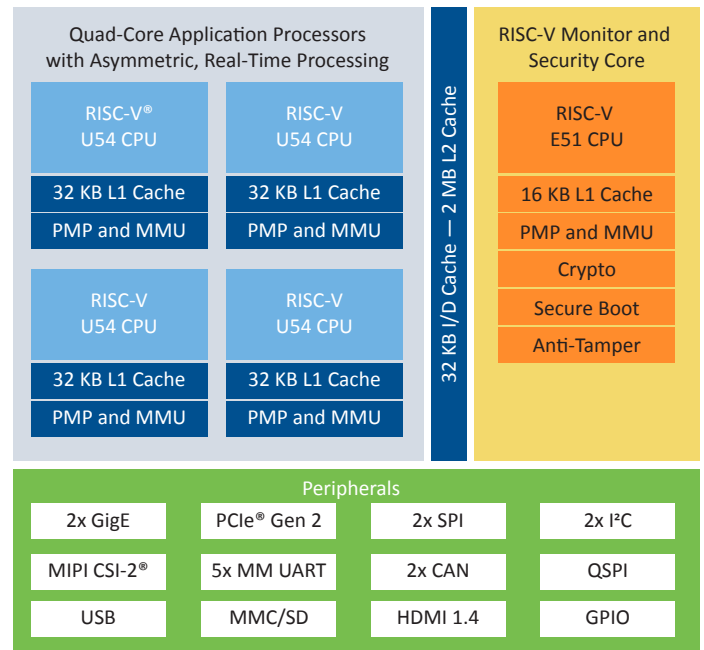
- Linux4Microchip
- Linux distributions and build systems:
 - Ubuntu®, Yocto Project®, Buildroot
- Zephyr® RTOS
- MPLAB® Extensions for VS Code®

Evaluation Kits

Curiosity PIC64GX1000 Kit ES



PIC64GX1000 Block Diagram



Product Table

Product	GX1000	
64-bit Application CPUs	4x RISC-V®	
64-bit Application CPUs DMIPs	5k	
Processing Modes	SMP and AMP	
Real-Time Optimizations	Yes	
Video I/O	CSI-2 Input, HDMI (720P) Output	
Video Pipeline	Debayer, Automatic White Balance	
Ethernet Interfaces	2x GbE	
AI/ML Features	No	
Secure Boot	Yes	
User/Application Crypto Acceleration	Yes	
Packages	FCS325	FCV484
PCIe® Gen 2	Root Port x1	x4
First Customer Availability	July 2024	July 2024

Contact Microchip for the fully qualified part number.