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.

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

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**

<table>
<thead>
<tr>
<th>BOARD</th>
<th>DESCRIPTION</th>
<th>NXP TECHNOLOGY</th>
<th>DIMENSIONS</th>
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</table>
| Daughter Card                | Control board that integrates MCU chip, debugging interface and Ethernet TSN port | • i.MX RT1176 (Crossover MCU)  
• PF0520 (PMIC)  
• TJA115x (CAN) | 70 mm x 101 mm |
| ISI-QMC-DGC02                |             | • SE05x (Secure Element)  
• NAFE13388 (Analog Front End - Analog Input) - Optional  
• TJA146x (CAN)  
• PN7462 (NFC Reader)  
• PCT2075 (Temperature Sensor) | 228 mm x 236 mm |
| Digital Board                | Expansion board for Daughter Card, integrates multiple peripherals for communication, security and HMI |             | 102 mm x 179 mm |
| ISI-QMC-D802                 |             | • GD3000 (Gate Driver)  
• NAFE13388 (present in ISI-QMC-PSB02, optional in ISI-QMC-PSB02B) |             |
| Power Stage Board            | Board that transforms the control commands into power signals to drive servo motor (200 W up to 450 W) |             |             |
| ISI-QMC-PSB02 or ISI-QMC-PSB02B |             | • Recommended: Incremental TTL encoder.  
• Sample code uses 4k counts/rev; this can be changed as well. |             |

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<th>RECOMMENDED MOTOR TYPE</th>
<th>ENCODER TECHNOLOGY</th>
<th>POWER</th>
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| • 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. |             |       |

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**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**

- Computer Software
- Daughter Card (ISI-QMC-DGC02)
- Digital Board (ISI-QMC-D802)
- Power Stage Board (ISI-QMC-PSB02)

**Recommended Technology**

- NXP Technology
- Non NXP Technology
- Optional Technology

www.nxp.com/imxrtindustrialdrive

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