i.MX RT INDUSTRIAL DRIVE DEVELOPMENT PLATFORM

Comprehensive modular development platform for Industrial applications with moving axis in Factory and Building Automation, Transportation, Robotics and more. This flexible modular board kit enables evaluation of multi-axis motor control, deterministic Ethernet with time-sensitive networking (TSN), human machine interfaces (HMI), and cyber-resilient industrial security.

OVERVIEW

Leveraging the 800 MHz performance on the industrial qualified i.MX RT1170 crossover MCU, the i.MX RT Industrial Drive Development Platform unites essential technologies for the next era of secure industrial IoT. The solution uses the i.MX RT1170 crossover microcontroller capability to control up to four Permanent-Magnet Synchronous Motors (PMSM) simultaneously. The solution makes use of advanced motor control algorithms and technologies, and the MCU has bandwidth to spare to support display, deterministic Ethernet TSN, data logging, fault detection and a security approach that will be certified ISA/IEC 62443-4 SL3. Together with the on-board NXP Secure Element (EdgeLock® SE05x), the development platform is a comprehensive, multi-board platform for the evaluation and validation of multiple industrial applications.

DAUGHTER CARD

POWER STAGE BOARD

DIGITAL BOARD

TARGET APPLICATIONS

- **Digital Manufacturing**
- **Industrial Robotics**
- **Mobile Service Robots**
- **Vertical Transportation**
- **Motor Drives**
- **Multi-axis Machinery**
- **3D Printers**

KEY VALUE PROPOSITION

- **Multi-axis servo control**
  Provides sample code to guide how to leverage MCU peripherals and Gate Drivers for single-to-multiple motor control.

- **Real-time deterministic communication**
  Provides sample code to guide enablement of a field device as a TSN end point in a TSN-enabled network.

- **Standardized industrial cybersecurity**
  Provides meaningful guidance and collateral to ease the ISA/IEC 62443-4-1/2 certification journey with NXP products.*

- **Fault detection**
  Provides sample code to enable NXP analogue and digital technology for instantaneous fault detection.

* Users should be aware that this platform only serves as a reference design platform. It does not grant automatic ISA/IEC62443-4-1/2 certification to their products.

i.MX RT INDUSTRIAL DRIVE DEVELOPMENT PLATFORM MAIN COMPONENTS

BOARD	DESCRIPTION	NXP TECHNOLOGY	DIMENSIONS
Daughter Card ISI-QMC-DGC02	Control board that integrates MCU chip, debugging interface and Ethernet TSN port	• i.MX RT1176 (Crossover MCU) • PF5020 (PMIC) • TJA115x (CAN)	70 mm x 101 mm
Digital Board ISI-QMC-DB02	Expansion board for Daughter Card, integrates multiple peripherals for communication, security and HMI	• SE05x (Secure Element) • NAFE13388 (Analog Front End - Analog Input) - Optional • TJA146x (CAN) • PN7462 (NFC Reader) • PCT2075 (Temperature Sensor)	228 mm x 236 mm
Power Stage Board ISI-QMC-PSB02 or ISI-QMC-PSB02B	Board that transforms the control commands into power signals to drive servo motor (200 W up to 450 W)	• GD3000 (Gate Driver) • NAFE13388 (present in ISI-QMC-PSB02, (optional in ISI-QMC-PSB02B)	102 mm x 179 mm

RECOMMENDED MOTOR TYPE	ENCODER TECHNOLOGY	POWER
• Platform can support: PMSM, brushless DC motor (BLDC), AC Induction motor (ACIM). • Sample code uses PMSM motor type. • **Be aware that motors are not included.**	• Recommended: Incremental TTL encoder. • Sample code uses 4k counts/rev; this can be changed as well.	Recommend not to exceed 420 W. Keep a safe zone from limits.

FLEXIBLE APPROACH FITS MULTIPLE INDUSTRIAL APPLICATIONS

The development platform consists of three main boards: a daughter card, which integrates a single i.MX RT1170 crossover MCU device, a digital board, which acts as the expansion peripheral board for the daughter card and a power stage board, which handles higher power rates to control the motors. Depending on application specifications, developers can add from one to four power stage boards to the system, providing flexibility for design requirements.

i.MX RT INDUSTRIAL DRIVE DEVELOPMENT PLATFORM SYSTEM DIAGRAM
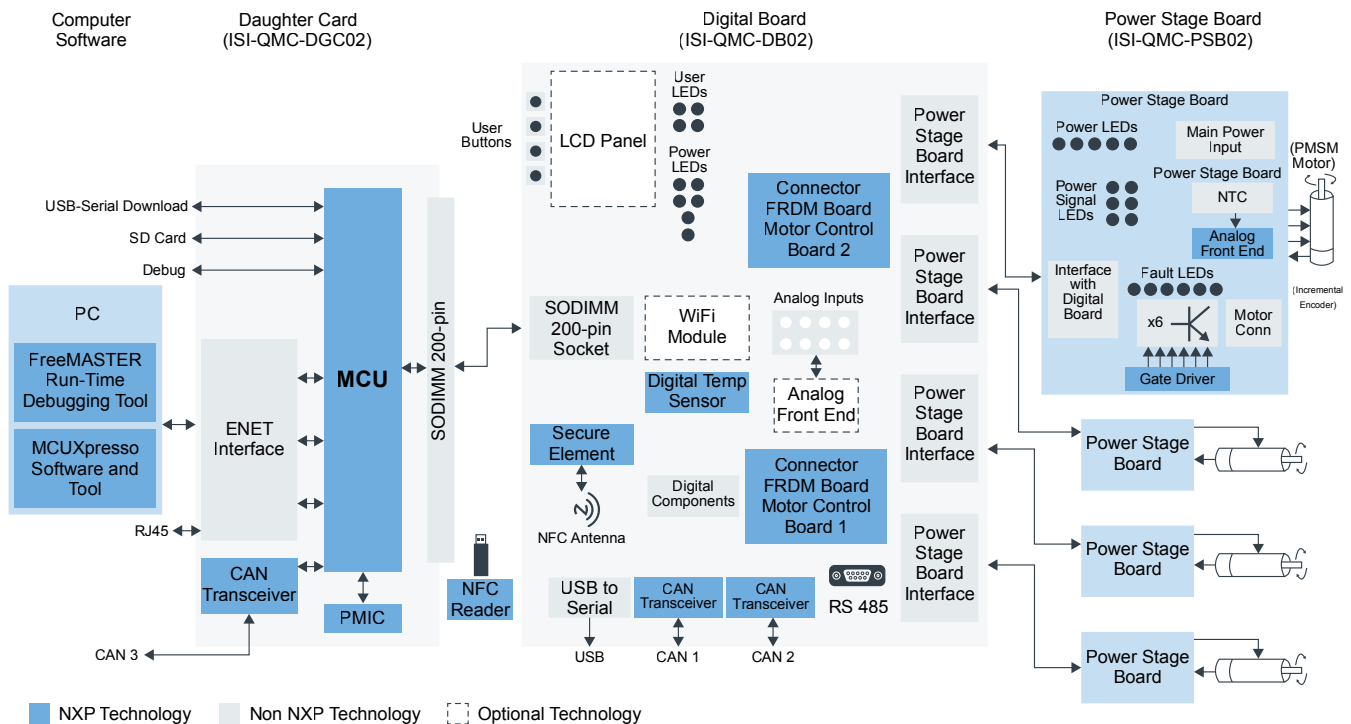
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