

AN14570

Design with RT1040-EVK for RT104x Devices

Rev. 1.0 — 12 February 2025

Application note

Document information

Information	Content
Keywords	AN14570, RT1041, RT1042, RT1042, RT1046
Abstract	This application note helps to facilitate selection and development of RT1040 family.



1 Introduction

i.MX RT1040 Crossover MCUs are based on the Arm Cortex-M7 core for real-time performance and high integration for Industrial and IoT applications.

The i.MX RT1040 Arm Cortex-M7 operates at up to 600 MHz with 1 MB on-chip RAM that can be configured as Tightly-Coupled Memory or general-purpose. The family offers various memory interfaces and a wide range of connectivity interfaces including UART, SPI, I²C, USB, and CAN. The new i.MX RT1046 provides additional flexibility with a 169 BGA compact package and an extended temperature range up to 125 °C.

Currently, there are four-part numbers in the RT1040 family: RT1041, RT042, RT1043, and RT1046. There are some minor differences between these parts, so this application note is written to facilitate selection and development.

2 Chip overview and key points

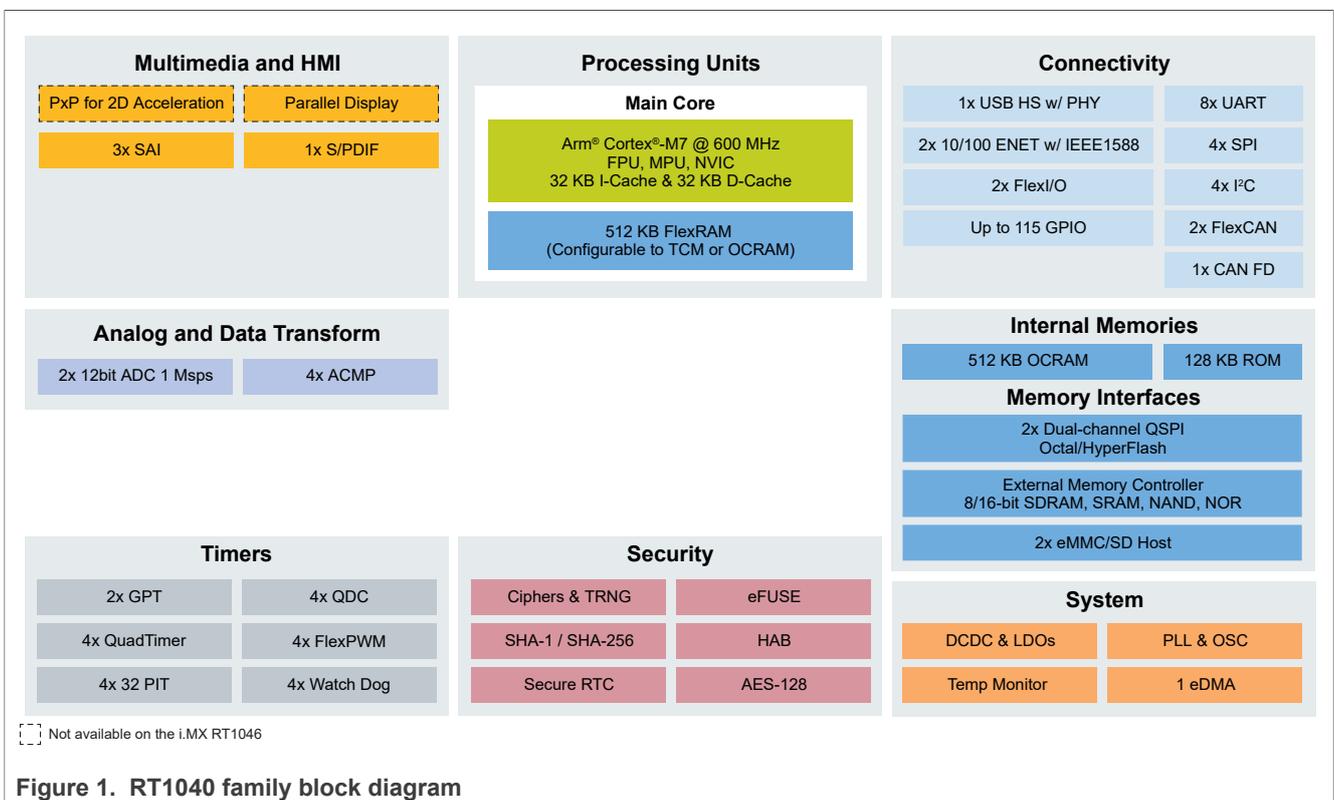


Figure 1. RT1040 family block diagram

About the performance, all commercial parts can run at 600 MHz and the industrial parts can achieve 528 MHz. All parts support up to 512 KB TCM which guarantees fixed low-latency memory access for performance-critical applications. Therefore, the performance of the CPU is consistent, and the main differences are reflected in the number of peripherals, the size of the SRAM storage space, and the package type.

Table 1 briefly describes the differences between the devices.

Table 1. Differences between RT1040 devices

	RT1041	RT1042	RT1043	RT1046
ADC	12 ch	12 ch	12 ch	15 ch
FlexRAM	512 KB	512 KB	512 KB	512 KB

Table 1. Differences between RT1040 devices...continued

	RT1041	RT1042	RT1043	RT1046
OCRAM	0	0	512 KB	512 KB
ENET	x1	x1	x1	x2
LPSPi	x3	x3	x3	x4
LCD/PXP	N	Y	Y	N
T _j (Commercial)	0 to +95	0 to +95	0 to +95	0 to +95
T _j (Industrial)	-40 to +125	-40 to +125	-40 to +125	-40 to +125
Package	9 × 9 mm, 0.65 mm, BGA169	9 × 9 mm, 0.65 mm, BGA169	9 × 9 mm, 0.65 mm, BGA169	7 × 7 mm, 0.5 mm, BGA169
	11 × 11 mm, 0.8 mm, BGA169	11 × 11 mm, 0.8 mm, BGA169		
Note: The ball maps for RT1041/RT1042 9 × 9 and 11 × 11 mm are different.				

Based on [Table 1](#) and common questions from customers, here are some key points:

- The ball maps for RT1041/RT1042 9 × 9 and 11 × 11 mm are different.
- The ball maps are different for 7 × 7, 9 × 9, and 11 × 11 mm in the RT1040 family.
- RT1043 = RT1042 + 512 KB OCrAM, but RT1043 only has a 9 × 9 mm package.
- In the same package, RT1041, RT1042, and RT1043 are pin-compatible.

3 Development and design reference materials

3.1 Hardware

For RT1041, RT1042, and RT1043, there are EVK design files for reference: [RT1040_EVK_Design_Files](#).

Note: The RT1040_EVK design is based on the chip with 11 × 11 mm, 0.8 mm, and BGA169 package. For RT1041/RT1042/RT1043 devices with 9 × 9 mm, 0.65 mm pitch, its ballmap is different from the one on RT1040_EVK and customer should refer to the symbol package information in the RT1040 datasheet.

For RT1046, there are RT1046 EVK design files for reference: [RT1046_EVK_Design_Files](#).

3.2 Software

For RT1041 and RT1042, customer can use the RT1040 SDK directly.

For RT1043, it has 512 KB FlexRAM and 512 KB OCrAM, which is bigger than RT1042. Based on this, customer can use the RT1040 SDK with the RT1060 linker file. Or, customer can use the RT1060 SDK.

For RT1046, suggest using the RT1060 SDK.

4 Revision history

[Table 2](#) summarizes the revisions to this document.

Table 2. Revision history

Document ID	Release date	Description
AN14570 v1.0	12 February 2025	Initial public release

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