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8      'enunciado': 'Densidad de los transistores en la historia de los micros' ,
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Densidad de los transistores en la historia de los micros

CPU

Processor	Transistor count	Date of introduction	Designer	Process	Area
Intel 4004	2,300	1971	Intel	10,000 nm	12 mm²
Intel 8008	3,500	1972	Intel	10,000 nm	14 mm²
MOS Technology 6502	3,510[3]	1975	MOS Technology	8,000 nm	21 mm²
Motorola 6800	4,100	1974	Motorola	6,000 nm	16 mm²
Intel 8080	4,500	1974	Intel	6,000 nm	20 mm²
RCA 1802	5,000	1974	RCA	5,000 nm	27 mm²
TMS 1000	8,000	1974[4]	Texas Instruments	8,000 nm	11 mm²
Intel 8085	6,500	1976	Intel	3,000 nm	20 mm²
Zilog Z80	8,500	1976	Zilog	4,000 nm	18 mm²
Motorola 6809	9,000	1978	Motorola	5,000 nm	21 mm²
Intel 8086	29,000	1978	Intel	3,000 nm	33 mm²
Intel 8088	29,000	1979	Intel	3,000 nm	33 mm²
WDC 65C02	11,500[5]	1981	WDC	3,000 nm	6 mm²
Intel 80186	55,000	1982	Intel	3,000 nm	60 mm²
Motorola 68000	68,000[*citation needed*]	1979	Motorola	3,500 nm	44 mm²
Intel 80286	134,000	1982	Intel	1,500 nm	49 mm²
WDC 65C816	22,000[6]	1983	WDC	3000 nm[7]	9 mm²
Motorola 68020	190,000[8]	1984	Motorola	2,000 nm	85 mm²
Intel 80386	275,000	1985	Intel	1,500 nm	104 mm²
ARM 1	25,000[8]	1985	Acorn	3,000 nm	50 mm²
Novix NC4016	16,000[9]	1985[10]	Harris Corporation	3,000 nm[11]	
ARM 2	30,000[8]	1986	Acorn	2,000 nm	30 mm²
Motorola 68030	273,000	1987	Motorola	800 nm	102 mm²
TI Explorer's 32-bit Lisp machine chip	553,000[12]	1987	Texas Instruments	2,000 nm[13]	
DEC WRL MultiTitan	180,000[14]	1988	DEC WRL	1,500 nm	61 mm²
Intel i960	250,000[15]	1988	Intel	600 nm	

Processor	Transistor count	Date of introduction	Designer	Process	Area
Intel 80486	1,180,235	1989	Intel	1000 nm	173 mm²
ARM 3	310,000	1989	Acorn	1,500 nm	87 mm²
68040	1,200,000	1990	Motorola	650 nm	152 mm²
R4000	1,350,000	1991	MIPS	1,000 nm	213 mm²
ARM 6	35,000	1991	ARM	800 nm	
Pentium	3,100,000	1993	Intel	800 nm	294 mm²
ARM700	578,977[16]	1994	ARM	700 nm	68.51 mm²
68060	2,500,000	1994	Motorola	600 nm	218 mm²
SA-110	2,500,000[8]	1995	Acorn/DEC/Apple	350 nm	50 mm²
ARM 9TDMI	111,000[8]	1999	Acorn	350 nm	4.8 mm²
Pentium Pro	5,500,000[17]	1995	Intel	500 nm	307 mm²
AMD K5	4,300,000	1996	AMD	500 nm	251 mm²
Pentium II Klamath	7,500,000	1997	Intel	350 nm	195 mm²
Pentium II Deschutes	7,500,000	1998	Intel	250 nm	113 mm²
AMD K6	8,800,000	1997	AMD	350 nm	162 mm²
Pentium III Katmai	9,500,000	1999	Intel	250 nm	128 mm²
Pentium III Coppermine	21,000,000	2000	Intel	180 nm	80 mm²
Pentium II Mobile Dixon	27,400,000	1999	Intel	180 nm	180 mm²
Pentium III Tualatin	45,000,000	2001	Intel	130 nm	81 mm²
AMD K6-III	21,300,000	1999	AMD	250 nm	118 mm²
AMD K7	22,000,000	1999	AMD	250 nm	184 mm²
Pentium 4 Willamette	42,000,000	2000	Intel	180 nm	217 mm²
Pentium 4 Northwood	55,000,000	2002	Intel	130 nm	145 mm²
Pentium 4 Prescott	112,000,000	2004	Intel	90 nm	110 mm²
Pentium 4 Prescott-2M	169,000,000	2005	Intel	90 nm	143 mm²
Pentium 4 Cedar Mill	184,000,000	2006	Intel	65 nm	90 mm²
Pentium D Smithfield	228,000,000	2005	Intel	90 nm	206 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Pentium D Presler	362,000,000	2006	Intel	65 nm	162 mm²
Atom	47,000,000	2008	Intel	45 nm	24 mm²
Barton	54,300,000	2003	AMD	130 nm	101 mm²
AMD K8	105,900,000	2003	AMD	130 nm	193 mm²
Itanium 2 McKinley	220,000,000	2002	Intel	180 nm	421 mm²
Cell	241,000,000	2006	Sony/IBM/Toshiba	90 nm	221 mm²
Core 2 Duo Conroe	291,000,000	2006	Intel	65 nm	143 mm²
Core 2 Duo Allendale	169,000,000	2007	Intel	65 nm	111 mm²
Itanium 2 Madison 6M	410,000,000	2003	Intel	130 nm	374 mm²
Atom "Medfield"	432,000,000[18]	2012	Intel	32 nm	64 mm²
AMD K10 quad-core 2M L3	463,000,000[19]	2007	AMD	65 nm	283 mm²
ARM Cortex-A9	26,000,000[20]	2007	ARM	45 nm	31 mm²
Core 2 Duo Wolfdale 3M	230,000,000	2008	Intel	45 nm	83 mm²
Itanium 2 with 9 MB cache	592,000,000	2004	Intel	130 nm	432 mm²
Core 2 Duo Wolfdale	411,000,000	2007	Intel	45 nm	107 mm²
Core i7 (Quad)	731,000,000	2008	Intel	45 nm	263 mm²
AMD K10 quad-core 6M L3	758,000,000[19]	2008	AMD	45 nm	258 mm²
POWER6	789,000,000	2007	IBM	65 nm	341 mm²
Six-core Opteron 2400	904,000,000	2009	AMD	45 nm	346 mm²
16-core SPARC T3	1,000,000,000[21]	2010	Sun/Oracle	40 nm	377 mm²
Apple A7 (dual-core ARM64 "mobile SoC")	1,000,000,000	2013	Apple	28 nm	102 mm²
Quad-core + GPU Core i7	1,160,000,000	2011	Intel	32 nm	216 mm²
Six-core Core i7 (Gulftown)	1,170,000,000	2010	Intel	32 nm	240 mm²
8-core POWER7 32M L3	1,200,000,000	2010	IBM	45 nm	567 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
8-core AMD Bulldozer	1,200,000,000[22]	2012	AMD	32 nm	315 mm²
Quad-core + GPU AMD Trinity	1,303,000,000	2012	AMD	32 nm	246 mm²
Quad-core z196[23]	1,400,000,000	2010	IBM	45 nm	512 mm²
Quad-core + GPU Core i7 Ivy Bridge	1,400,000,000	2012	Intel	22 nm	160 mm²
Quad-core + GPU Core i7 Haswell	1,400,000,000[24]	2014	Intel	22 nm	177 mm²
Dual-core Itanium 2	1,700,000,000[25]	2006	Intel	90 nm	596 mm²
Quad-core + GPU GT2 Core i7 Skylake K	1,750,000,000	2015	Intel	14 nm	122 mm²
Six-core Core i7 Ivy Bridge E	1,860,000,000	2013	Intel	22 nm	256 mm²
Dual-core + GPU Iris Core i7 Broadwell-U	1,900,000,000[26]	2015	Intel	14 nm	133 mm²
Six-core Xeon 7400	1,900,000,000	2008	Intel	45 nm	503 mm²
Quad-core Itanium Tukwila	2,000,000,000[27]	2010	Intel	65 nm	699 mm²
Apple A8 (dual-core ARM64 "mobile SoC")	2,000,000,000	2014	Apple	20 nm	89 mm²
Apple A9 (dual-core ARM64 "mobile SoC")	> 2,000,000,000	2015	Apple	14 nm (Samsung) / 16 nm (TSMC)	96 mm² (Samsung) / 104.5 mm² (TSMC)
Apple A9X (dual-core ARM64 "mobile SoC")	> 3,000,000,000	2015	Apple	16 nm	143.9 mm²
8-core POWER7+ 80 MB L3 cache	2,100,000,000	2012	IBM	32 nm	567 mm²
Six-core Core i7/8-core Xeon E5 (Sandy Bridge-E/EP)	2,270,000,000[28]	2011	Intel	32 nm	434 mm²
8-core Xeon Nehalem-EX	2,300,000,000[29]	2010	Intel	45 nm	684 mm²
8-core Core i7 Haswell-E	2,600,000,000[30]	2014	Intel	22 nm	355 mm²
10-core Xeon Westmere-EX	2,600,000,000	2011	Intel	32 nm	512 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Six-core zEC12	2,750,000,000	2012	IBM	32 nm	597 mm²
Apple A8X (tri-core ARM64 "mobile SoC")	3,000,000,000[31]	2014	Apple	20 nm	128 mm²
Qualcomm Snapdragon 835 (octa-core ARM64 "mobile SoC")	3,000,000,000[32][33]	2016	Qualcomm	10 nm	72.3 mm²
Qualcomm Snapdragon 845 (octa-core ARM64 "mobile SoC")	5,300,000,000[34][35]	2017	Qualcomm	10 nm	94 mm²
Qualcomm Snapdragon 710 (octa-core ARM64 "mobile SoC")		2018	Qualcomm	10 nm	
Qualcomm Snapdragon 675 (octa-core ARM64 "mobile SoC")		2018	Qualcomm	11 nm	
Qualcomm Snapdragon 850 (octa-core ARM64 "mobile SoC")	5,300,000,000[36][37]	2017	Qualcomm	10 nm	94 mm²
Qualcomm Snapdragon 855 (octa-core ARM64 "mobile SoC")		2018	Qualcomm	7 nm	73.27 mm²
Samsung Exynos 9820 (octa-core ARM64 "mobile SoC")		2019	Samsung	8 nm	127 mm²
Qualcomm Snapdragon 8cx / SCX8180 (octa-core ARM64 "mobile SoC")	8,500,000,000[38][39]	2018	Qualcomm	7 nm	112 mm²
8-core Itanium Poulson	3,100,000,000	2012	Intel	32 nm	544 mm²
10-core Core i7 Broadwell-E	3,200,000,000[40]	2016	Intel	14 nm	246 mm²[41]
Apple A10 Fusion (quad-core ARM64 "mobile SoC")	3,300,000,000	2016	Apple	16 nm	125 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
IBM z13	3,990,000,000	2015	IBM	22 nm	678 mm²
12-core POWER8	4,200,000,000	2013	IBM	22 nm	650 mm²
Apple A11 Bionic (hexa-core ARM64 "mobile SoC")	4,300,000,000	2017	Apple	10 nm	89.23 mm²
15-core Xeon Ivy Bridge-EX	4,310,000,000[42]	2014	Intel	22 nm	541 mm²
Zeppelin SoC Ryzen	4,800,000,000[43]	2017	AMD	14 nm	192 mm²
Ryzen 5 1600 Ryzen	4,800,000,000[44]	2017	AMD	14 nm	213 mm²
Ryzen 5 1600 X Ryzen	4,800,000,000[45]	2017	AMD	14 nm	213 mm²
61-core Xeon Phi	5,000,000,000[46]	2012	Intel	22 nm	720 mm²
Xbox One main SoC	5,000,000,000	2013	Microsoft/AMD	28 nm	363 mm²
18-core Xeon Haswell-E5	5,560,000,000[47]	2014	Intel	22 nm	661 mm²
IBM z14	6,100,000,000	2017	IBM	14 nm	696 mm²
Apple A12 Bionic (hexa-core ARM64 "mobile SoC")	6,900,000,000[48][49]	2018	Apple	7 nm	83.27 mm2
HiSilicon Kirin 960 (octa-core ARM64 "mobile SoC")	4,000,000,000[50]	2016	Huawei	16 nm	110.00 mm2
HiSilicon Kirin 980 (octa-core ARM64 "mobile SoC")	6,900,000,000[51]	2018	Huawei	7 nm	74.13 mm2
HiSilicon Kirin 970 (octa-core ARM64 "mobile SoC")	5,500,000,000[52]	2017	Huawei	10 nm	96.72 mm2
HiSilicon Kirin 710 (octa-core ARM64 "mobile SoC")	5,500,000,000[53]	2018	Huawei	12 nm	
Xbox One X (Project Scorpio) main SoC	7,000,000,000[54]	2017	Microsoft/AMD	16 nm	360 mm²[54]
IBM z13 Storage Controller	7,100,000,000	2015	IBM	22 nm	678 mm²
28-core Xeon Platinum 8180	8,000,000,000[55]	2017	Intel	14 nm	

Processor	Transistor count	Date of introduction	Designer	Process	Area
22-core Xeon Broadwell-E5	7,200,000,000[56]	2016	Intel	14 nm	456 mm²
POWER9	8,000,000,000	2017	IBM	14 nm	695 mm²
72-core Xeon Phi	8,000,000,000	2016	Intel	14 nm	683 mm²
IBM z14 Storage Controller	9,700,000,000	2017	IBM	14 nm	696 mm²
32-core SPARC M7	10,000,000,000[57]	2015	Oracle	20 nm	
Apple A12X Bionic (octa-core ARM64 "mobile SoC")	10,000,000,000[58]	2018	Apple	7 nm	122 mm2
Apple A10X Fusion (hexa-core ARM64 "mobile SoC")	4,300,000,000[59]	2017	Apple	10 nm	96.40 mm2
Centriq 2400	18,000,000,000[60]	2017	Qualcomm	10 nm	398 mm2
32-core AMD Epyc	19,200,000,000	2017	AMD	14 nm	768 mm2
GC2 IPU	23,600,000,000	2018	Graphcore	16 nm	825 mm2
Tegra Xavier SoC	9,000,000,000[61]	2018	Nvidia	12 nm	350 mm²

GPu

Processor	Transistor count	Date of introduction	Manufacturer	Process	Area
NV3	3,500,000	1997	NVIDIA	350 nm	90 mm²
Rage 128	8,000,000	1999	AMD	250 nm	70 mm²
NV5	15,000,000	1999	Nvidia	250 nm	
NV10	23,000,000	1999	Nvidia	220 nm	111 mm²
NV11	20,000,000	2000	Nvidia	180 nm	65 mm²
NV15	25,000,000	2000	Nvidia	180 nm	81 mm²
R100	30,000,000	2000	AMD	180 nm	97 mm²
NV20	57,000,000	2001	Nvidia	150 nm	128 mm²
R200	60,000,000	2001	AMD	150 nm	68 mm²
NV25	63,000,000	2002	Nvidia	150 nm	142 mm²
R300	107,000,000	2002	AMD	150 nm	218 mm²
R360	117,000,000	2003	AMD	150 nm	218 mm²
NV38	135,000,000	2003	Nvidia	130 nm	207 mm²
R480	160,000,000	2004	AMD	130 nm	297 mm²
G86 Tesla	210,000,000	2007	Nvidia	80 nm	127 mm²
G98 Tesla	210,000,000	2008	Nvidia	65 nm	86 mm²
NV40	222,000,000	2004	Nvidia	130 nm	305 mm²

Processor	Transistor count	Date of introduction	Manufacturer	Process	Area
RV710	242,000,000	2008	AMD	55 nm	73 mm²
GT218 Tesla	260,000,000	2009	Nvidia	40 nm	57 mm²
G84 Tesla	289,000,000	2007	Nvidia	80 nm	169 mm²
Cedar RV810	292,000,000	2010	AMD	40 nm	59 mm²
GF119 Fermi	292,000,000	2011	Nvidia	40 nm	79 mm²
G70	303,000,000	2005	Nvidia	110 nm	333 mm²
G96 Tesla	314,000,000	2008	Nvidia	55 nm	121 mm²
R520	321,000,000	2005	AMD	90 nm	288 mm²
Caicos RV910	370,000,000	2011	AMD	40 nm	67 mm²
R580	384,000,000	2006	AMD	90 nm	352 mm²
GT216 Tesla	486,000,000	2009	Nvidia	40 nm	100 mm²
G94 Tesla	505,000,000	2008	Nvidia	65 nm	240 mm²
RV730	514,000,000	2008	AMD	55 nm	146 mm²
GF108 Fermi	585,000,000	2011	Nvidia	40 nm	116 mm²
Redwood RV830	627,000,000	2010	AMD	40 nm	104 mm²
RV670	666,000,000	2008	AMD	55 nm	192 mm²
G80	681,000,000	2006	Nvidia	90 nm	480 mm²

Processor	Transistor count	Date of introduction	Manufacturer	Process	Area
R600	700,000,000	2007	AMD	80 nm	420 mm²
Turks RV930	716,000,000	2011	AMD	40 nm	118 mm²
GT215 Tesla	727,000,000	2009	Nvidia	40 nm	144 mm²
G92	754,000,000	2007	Nvidia	65 nm	324 mm²
RV740	826,000,000	2009	AMD	40 nm	137 mm²
RV770	956,000,000	2008	AMD	55 nm	256 mm²
RV790	959,000,000[63]	2008	AMD	55 nm	282 mm²
Juniper RV840	1,040,000,000	2009	AMD	40 nm	166 mm²
Oland	1,040,000,000	2013	AMD	28 nm	90 mm²
GF106 Fermi	1,170,000,000	2010	Nvidia	40 nm	238 mm²
GK107 Kepler	1,270,000,000	2012	Nvidia	28 nm	118 mm²
GT200b Tesla	1,400,000,000	2008	Nvidia	55 nm	470 mm²
GT200 Tesla	1,400,000,000[64]	2008	Nvidia	65 nm	576 mm²
Cape Verde	1,500,000,000	2012	AMD	28 nm	123 mm²
Barts RV940	1,700,000,000	2010	AMD	40 nm	255 mm²
GP108 Pascal	1,850,000,000	2017	Nvidia	14 nm	74 mm²
GM107 Maxwell	1,870,000,000	2014	Nvidia	28 nm	148 mm²

Processor	Transistor count	Date of introduction	Manufacturer	Process	Area
GF104 Fermi	1,950,000,000	2011	Nvidia	40 nm	332 mm²
Bonaire	2,080,000,000	2013	AMD	28 nm	160 mm²
Cypress RV870	2,154,000,000[65]	2009	AMD	40 nm	334 mm²
Polaris 12 "Lexa"	2,200,000,000	2017	AMD	14 nm	101 mm²
GK106 Kepler	2,540,000,000	2012	Nvidia	28 nm	221 mm²
Cayman RV970	2,640,000,000	2010	AMD	40 nm	389 mm²
Pitcairn	2,800,000,000	2012	AMD	28 nm	212 mm²
GM206 Maxwell	2,940,000,000	2014	Nvidia	28 nm	228 mm²
Polaris 11 "Baffin"	3,000,000,000	2016	AMD	14 nm	123 mm²
GF100 Fermi	3,200,000,000[66]	2010 Mar	Nvidia	40 nm	526 mm²
GF110 Fermi	3,000,000,000[66]	2010 Nov	Nvidia	40 nm	520 mm²
GP107 Pascal	3,300,000,000	2017	Nvidia	14 nm	132 mm²
GK104 Kepler	3,540,000,000[67]	2012	Nvidia	28 nm	294 mm²
Tahiti	4,312,711,873[68]	2011	AMD	28 nm	365 mm²
GP106 Pascal	4,400,000,000	2016	Nvidia	16 nm	200 mm²
Tonga	5,000,000,000	2014	AMD	28 nm	366 mm²
GM204 Maxwell	5,200,000,000	2014	Nvidia	28 nm	398 mm²

Processor	Transistor count	Date of introduction	Manufacturer	Process	Area
Polaris 10 "Ellesmere"	5,700,000,000[69]	2016	AMD	14 nm	232 mm²
Hawaii	6,300,000,000	2013	AMD	28 nm	438 mm²
GK110 Kepler	7,080,000,000[70]	2012[71]	Nvidia	28 nm	561 mm²
GP104 Pascal	7,200,000,000	2016	Nvidia	16 nm	314 mm²
GP102 Pascal	11,800,000,000	2017	Nvidia	16 nm	471 mm²
GM200 Maxwell	8,000,000,000	2015	Nvidia	28 nm	601 mm²
Fiji	8,900,000,000	2015	AMD	28 nm	596 mm²
Vega 10	12,500,000,000[72]	2017	AMD	14 nm	484 mm²
Vega 20	13,280,000,000	2018	AMD	7 nm	331 mm²
GP100 Pascal	15,300,000,000[73]	2016	Nvidia	16 nm	610 mm²
TU102 Turing	18,600,000,000	2018	Nvidia	12 nm	754 mm²
GV100 Volta	21,100,000,000[74]	2017	Nvidia	12 nm	815 mm²
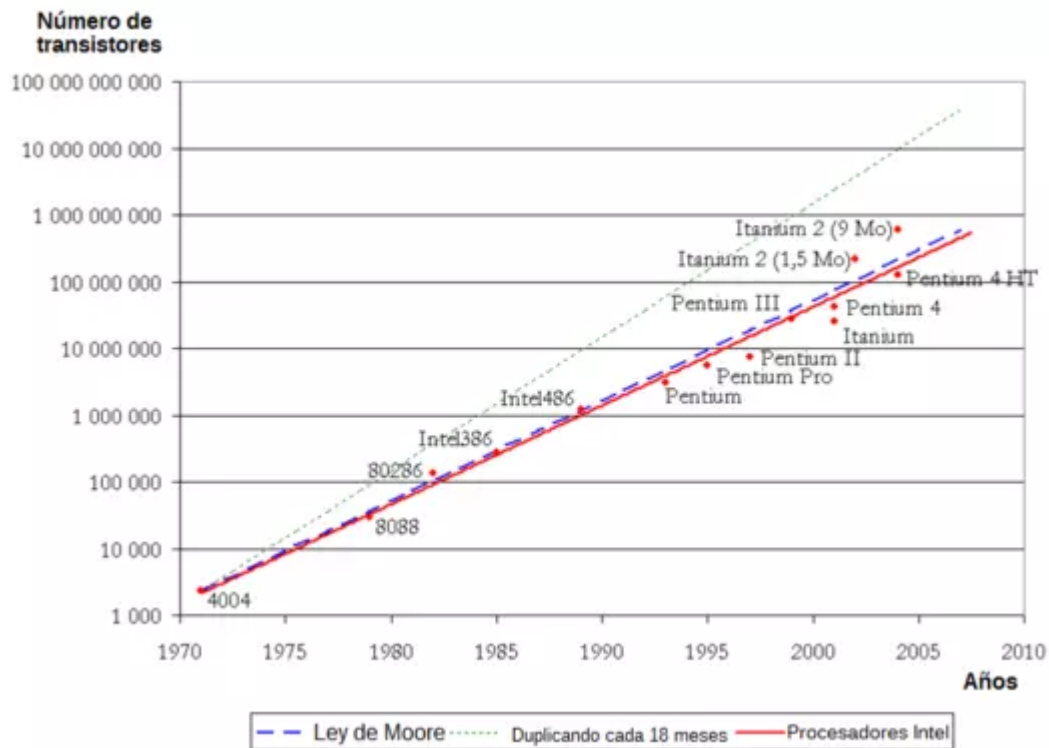
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