

BA2X™ Processor IP Cores Family

Royalty-free, code-dense, low-power 32-bit MPUs

Features	BA20 PipelineZero Embedded	BA21 Ultra Low Power, Deeply Embedded	BA22-DE Deeply Embedded	BA22-CE Cache Enabled	BA22-AP Basic App. Processor	BA25 Application Processor
Coremarks / MHz ¹	3.48	2.77	2.93	2.93	2.93	2.51
Fmax @ TSMC 29nm HPM ²	350 MHz	400 MHz	900 MHz	800 MHz	800 MHz	1,000 MHz
Area @ TSMC 29nm HPM in Gates or Sq. mm. ^{2,3}	8k 0.006	10k 0.07	15k 0.011	30k 0.022	55k 0.038	200k 0.145
BA2 Variable Length ISA	✓	✓	✓	✓	✓	✓
Pipeline Stages	1	2	4/5	5	5	7/12
Out of Order Completion	X	✓	X	X	X	✓
Branch Prediction Unit	X	X	X	X	X	✓
Memory Protection Unit	✓	✓	✓	✓	X	X
Number of GPRs	12–32	12–32	16–32	16–32	32	32
SoC Data Bus	AXI4	AXI4/AHB	AHB/WB/AXI4	AHB/WB/AXI4	AHB/WB/AXI4	AXI4
SoC Instruction Bus	AXI4	AXI4/AHB	AHB/WB/AXI4	AHB/WB/AXI4	AHB/WB/AXI4	AXI4
Hardware Multiplier	✓	✓	✓	✓	✓	✓
Hardware Divider	✓	✓	✓	✓	✓	✓
Multiply-Accumulate Unit	✓	✓ ²	✓	✓	✓	✓
Floating Point Unit	✓	✓	✓	✓	✓	✓
Saturated Arithmetic Instructions	✓	✓	✓	✓	✓	✓
DSP Extensions Acceleration	✓	✓	✓	✓	✓	✓
JTAG Debug	✓	✓	✓	✓	✓	✓
Two-Wire Debug	✓	✓	✓	✓	✓	✓
Embedded Tick Timer, PIC & PMU	✓	✓	✓	✓	✓	✓
Vectored Interrupt Controller	✓	✓	✓	✓	✓	✓
Tightly Coupled I/D Buses	✓	✓	✓	✓	✓	✓
Instr. & Data Caches	X	X	X	✓ (L0)	✓ (L0)	✓ (L0/L1)
Instr. & Data MMU	X	X	X	X	✓ (L0)	✓ (L0/L1)
Configurable Periphs. Platform	✓	✓	✓	✓	✓	✓
Beyond Studio IDE & GCC SDK	✓	✓	✓	✓	✓	✓

✓= Included or user-configurable option ✓= On request X = Not supported

Notes

1. CoreMarks score depends on core configuration. Please consult CAST to get the benchmark score for the configuration of your choice.
2. Value depends on core configuration, synthesis tool & settings, and libraries. Please contact CAST to get accurate characterization data for the configuration, libraries, synthesis tool & settings of your choice.
3. Area figures for BA22-CE, BA22-AP, and BA25 exclude the area of SRAMs required for the implementation of caches and/or MMUs.

