

Development platform for cost-effective MCU multi-motor control applications

## 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.

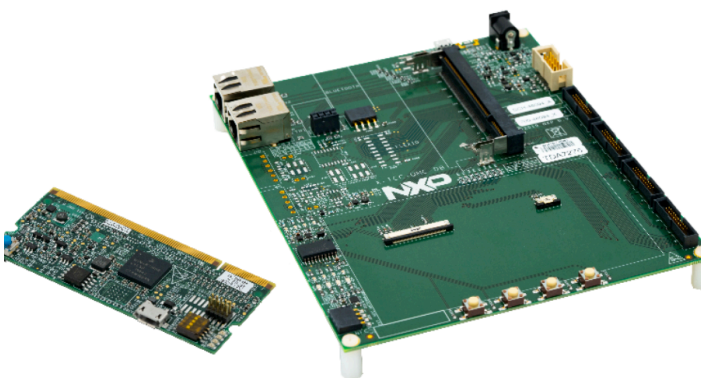
The platform includes hardware and software capable of simultaneously driving up to 4 permanent-magnet synchronous motors (PMSM). It additionally provides communication, security and human-machine interface functionalities.

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.

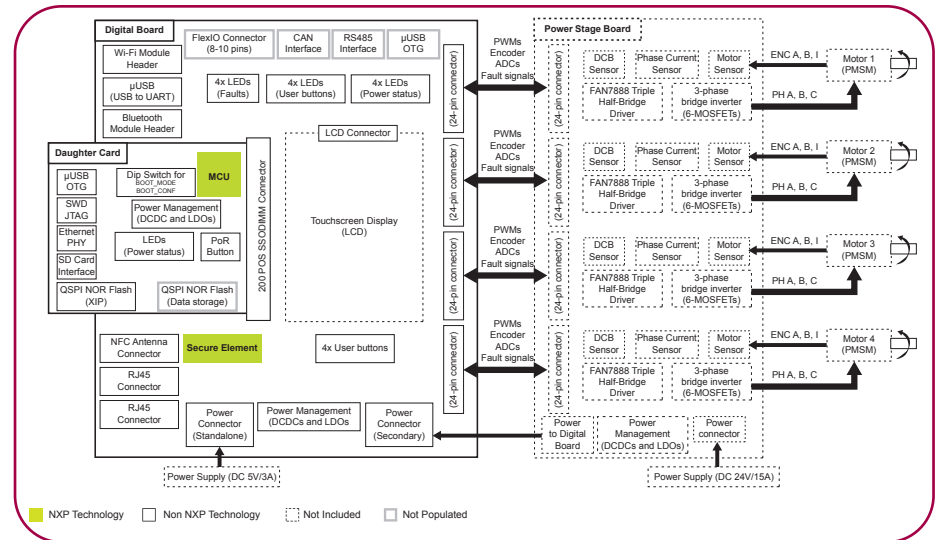
**Secure:** The digital board's EdgeLock™ SE050 secure element acts as a highly secure root of trust for advanced security use cases, enhancing the overall system security.

**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.

## QUAD MOTOR CONTROL DEVELOPMENT PLATFORM BLOCK DIAGRAM



## MAIN COMPONENTS

COMPONENT	DESCRIPTION	FEATURES	DIMENSIONS
Daughter Card	<ul style="list-style-type: none"> <li>Small-form-factor board designed to be plugged into digital board</li> <li>Daughter card integrates single-chip i.MX RT crossover processor</li> <li>Allows future upgrades of digital board with i.MX RT high-end roadmap</li> </ul>	<ul style="list-style-type: none"> <li>200 pos SODIMM card form factor</li> <li>1x i.MX RT 1050 (main controller)</li> <li>Power management with DCDC and LDOs</li> <li>1x Ethernet PHY</li> <li>1x SD card interface</li> <li>1x on board PoR (Power-on reset) button</li> <li>1x dip switch for boot mode and configuration</li> <li>1x on board QSPI NOR flashes for XIP</li> </ul>	67.6 x 30.48 mm
MIMXRT1052CVL5B	<ul style="list-style-type: none"> <li>i.MX RT1050 crossover processor qualified for industrial requirements</li> </ul>	<ul style="list-style-type: none"> <li>528 MHz Arm® Cortex®-M7core, with 32 KB L1 instruction cache, 32 KB L1 data cache and full featured floating-point unit (FPU)</li> <li>Boot ROM (96 KB)</li> <li>On-chip RAM (512 KB)</li> </ul>	10 x 10 mm 0.65 mm pitch
Digital Board	<ul style="list-style-type: none"> <li>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</li> <li>Integrates a secure element that enhances the overall system security</li> </ul>	<ul style="list-style-type: none"> <li>1 x 200 pos SODIMM connector for daughter card</li> <li>4 x motor control connector (includes PWM, encoder, ADC and fault signals)</li> <li>Power management with DC-DCs and LDOs</li> <li>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</li> <li>Onboard user LEDs and buttons</li> <li>1 x EdgeLock™ SE050 secure element</li> </ul>	138.6 x 174 mm
SE050C2	<ul style="list-style-type: none"> <li>EdgeLock™ SE050 secure element qualified for industrial requirements</li> </ul>	<ul style="list-style-type: none"> <li>Built on NXP Integral Security Architecture 3.0™</li> <li>CC EAL 6+ certified HW and OS</li> <li>Multiple logical and physical protection layers</li> </ul>	3 x 3 mm 0.4 mm pitch HX2QFN20
*Power Stage Board (*Not available as a product, only as development design)	<ul style="list-style-type: none"> <li>Single board integrating 4 power stages to control PMSM or BLDC motors</li> <li>Provides seamless connection with digital board to control each individual power stage</li> <li>Board design based on NXP's motor control FRDM technology</li> </ul>	<ul style="list-style-type: none"> <li>Power management with DC-DC and LDO</li> <li>DC bus motor break circuitry</li> <li>Integrates 4 x FRDM motor control power</li> <li>Support up to 4 PMSM or BLDC motors</li> <li>Input for encoder/hall sensors</li> <li>Input voltage 24 V/30 V/48v</li> <li>Maximum input current 16 A</li> </ul>	123.2 x 213.1 mm

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