i.MX RT Series

# **NXP** Communicator

# Expanding the i.MX RT Series

# i.MX RT1020

High-performance features set in low-cost LQFP package

Featuring ARM Cortex-M7 core with up to 500 MHz frequency, the i.MX RT1020 expands the popular i.MX RT Series with an LQFP package option.

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## **Crossover Processors**

Crossover processors are built using applications processors chassis, delivering a high level of integration, high speed peripherals, enhanced security, and engines for enhanced user experience (for example, 2D/3D graphics); but powered by a low-power MCU core running a real-time operating system like RTOS. Crossover processing helps MCU customers move up to applications processor-level of performance while staying with their current tool chain—and potentially without having to add time, cost, or complexity of Linux (or other higher level operating systems) software development to their product design cycle.

Crossover processors is a term defined by NXP in June 2017, with the first i.MX RT processor (the i.MX RT1050) launched in October 2017.



## i.MX RT Series

i.MX RT series is NXP's line of real-time applications processors. Products are built using i.MX technology and have performance over 400 MHz. The wider Cortex-M portfolio from NXP is still readily available and continues to grow, especially within the popular LPC and Kinetis portfolios of microcontrollers. i.MX RT series bridges the gap between the traditional MCUs and the i.MX space, allowing MCU customers a path for significant performance and integration improvements, without sacrificing ease-of-use.

The i.MX RT series was announced in June 2017 and includes products like the i.MX RT1050 (announced June 2017, launched October 2017), i.MX RT1020 (announcement in October 2017, launch in June 2018) and the i.MX RT1060 (announced in February 2018, launch in October 2018).

## i.MX RT1020

i.MX RT1020 is the latest product in the i.MX RT series.

The i.MX RT1020 expands the i.MX RT crossover processor families by providing highperformance feature set in low-cost LQFP packages, further simplifying board design and layout for customers. The i.MX RT1020 runs on the Arm<sup>®</sup> Cortex-M7<sup>®</sup> core at up to 500 MHz. Below is the product comparison between the i.MX RT1020 and i.MX RT1050.

# i.MX RT1020 - From i.MX RT1050 to Low Cost LQFP Solutions



Red indicates change from i.MX RT1050

### **Target Applications (similar to i.MX RT1050)**

- Audio Subsystem—professional microphone, guitar pedals
- Consumer Products—Smart appliances
- Home and Building Automation—HVAC climate control, security, lighting control panels, IoT gateways
- Industrial Computing Designs—EBS, PLCs, factory automation, test and measurement, M2M, assembly line robotics
- Motor Control and Power Conversion—3D printers, thermal printers, unmanned autonomous vehicles, robotic vacuum cleaners

### i.MX RT1020 Product Overview

#### **Block Diagram**

System Control	Main CPU Platform	Connectivity
Secure JTAG	Core	2x eMMC 4.5/SD 3.0
PLL, OSC	Arm <sup>®</sup> Cortex <sup>®</sup> -M7	8x UART
eDMA	16 KB I-cache 16 KB D-cache	8x8 Keypad
4x Watch Dog	FPU MPU NVIC	4x 12C
6x GP Timer		4x SPI
2x Quadrature ENC	External Memory	GPIO
2x QuadTimer	Dual-Channel Quad-SPI with Bus Encryption Engine	3x 12S/SAI
2x FlexPWM	External Memory Controller	S/PDIF Tx/Rx
IOMUX	8/16-bit SDRAM Parallel NOR Flash	2x CAN
Internal Memory	NAND Flash	USB2.0 OTG with PHY
256KB SRAM/TCM	Security	WIGHFITT
96KB ROM	Ciphers & RNG	10/100 ENET with IEEE 1588
Power Mgmt	Secure RTC	ADC / DAC
DCDC & LDO	eFuse	2x ADC (20-ch.)
Temp Monitor	HAB	4x ACMP

#### PERFORMANCE AND INTEGRATION HIGHLIGHTS

- ARM<sup>®</sup> Cortex<sup>®</sup>-M7 up to 500 MHz with 16KB/16KB I/D cache
- High Speed USB with PHY
- Multi PWM for dual motor control
- Security (on-the-fly FlexSPI decryption)
- Rich audio features

#### LOW COST AND EASY TO DEVELOP

- Starting from \$2.18 @ 10Ku
- LQFP packages enable low-cost 2-layer PCB design
- Integrated power management module reduces complexity of external power supply
- FreeRTOS with SDK
- MCUXpresso / Keil / IAR

#### **SPECIFICATIONS**

- Package:
  - 100 LQFP, 14x14  $\leftarrow$  Launching in June 2018
  - − 144 LQFP, 20x20 ← follow-up launch in Q4 2018
- Temp/Qual:
  - -40 to 105 C (Tj), Industrial
  - 0 to 95 C (Tj) Consumer

### **Development tools and Ecosystem**

#### MIMXRT1020-EVK

The MIMXRT1020-EVK development board is orderable now and has a distributor cost of \$41.65 USD. This board provides true MCU-usability and the out-of-box experience (OOBE) will follow the popular Kinetis format with the Getting Started information and videos online at time of launch.



#### Processor

• NXP Semiconductors MIMXRT1021, 500MHz ARM Cortex-M7, 144 LQFP

#### Memory

- 256 Mbit SDRAM memory
- 512Mbit Hyper Flash
- Footprint for QSPI Flash
- TF socket for SD card

#### Audio

- Audio Codec
- 4-pole Audio Headphone Jack
- External speaker connection
- Microphone

#### Connectivity

- Micro USB OTG connector
- Ethernet (10/100T) connector
- CAN transceivers
- ARDUINO interface

#### Sensor

• 6-axis ecompass (3-axis Mag, 3-axis Accel) sensor (FXOS8700CQ)

#### Debug

- JTAG connector
- On-board DAP-Link debugger

#### 2 layer through hole PCB

### **Software Enablement**

- MCUXpresso SDK
  - o Extensive suite of robust peripheral drivers, stacks, and middleware
  - Includes software examples demonstrating use of peripheral drivers and middleware
- ARM<sup>®</sup> Mbed<sup>®</sup>-enabled
- Free RTOS
- Integrated Development Environments (IDE)
  - IAR Embedded Workbench
  - o ARM Keil Microcontroller Development Kit
  - MCUXpresso IDE