

# Many-Core Fabricated Chips Information Page

This page contains a comprehensive listing of key attributes of fabricated programmable many-core chips, such as the number of cores, clock rate, power, and chip area.

The table is **Sortable** by clicking a column heading in the top row. Clicking once, the table will be sorted from low to high, and clicking twice, the table will be sorted from high to low.

Year	Processor	Number of Cores	Clock Rate (GHz)	CMOS Tech (nm)	Die Size (mm <sup>2</sup> ) *	Die Size Scaled to 22nm (mm <sup>2</sup> ) †	Voltage (V)	Chip Power (W)	Single Processor Power (mW)	Energy	Organization	Reference
2002	RAW	16	0.425	180	331.24 (16)	3.975	-	25 W	1562.5 mW #	-	MIT	[1]
2005	Cell	9	4.0	90	221 ?	17.76 ?	1	-	-	-	Sony,Toshiba,IBM	[2]
2006	SEAforth24	24	1.0	180	7.29 ?	0.0875 ?	-	0.15 W	6.25 mW #	-	Intelesys Corporation	[3]
2006	AsAP 1	36	0.60	180	32.1	0.3852	2	-	2.4 mW @0.9V, 116MHz 32 mW @1.8V, 475MHz	93.0 pJ/Op = 0.093 mW/MHz 300 pJ/Op = 0.3 mW/MHz @1.8V	UC Davis	[4]
2006	PC202/203/205	248	0.16	-	-	-	-	-	-	-	picoChip	[5] [6]
2007	SPARC T2	8	1.4	65	342	51.3	1.1	84.0 W @1.4GHz	10500.0 mW @1.4GHz #	-	Sun Microsystems	[7]
2007	Tilera TILE64	64	0.75	90	-	-	-	10.8 W @1V, 750MHz	168.75 mW @1V, 750MHz #	-	Tilera Corporation	[8]
2007	Polaris(TeraFLOPS)	80	5.67	65	275.0 (3)	41.25	1.35	15.6 W @670mV 97 W @1.07V, 4.27GHz 230 W @1.35V, 5.67GHz	195.0 mW @670mV 1212.5 mW @1.07V, 4.27GHz 2875 mW @1.35V, 5.67GHz	97 pJ/fl operation	Intel Tera-Scale	[9],[10]
2008	Xeon E7450	6	2.4	45	503	115.69	0.9-1.45	90 W	15000 mW #	-	Intel	[11]
2008	Xeon X7460	6	2.66	45	503	115.69	0.9-1.45	130 W	21666.7 mW #	-	Intel	[11]
2008	FireStream 9270	10 ?	0.75	55	-	-	-	<160 W	<16000 mW #	-	AMD	[12]
2008	GeForce 8800 Ultra	16	1.5	90	470	37.6	1.3	150.0 W @1.3V	1171.88 mW @1.3V #	-	Nvidia	[13]
2008	GeForce 9800 GTX+	16	0.783	55	260?	49.4 ?	-	141 W	17625 mW #	217.6 pJ/fl operation ?	Nvidia	[14]
2008	SEAforth 40C18	40	0.7	-	-(0.13)	-	-	0.15 W	3.75 mW #	-	Intelesys Corporation	[15] [16]
2008	AsAP 2	167	1.2	65	39.44 (0.1684)	5.916	1.3	-	0.608 mW @0.675V, 66MHz 3.4 mW @0.75V, 260MHz 47 mW @1.2V, 1.06GHz 62 mW @1.3V, 1.2GHz	5.9 pJ/Op avg@1.3V, 1GHz 32 pJ/Op = 0.032mW/MHz, 100%active	UC Davis	[17]
2008	Ambric Am2045	336	0.3	130	-	-	1.2 ?	10.0 W @300MHz	29.76 mW @300MHz #	10.0 pJ/op@300MHz	Ambric, Inc	[18] [19]
2009	GeForce G210M	2	1.5	40 ?	-	-	-	14 W ?	-	194.6 pJ/fl operation ?	Nvidia	[20]
2009	QorIQ P4080	8	1.5	45	-	-	-	-	3750.0 mW @1.5GHz #	-	Freescale Semiconductor	[21]



2014	Xeon E5-2430 v2	6	2.5	22	-	-	0.65-1.3	80 W	13333 mW #	-	Intel	[11]
2014	Core i7-5960X	8	3.0	22	-	-	-	140 W	17500 mW #	-	Intel	[11]
2014	TMS320C6678	8	1.4	40	-	-	SmartReflex variable	-	-	-	Texas Instruments	[54]
2014	Xeon E7-8895 v2	15	2.8	22	-	-	-	155 W	10333.33 mW #	-	Intel	[11]
2014	GeForce GTX 980 (Maxwell)	16	1.126	28	398	276.21	-	165 W	10312.5 mW #	-	Nvidia	[38]
2014	Opteron 6370P	16	2.0	32	316	154.84	-	99 W	6187.5 mW #	-	AMD	[42]
2014	ThunderX	24-48	2.5	28	-	-	-	-	-	-	Cavium	[55]
2014	Xeon Phi 7120X	61	1.238	22	-	-	-	300 W	4918.03 mW #	248.35 pJ/fl operation	Intel	[52]
2015	Xeon E5-2418L v3	6	2.0	22	-	-	0.65-1.3	50 W	8333 mW #	-	Intel	[11]
2015	Xeon E7-4809 v3	8	2.0	22	-	-	-	115 W	14375 mW #	-	Intel	[11]
2015	Carrizo x86 APU	12	-	28	250.04	173.53	-	-	-	-	AMD	[56]
2015	Xeon E7-4830 v3	12	2.1	22	-	-	-	115 W	9583 mW #	-	Intel	[11]
2015	Xeon E7-4850 v3	14	2.2	22	-	-	-	115 W	8214 mW #	-	Intel	[11]
2015	Xeon E7-8860 v3	16	2.2	22	-	-	-	140 W	8750 mW #	-	Intel	[11]
2015	Xeon E7-8880 v3	18	2.3	22	-	-	-	150 W	8333 mW #	-	Intel	[11]
2015	Radeon R9 Nano	64	1.0	28	-	-	-	175 W	2734 mW #	-	AMD	[50] [57]
2015	Mobileye EyeQ4	14	-	28	-	-	-	3 W	-	-	Mobileye	[59]
2016	Heterogeneous Nona-Core SoC	9	2.0	16nm FinFET	111.36	-	-	-	-	-	Renesas	[60]
2016	Tri-Cluster CPU Subsystem	10	2.5	20	100	-	-	-	-	-	MediaTek	[61]
2016	Homogeneous Scalable 3D Network-on-Chip	32	1.0	65	72.2	10.83	1.2	0.0557 W	1.741 mW#	-	CEA-LETI-MINATEC	[62]
2016	KNUPATH Hermosa Processors	256	-	-	-	-	-	34 W	132.8 mW#	-	Knupath	[63]
2016	KiloCore	1000	1.782 GHz@1.1V	32	64.0 (0.055)	31.36	1.1	13.1 W @0.84V	0.67 mW @0.56V, 115MHz	5.8 pJ/Op @0.56V, 115MHz	UC Davis	[64]
Year	Processor	Number of Cores	Clock Rate (GHz)	CMOS Tech (nm)	Die Size (mm <sup>2</sup> ) *	Die Size Scaled to 22nm (mm <sup>2</sup> ) †	Voltage (V)	Chip Power (W)	Single Processor Power (mW)	Energy	Organization	Reference

## Notes:

\*: The value inside the parenthesis is **single core area**.

†: The die size is scaled to 22nm CMOS Technology using table \*\*\*.

‡: Each core consists of 8 SIMD processors and one Master processor.

#: The **single processor power** is calculated from dividing total power by number of cores.

\*\*: 256 user cores and 32 system cores.

**Table \*\*\*: Scale Factors for Scaling Die Size to 22nm CMOS Technology**

CMOS Tech (nm)	180	150	130	120	90	65	55	45	40	32	28	22
Scale Factor	0.012	0.026 §	0.035	0.046 §	0.08	0.15	0.19 §	0.23	0.33 §	0.49	0.694 §	1

## Notes:

The data of this table come from Table VII of [58], these scale factors are formed by using Geometric Means of Three Aspects: Minimum Feature Size, Metal I half pitch, (4T) Logic Gate Size.

The scale factor that followed with a '\$' means it is derived from original data by linear interpolation.

The CMOS technology that is larger than 180 nm, such as 250 nm, 600 nm, is defined not scalable in this context, since the linear interpolation will lead to negative scale factor.

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