



## Benefits

### 1. Performance

Cortex-A78AE delivers 30% higher performance at improved power efficiency and is well suited to the needs of automated driving and industrial autonomous systems.

With options for multiple safety modes, multicore and multichip constructions, accelerator interfaces and heterogenous compute configurations, it can support a variety of application footprints while allowing the deployment of the same SoC compute architecture into different functional domains.

### 2. Safety Features

Second generation of Arm's safety architecture provides end-to-end protection capability and enhanced flexibility to operate in three modes; split mode for pure performance, lock mode for highest safety and hybrid mode to offer the balance of safe compute performance.



## Overview

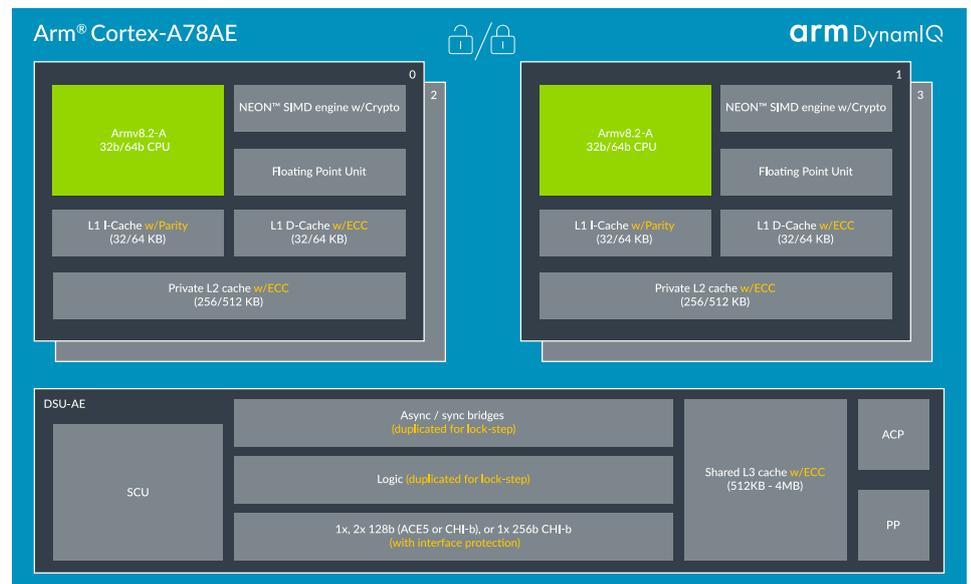
The Cortex-A78AE processor combines high performance and power efficiency to deliver Arm's CPU of choice for safe compute in thermally constrained designs.

## Safety Ready

Cortex-A78AE is designed for devices undertaking complex and demanding safety-critical tasks with differing workloads, and is well suited to the needs of automated driving and industrial autonomous systems.

The design supports features to achieve ASIL D/SIL 3 in Lock mode and to aid achievement of ASIL B/SIL 2 in Hybrid mode, allowing flexibility through its Split-Lock feature operating in second-generation Dual Core Lock-Step (DCLS). Hybrid mode enables the highest safety levels for mission-critical deployments or highest performance for lower safety applications. CPUs can be taken offline serially allowing for periodic invasive test routines. Support for stepping around bad memory blocks and the ability to interface with other AE IP to provide end-to-end safety integrity checks make Cortex-A78AE the ideal CPU of choice for high-performance safety deployments.

Learn more at [www.arm.com/safety](http://www.arm.com/safety)



## Specifications

Feature	Cortex-A78AE
Architecture	Armv8.2-A (AArch32 at ELO only)
Main Extensions	Armv8.1 extensions Armv8.2 extensions Armv8.3 (LDAPR instructions only) Armv8.4 Dot Product Cryptography extensions RAS extensions
Pipeline	Out-of-order
Superscalar	Yes
Physical Addressing (PA)	48-bit
Large Physical Address Extensions (LPAE)	Yes
TrustZone for Cortex-A	Yes
Neon and Floating Point Unit	Included with INT8 Dot Product and IEEE FP16
Floating Point Unit only	Included
Interrupt Controller	External GICv4
Bus Protocol	ACE or CHI
L1 I-Cache/D-Cache	32KB -64kB
L2 Cache	256-512kB
L3 Cache	Optional 512kB-4MB
Dual Core Lock-Step (DCLS)	Yes
Functional Safety Support	ASIL D Systematic <sup>1</sup> & ASIL D Diagnostic <sup>2</sup>
Cryptography Unit	Supported (separately licensable), with cryptography extensions
Error Code Correction (ECC)/Parity	Yes
Accelerator Coherency Port (ACP)	Optional
Peripheral Port	Optional
Generic Timer	Armv8-A
Non-intrusive debug (trace)	Included

<sup>1</sup>Suitable for up to ASIL D systematic development

<sup>2</sup>Contributes towards up to ASIL D hardware diagnostic metrics

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## Related Products

### Mali-G78AE

Mali-G78AE is a highly scalable GPU that enables configurable workload separation and virtualization. Mali-G78AE is designed to the IEC 61508 and ISO 26262 safety standards for industrial and automotive applications respectively and is ASIL B SIL 2 safety-capable.

### Mali-C71AE

As an advanced high-performance ISP, Mali-C71AE delivers key visual information to both computer vision systems and human display for clear and convenient viewing. Mali-C71AE is the first Arm ISP with built-in features for functional safety.

### CoreLink CMN-600AE

High performance coherent mesh network supporting up to ASIL D/SIL 3 safety requirements for a wide range of automotive and industrial applications, featuring CCIX enabled coherent multichip support, quality-of-service (QoS) and flexible system-level cache.

### Corelink GIC-600AE

Arm's newest Interrupt controller, the GIC-600AE is fully software compatible with the GIC-600 and is engineering with safety mechanisms to meet demanding safety requirements up to and including ASIL D/ SIL 3. The GIC-600AE supports the GIC v4 standard and is the interrupt controller for choice for the Cortex-A78AE.

### CoreLink MMU-600AE

MMU-600AE enables high performance virtualization for a wide range of automotive applications with safety mechanisms to meet safety requirements up to ASIL D/SIL 3. It is software compatible with MMU-600 and supports the MMU v3.1 architecture.



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