Quad Motor Control Development Platform

The quad motor control development platform is a flexible and cost-effective two-board solution that uses the i.MX RT1050 cross-over MCU for rapid development of multi-motor control applications.

OVERVIEW

NXP’s quad motor control development platform provides a unique solution to dramatically shorten the development time of multi-motor control devices.

The platform includes hardware and software capable of simultaneously driving up to 4 permanent-magnet synchronous motors (PMSM). It additionally provides communication, security and human-machine interface functionalities.

The design information of a fully compatible low-voltage power stage board complements the support package.

TARGET APPLICATIONS

The quad motor control development platform presents a powerful solution for the creation of next-generation multi-motor control applications, including:

- Factory automation
  - Motor control for automatic guided vehicles (AGVs), robots, conveyor belt systems, 4-axis machinery, low-end multi-axis servo drives, AC drives
- Digital manufacturing
  - 3D printers, low-end CNC machines, industrial printers
- Building automation devices
  - HVAC, door access control
- Surveillance devices
  - Drones, positioning system for surveillance cameras
- Smart appliances
  - Cleaning robots, washing machines, printers
**KEY VALUE PROPOSITION**

The quad motor control development platform consists of two main boards: a daughter card, which integrates a single i.MX RT chip, and a digital board, which acts as the expansion board for the daughter card.

**Cost-effective:** A single i.MX RT MCU solution is able to control up to 4 motors simultaneously allowing a significant bill-of-materials reduction.

**Flexible:** The 2-board design allows easy migration with the i.MX RT high-end roadmap. Future daughter card releases will integrate upcoming i.MX RT MCUs, enabling the upgrade of digital boards in the field.

**Multiple peripherals:** The digital board is a powerful expansion board providing access to the many peripherals that the i.MX RT family supports: PWMs, ADCs, UARTs, USB, Ethernet, CAN, LCD, FlexIO.

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### MAIN COMPONENTS

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<tr>
<td>Daughter Card</td>
<td>Small-form-factor board designed to be plugged into digital board</td>
<td>200 pos SODIMM card form factor, 1x i.MX RT 1050 (main controller), Power management with DCDC and LDOs, 1x Ethernet PHY, 1x SD card interface, 1x on board PoR (Power-on reset) button, 1x dip switch for boot mode and configuration, 1x on board QSPI NOR flashes for XIP</td>
<td>67.6 x 30.48 mm</td>
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<tr>
<td>MIMXRT1052CVL5B</td>
<td>i.MX RT1050 crossover processor qualified for industrial requirements</td>
<td>528 MHz Arm® Cortex®-M7 core, with 32 KB L1 instruction cache, 32 KB L1 data cache and full featured floating-point unit (FPU), Boot ROM (96 KB), On-chip RAM (512 KB)</td>
<td>10 x 10 mm 0.65 mm pitch</td>
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<tr>
<td>Digital Board</td>
<td>Main connection board designed to expand peripherals of the daughter card, enabling interfaces for motor control, wired/wireless communication, HMI and general input/output ports</td>
<td>1 x 200 pos SODIMM connector for daughter card, 4 x motor control connector (includes PWM, encoder, ADC and fault signals), Power management with DC-DCs and LDOs, 1 x LCD interface, 1 x µUSB interface, 1 x header for external Wi-Fi® module, 1 x header for external Bluetooth® module, 1 x RJ45 Ethernet port, Onboard user LEDs and buttons, 1 x EdgeLock™ SE050 secure element</td>
<td>138.6 x 174 mm</td>
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<tr>
<td>SE050C2</td>
<td>EdgeLock™ SE050 secure element qualified for industrial requirements</td>
<td>Built on NXP Integral Security Architecture 3.0™, CC EAL 6+ certified HW and OS, Multiple logical and physical protection layers</td>
<td>3 x 3 mm 0.4 mm pitch HX2QFN20</td>
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*Power Stage Board (*Not available as a product, only as development design)*

- Single board integrating 4 power stages to control PMSM or BLDC motors
- Provides seamless connection with digital board to control each individual power stage
- Board design based on NXP’s motor control FRDM technology
- Power management with DC-DC and LDO
- DC bus motor break circuitry
- Integrates 4 x FRDM motor control power
- Support up to 4 PMSM or BLDC motors
- Input for encoder/hall sensors
- Input voltage 24 V/30 V/48V
- Maximum input current 16 A

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**Secure:** The digital board’s EdgeLock™ SE050 secure element acts as a highly secure root of trust for advanced security use cases, enhancing the overall system security.

**Versatile:** The quad motor control application requires only 30 percent of i.MX RT computing power, allowing additional concurrent applications like HMI, wired/wireless communication and cryptographic operations.

**Motor control software enablement:** The development platform’s support package includes standalone sample code for motor control and is compliant with the latest NXP MCUXpresso SDK and NXP’s user-friendly real-time debugger, FreeMASTER.

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**QUAD MOTOR CONTROL DEVELOPMENT PLATFORM BLOCK DIAGRAM**

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**www.nxp.com/quadmotorcontrol**

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