BDTI's Pocket Guide to Processing Engines for Embedded Applications
Updated November 2013

The most trusted source of analysis, advice, and engineering for embedded processing technology and applications.
Phone: +1 (925) 954-1411 Email: info@BDTI.Com

C H I P S

Vendor	BDTI Certified	Family	Floating, Fixed, or Both	Data Width	Core Clock Speed [1]	BDTImark2000™/ *BDTIsimMark2000™* [2]	BDTI memMark 2000™[3]	Other Benchmark Results Available	Total On-Chip Memory, Bytes	1K Unit Price / 2Q12	Notes
Analog Devices	✓	ADSP-218x	Fixed point	16 bits	80 MHz	**240**	65		8 K-104 K	$8-31	Many family members with assorted peripherals
	✓	ADSP-219x	Fixed point	16 bits	160 MHz	**410**	63		20 K-160 K	$13-33	Enhanced version of the ADSP-218x
	✓	ADSP-BF5xx (Blackfin)	Fixed point	16 bits	600 MHz	**3360 [4,5]**	72 [3,4]		52 K-328 K	$4-43	Dual-MAC DSP with variable speed and voltage
	✓	ADSP-BF60x (Blackfin)	Fixed point	8/16/32 bits	500 MHz	*6580*	67	OFDM	292 K-420 K	$15-22	VLIW and SIMD architecture backwardd compatible with BF5xx
	✓	ADSP-2116x (SHARC)	Both	32/40 bits	110 Mhz	*600*	34		128 K	$26-36	SIMD architecture supporting multiprocessor topologies
	✓	ADSP-2126x (SHARC)	Both	32/40 bits	200 MHz	**1090**	34		512 K-768 K	$7-25	Features SIMD, strong multiprocessor support
	✓	ADSP-213xx (SHARC)	Both	32/40 bits	400 MHz	**2050**	34`		384 K-1024 K	$10-43	SHARC with a lengthened pipeline for higher clock speeds
		ADSP-214x (SHARC)	Both	32/40 bits	450 MHz	n/a	n/a		256K-1152K	$8-37	Hardware-based filter accelerators, audio-focused peripherals
		ADSP-TS20x (TigerSHARC)	Both	8/16/32/40 bits	600 MHz	**6400 [5]**	52 [5]		512 K-3 M	$184-339	4-way VLIW with SIMD capabilities; uses eDRAM
Freescale	✓	B4860 (SC3900)	Fixed point	16 bits	1.2 GHz	*37460 [4]*	52		9856 K	$164-295	Six SC3900 DSP cores, targets base station applications
	✓	DSP563xx/5672x	Fixed point	24 bits	275 MHz	**820 [4]**	50		n/a	$6-46	Many audio-oriented parts; binary-compatible with '560xx
	✓	DSP56F8xx (56800)	Fixed point	16 bits	80 MHz [6]	**110**	78		28 K-152 K	n/a	Contains many microcontroller-like features
	✓	DSP5685x/56F8xxx (56800E)	Fixed point	16 bits	120 MHz	*340*	79		14 K-612 K	n/a	Enhanced version of the '568xx
	✓	MSC71xx (SC1400 core)	Fixed point	16 bits	300 MHz	*3370*	67		408 K-472 K	$37-43	Based on SC1400 licensable core
	✓	MSC81xx (SC140 core)	Fixed point	16 bits	500 MHz	**5610 [4]**	67 [4]		1440 K	$78-121	Based on SC140-compatible core; most chips use four cores
	✓	MSC814x (SC3400 core)	Fixed point	16 bits	1 GHz	**11900 [4]**	67 [4]	OFDM	10.9 M	$122-147	Based on SC3400 core; quad-core chip
	✓	MSC815x/825x (SC3850 core)	Fixed point	16 bits	1 GHz	**15420 [4]**	67 [4]		1728 K-4608 K	$68-157	Based on SC3850 core; devices with 4 and 6 cores available
Microchip	✓	dsPIC3xF	Fixed point	16 bits	70 MHz	*190*	78		6 K-588 K	$2-8	Hybrid microcontroller/DSP
NXP	✓	TriMedia 3270 core	Both	8/16/32 bits	350 MHz	n/a	n/a	Video Encoder/Decoder	16 M	n/a	VLIW media processor with SIMD capabilities
PicoChip	✓	PC102	Fixed point	16 bits	160 MHz	n/a	n/a	OFDM	1 M	$99	Massively parallel chip with 344 processors
Qualcomm	✓	Qualcomm Hexagon V2 (1 thread)[7]	Fixed point	16 bits	100 MHz (per thread)	*1550*	53		na	na	Multi-threaded device (6 threads, each running at 100 MHz) Projected best-case BDTIsimMark2000 for 6 threads is 9300
	✓	Qualcomm Hexagon V4 (1 thread)[7]	Fixed point	16 bits	233 MHz (per thread)	*4220*	57		na	na	Multi-threaded device (3 threads, each running at 233 MHz) Projected best-case BDTIsimMark2000 for 3 threads is 12660
	✓	Qualcomm Hexagon V5 (1 thread)[7]	Fixed point	8/16/32 bits	267 MHz (per thread)	*4840*	57		na	na	Multi-threaded device (3 threads, each running at 267 MHz) Projected best-case BDTIsimMark2000 for 3 threads is 14520
	✓	Qualcomm Hexagon V5 (1 thread)[7]	Floating point	8/16/32 bits	267 MHz (per thread)	*2400*	43		na	na	Multi-threaded device (3 threads, each running at 267 MHz) Projected best-case BDTIsimMark2000 for 3 threads is 7200
Texas Instruments	✓	OMAP35x	Fixed point	8/16/32 bits	720 MHz	*5450*	78		320 K	$23-38	Metrics for ARM Cortex-A8 core only (optional 'C64x+ DSP available)
		TMS320 [C/F] 280x/281x/282x	Fixed point	32 bits	150 MHz	n/a	n/a		40 K-582 K	$3-16	Hybrid microcontroller/DSP; assembly-compatible w/ 'C24x
		TMS320F2802x/2803x/2806x	Fixed point	32 bits	90 MHz	n/a	n/a		40 K-422 K	$1-8	Peripherals and accelerators targeting control applications
	✓	TMS320C54x	Fixed point	16 bits	160 MHz	**500 [4]**	64 [4]		24 K-336 K	$4-134	Many specialized instructions
	✓	TMS320C55x	Fixed point	16 bits	300 MHz	**1460**	75		64 K-376 K	$2-17	Dual-issue, dual-MAC DSP; assembly-compatible w/ 'C54x
	✓	TMS320C64x	Fixed point	8/16 bits	1 GHz	**9130**	54	OFDM	160 K-1056 K	$18-202	Adds quad-MAC capabilities and specialized operations to 'C62x
	✓	TMS320DM6446	Fixed point	8/16 bits	600 MHz	**6590**	60	H.264 Sol. Benchmark	232 K	$36	ARM9, C64x+ and video accelerator (BDTImark2000 for C64x+ only)
	✓	TMS320C64x+	Fixed point	8/16 bits	1.2 GHz	**13170**	60	OFDM	128 K-3 M	$10-216	Adds 8-MAC capabilities and specialized operations to 'C64x
	✓	TMS320C66x	Fixed point	16 bits	1.5 GHz	**20030 [4]**	62 [4]		2M-8M	$34-399	High performance fixed– and floating–point DSP core
		TMS320C2834x/F2833x	Floating point	32 bits	300 MHz	n/a	n/a		182 K-582 K	$9-16	Adds floating-point unit to 'C28x
	✓	TMS320C66x	Floating point	32 bits	1.5 GHz	**12860 [4]**	42 [4]		2M-8M	$34-399	High performance fixed– and floating–point DSP core
	✓	TMS320C67x	Floating point	32 bits	300 MHz	**1500**	35		72 K-264 K	$14-33	Floating-point version of 'C62x
		TMS320C67x+	Floating point	32 bits	300 MHz	n/a	n/a		480 K-672 K	$7-29	Adds registers and audio-oriented instructions to the 'C67x
Tilera	✓	TILE64	Fixed point	8/16 bits	866 MHz	n/a	n/a	OFDM	5120 K	$896	64 core chip, 3-way VLIW with SIMD capabilities

NOTES:

[1] Clock speed is for fastest family member.

[2] The BDTImark2000 and BDTIsimMark2000 provide summary measures of DSP speed, based on scores on the BDTI DSP Kernel Benchmarks™. **Higher is faster**. Both scores are calculated with the same formula, but BDTIsimMark2000 scores may use projected clock speeds. BDTImark2000 scores are shown in **bold** and BDTIsimMark2000 scores in *italic*. See www.BDTI.com/Resources/BenchmarkResults for more information and scores.

[3] The BDTImemMark provides a summary measure of memory use in signal processing applications; higher is better.

[4] Score for one core. Some family members contain multiple cores. Details available from BDTI.

[5] Score does not apply to some family members, which use slightly different architectures. Details available from BDTI.

[6] The DSP56F8xx requires two clock cylces per instruction cycle.

[7] Multi-threaded device. BDTIsimMark2000 result listed is the score for a single thread. The "Notes" column lists the projected best case score using the maximum number of available threads (not an official BDTIsimMark2000 score).

✓ This processor has BDTI Certified benchmark results available.

BDTI's Pocket Guide to Processing Engines for Embedded Applications
Updated November 2013

The most trusted source of analysis, advice, and engineering for embedded processing technology and applications.
Phone: +1 (925) 954-1411 Email: info@BDTI.Com

CORES

Licensor	BDTI Certified	Family	Floating, Fixed, or Both	Data Width	Core Clock Speed [1,2]	BDTImark2000™ / *BDTIsimMark2000™* [3]	BDTI memMark 2000™[4]	Other Benchmark Results Available [5]	Total Core Memory Space, Bytes	Die Area [2]	Notes
ARC		ARC 600/ARC XY	Fixed point	16/32 bits [6]	180 MHz [7]	n/a	n/a		4 G	0.77 mm² [7]	Customizable core with optional DSP features
		ARC 700/ARC XY	Fixed point	16/32 bits [6]	265 MHz [7]	n/a	n/a		4 G	1.1 mm² [7]	Longer pipeline enables higher clock rate
	✓	AV 401V	Fixed point	16/32 bits	n/a [8]	n/a	n/a	H.264 Sol. Benchmark	4 G	n/a [8]	Licensable video subsystem based on ARC 700 plus accelerators
ARM	✓	ARM7	Fixed point	32 bits	145 MHz	*160*	57		4 G	0.28 mm²	Widely licensed 32-bit microprocessor core
	✓	ARM9	Fixed point	32 bits	255 MHz	*320*	74		4 G	n/a	Adds separate bus for data access, deeper pipeline to ARM7
	✓	ARM9E	Fixed point	16/32 bits	265 MHz	*550*	72		4 G	1.7 mm²	ARM9 enhanced with single-cycle MAC unit
	✓	ARM1136	Fixed point	16/32 bits	330 MHz	*1160*	72		4 G	2.3 mm²	Adds SIMD, load/store unit, branch prediction, deeper pipeline
	✓	ARM1176	Fixed-point	16/32 bits	335 MHz	*1200*	72	Video Encoder/Decoder	4 G	2.5 mm²	Very similar to ARM1136
	✓	Cortex-A8	Fixed point	8/16/32 bits	n/a [8]	*7.6 per MHz*	78	Video Encoder/Decoder	4 G	n/a [8]	Dual-issue superscalar architecture with NEON DSP extensions
	✓	Cortex-R4	Fixed point	16/32 bits	n/a [8]	*3.8 per MHz*	73		4 G	n/a [8]	Dual-issue superscalar architecture; software compatible with ARM9E
CEVA		CEVA-TeakLite	Fixed point	16 bits	170 MHz	n/a	n/a		256 K	0.4 mm²	Single-MAC, single-issue DSP core
		CEVA-TeakLite II	Fixed point	16 bits	200 MHz	n/a	n/a		4 M	0.5 mm²	Faster version of CEVA-TeakLite
	✓	CEVA-TeakLite III	Fixed point	16/32 bits	335 MHz	*2140*	69		4 G	1.14 mm²	Dual-MAC DSP core; backward compatible with TeakLite II
		CEVA-Teak	Fixed point	16 bits	150 MHz	n/a	n/a		8 M	0.9 mm²	Dual-MAC DSP core
	✓	CEVA-X1620	Fixed point	8/16 bits	330 MHz	*2660*	67		4 G	2.6 mm²	8-way VLIW, dual-MAC DSP core
		CEVA-X1641	Fixed point	8/16 bit	600 MHz	n/a	n/a		4 G	n/a	8-way VLIW, quad-MAC DSP core supporting SIMD operations
Coreworks	✓	Sideworks CWcomp4465	Fixed point	16 bits	209 MHz	*2440*	48		4G	0.68 mm²	Customized SideWorks DSP engine + FireWorks 32-bit RISC CPU
ITRI	✓	PAC DSP	Fixed point	8/16/32 bits	n/a [8]	*8.8 per MHz*	43		4G	n/a [8]	4-way VLIW, quad-MAC DSP core
MIPS	✓	MIPS32 24KE (with DSP ASE)	Fixed point	16/32 bits	335 MHz	*1000*	73		4 G	2.0 mm²	MIPS core with SIMD DSP extensions
Tensilica	✓	ConnX 545CK	Fixed point	18 bits	245 MHz	*4070*	69		4 G	5.49 mm²	VLIW-based customizable core; with optional DSP features
Toshiba	✓	Venezia (MeP + IVC2)	Fixed point	8/16/32 bits	n/a [8]	*7.9 per MHz*	69		4G	n/a [8]	MeP core: 32-bit RISC; IVC2 coprocessor: 64-bit SIMD
VeriSilicon		ZSP*neo*	Fixed point	16/32 bits	165 MHz	n/a	n/a		256 K	0.45 mm²	Single-MAC, scalar variant of the ZSP400
		ZSP200	Fixed point	16/32 bits	165 MHz	n/a	n/a		256 K	0.7 mm²	Single-MAC, 2-way superscalar variant of the ZSP400
	✓	ZSP400	Fixed point	16/32 bits	165 MHz	**780**	74		256 K	1.3 mm²	Dual-MAC, 4-way superscalar DSP core
	✓	ZSP410	Fixed point	16/32 bits	185 MHz	**870**	74		4 G	1.4 mm²	Enhanced ZSP400 with instruction cache
	✓	ZSP500	Fixed point	16/32 bits	205 MHz	*1620*	68		64 M	2.2 mm²	Second-generation ZSP; dual-MAC, 4-way superscalar
		ZSP540	Fixed point	16/32 bits	200 MHz	n/a	n/a		64 M	2.7 mm²	Quad-MAC, 4-way variant of the ZSP500
		ZSP600	Fixed point	16/32 bits	175 MHz	n/a	n/a		64 M	3.1 mm²	Quad-MAC, 6-way variant of the ZSP500

FPGAs

Vendor	BDTI Certified	Family	Core Clock Speed	BDTI Benchmark Score Available	1K Unit Price 2Q2011	Notes
Altera	✓	Stratix II EP2S15F672C5	Slow speed grade	OFDM	$38	FPGA with hardwired DSP features, such as multipliers
Xilinx	✓	Virtex-4 SX25-10FF668C	Slow speed grade	OFDM	$89	FPGA with hardwired DSP features, such as multipliers
	✓	Virtex-4 XC4VFX140-11FF1760C4006	Med. speed grade	OFDM	$1,280	FPGA with hardwired DSP features, such as multipliers

Notes:
[1] Worst-case clock speed.
[2] All core data is for the TSMC CL013G process and ARM Artisan SAGE-X library (devices with the "BDTI Certified" box checked conform to BDTI's standardized conditions for processor cores).
[3] The BDTImark2000 and BDTIsimMark2000 provide summary measures of DSP speed, based on scores on the BDTI DSP Kernel Benchmarks(tm). **Higher is faster**. Both scores are calculated with the same formula, but BDTIsimMark2000 scores may use projected clock speeds. BDTImark2000 scores are shown in **bold** and BDTIsimMark2000 scores in *italic* . See www.BDTI.com/Resources/BenchmarkResults for more information and scores.
[4] The BDTImemMark provides a summary measure of memory use in signal processing applications; higher is better.
[5] Additional BDTI Benchmark results available at www.BDTI.Com
[6] Native multiplier width(s). Users may add custom instructions that support other data widths.
[7] Assumes use of optional DSP extensions but no other optional features.
[8] BDTI does not have clock speed and silicon area for this processor based on BDTI's standardized conditions for processor cores.

✓ This processor has BDTI Certified benchmark results available.