DDR memory selection and enablement for i.MX platforms

When evaluating DDR options, whether prioritizing system performance and power efficiency or focusing on reliability criteria such as long lifecycle support, stability and cost-effectiveness, or finding a balanced combination of both these factors, the i.MX Applications processors offer the DRAM interface flexibility required to meet these needs.

With scalable architectures and support for DRAM interfaces ranging from LPDDR2/3, DDR3L, DDR4,LPDDR4/4x to LPDDR5, each new generation the i.MX Series has evolved the memory subsystem to balance performance and power efficiency for their targeted end applications, while remaining scalable to support both legacy and latest generation DRAM technologies. This adaptability for stable legacy memory options while evolving to support the new latest DRAM standards enables customers to design systems that leverage the most appropriate memory solutions.

DRAM interface support across i.MX series

The following table details the DRAM interfaces supported across the i.MX 6, 7, 8, and 9 series of application processors.

i.MX Series/Family	LPDDR2	LPDDR3	DDR3L	DDR4	LPDDR4	LPDDR4x	LPDDR5
i.MX 6	✓	✓ *	✓				
i.MX 7Solo/Dual/ULP	✓	✓ *	✓ *				
i.MX 8M Quad/Mini/Nano			✓	✓	✓		
i.MX 8M Plus				✓	✓		
i.MX 8					✓		
i.MX 8X/8XLite			✓		✓		
i.MX 8ULP		✓			✓	✓	
i.MX 91					✓		
i.MX 93					✓	✓	
i.MX 943					✓		✓
i.MX 95						✓	✓
i.MX 952						✓	✓

*Interface supported on only select devices within the i.MX Series/Family

Table 1: i.MX applications processor DRAM interface support

The i.MX series of application processors are designed with DRAM interfaces selected to deliver optimal performance, power efficiency and reliability for their targeted end applications in the consumer, industrial and automotive sectors.

i.MX 6 and i.MX 7 series

Both the i.MX 6 and i.MX 7 Series support LPDDR2 and DDR3/DDR3L memory; the i.MX 7 Series also supports LPDDR3. This combination provides a cost-effective solution while also ensuring a long lifecycle for product designs, making these series well-suited for applications where longevity and budget are important considerations.

i.MX 8 series

With the introduction of the i.MX 8 Series, support for LPDDR4 and DDR4 was added. These interfaces enable the development of high-bandwidth applications, such as machine vision systems, advanced multimedia solutions and automotive infotainment platforms. The i.MX 8M family has several devices which support three protocols, DDR3L, DDR4 and LPDDR4. Additionally, five device families within the i.MX 8 Series have maintained backward compatibility with DDR3/DDR3L interfaces, and one family maintained backward compatibility for LPDDR3, ensuring flexibility for various design requirements.

i.MX 9 series

The i.MX 9 Series further introduced LPDDR4X and LPDDR5 interfaces. These interfaces enable the processors to meet the demanding requirements of high-performance multimedia, Edge AI workloads, and autonomous systems. Additionally, select device families within the i.MX 9 Series continue to provide support for LPDDR4, offering compatibility with existing solutions while delivering improved performance.

Comprehensive tools, documentation and support

NXP provides comprehensive support through regularly updated tools, documentation, and multi-vendor validation to reduce design risk and accelerate time-to-market.

DDR tools for i.MX

The DDR Tools enable users to generate and test a custom DRAM initialization based on their device configuration (density, number of chip selects, etc.) and board layout (data bus bit swizzling, etc.). This process equips the user to then proceed with the bring-up of a boot loader and an OS.

- For 6 and 7 Series family DDR tools, visit i.MX 6/7 Series DDR Tool Release
- For i.MX 8/8X family DDR tools, visit i.MX 8/8X Family DDR Tools Release
- The DDR tools for i.MX 8M families, i.MX 91 and i.MX 93 are integrated into the Config Tools for i.MX Applications Processors

Design guidelines

Detailed DRAM layout, routing and validation recommendations guidelines are outlined in the NXP hardware developer's guides for the specific SoCs.

DDR memory compatibility guides

The DDR memory compatibility guides provide supportive information to assist in selecting appropriate DDR devices for specific i.MX processor families and support customers in assessing project feasibility when evaluating SoCs for their products. They also include a list of NXP and vendor-validated memory part numbers.

The DDR memory compatibility guides are available for the i.MX 8 and 9 Series:

i.MX 93 memory compatibility guide

i.MX 8M Quad/Mini/Nano/Plus - LPDDR4, DDR4 & DDR3L memory compatibility guide

i.MX 8ULP - LPDDR3, LPDDR4 & LPDDR4X memory compatibility guide

i.MX 8/8X/8XLite - LPDDR4 and DDR3L memory compatibility guide

NXP continually collaborates with leading memory vendors to test new devices and maintain regularly updated DDR compatibility guides.

NXP product longevity

Products covered under NXP's Product Longevity program are guaranteed product availability for a minimum of 10 to 15 years from the product's launch date. Ensuring stable supply, particularly in markets where long-term availability is critical.

Learn more about the i.MX Series of Application Processors.

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