TOSHIBA

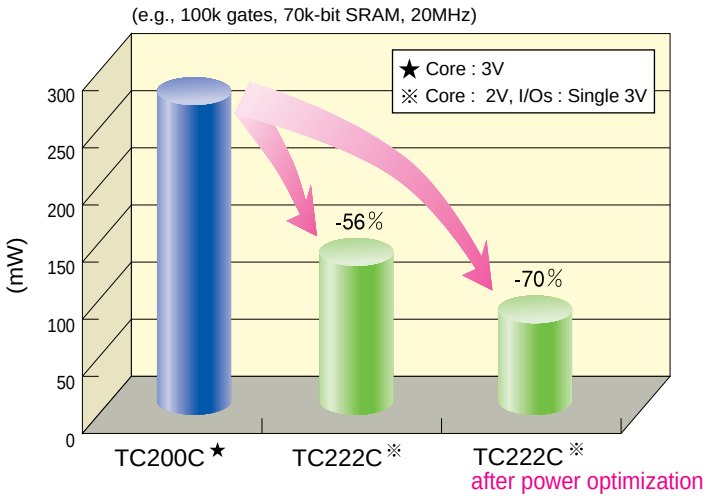
Low Power CMOS ASIC
0.3µm 3V/2V
TC222C Series Cell-Based IC

PRODUCT GUIDE

Overview

Toshiba's TC222C cell-based ASIC series provides silicon solutions to meet your design goals for high-performance and low-power systems. Fabricated on an advanced 0.3-micron double/triple metal CMOS process, the TC222C Series offers a choice of many different array sizes ranging from 59,000 to 2,077,000 usable gates. The TC222C Series is optimized for low 2.0V operation with dual 2.0/3.0V I/O options. The special cell architecture led to an extremely low power dissipation rating of 0.09μW/MHz/gate (with a fanout of 1). For a wide variety of applications, three or more variations of macrocells are available allowing the optimum tuning of performance and power. The placement-and-routing run can be power-driven to ensure that the result is the lowest power implementation that meets timing constraints. All these features help to substantially reduce your chip's power while maximizing the critical path speed.

Power Comparison



Product Specifications

Process Technology		0.3μm HC²MOS Si-gate double-/triple-layer metal
Gate Delay	2-input NAND, High drive, F/O = 1	0.10 ns
	2-input NAND, High drive, F/O = 2 + estimated wire load	0.21 ns
Power Consumption	2-input NAND, Low drive, F/O = 1*	0.09 μW/MHz/gate
	2-input NAND, Low drive, F/O = 4*	0.18 μW/MHz/gate
Power Supply		[Core] 2.0 V [I/O] 3.0 V / 2.0 V
Recommended Operating Voltage Range		[Core] 2.0 V±0.2 V [I/O] 3.0 V±0.3 V / 2.0 V±0.2 V

* Loaded with low-power cell(s)

Product Lines

Double-layer Metal				Triple-layer Metal				Maximum I/O Pads		
Ref. No	Part Number	Gird Complexity	Equivalent Gates	Ref. No	Part Number	Gird Complexity	Equivalent Gates	Wire Bonding	TCP/TBGA	PQFP[TAB] /TBGA
04	**TC222C040**	118,000	59,000	54	**TC222C540**	196,000	98,000	96	148	200
06	**TC222C060**	166,000	83,000	56	**TC222C560**	274,000	137,000	120	184	248
08	**TC222C080**	226,000	113,000	58	**TC222C580**	372,000	186,000	136	212	288
10	**TC222C100**	274,000	137,000	60	**TC222C600**	450,000	225,000	152	236	316
12	**TC222C120**	334,000	167,000	62	**TC222C620**	546,000	273,000	168	260	348
14	**TC222C140**	400,000	200,000	64	**TC222C640**	654,000	327,000	184	284	380
16	**TC222C160**	448,000	224,000	66	**TC222C660**	720,000	360,000	200	312	420
18	**TC222C180**	520,000	260,000	68	**TC222C680**	836,000	418,000	216	336	452
20	**TC222C200**	598,000	299,000	70	**TC222C700**	962,000	481,000	232	360	484
22	**TC222C220**	682,000	341,000	72	**TC222C720**	1,094,000	547,000	248	384	516
24	**TC222C240**	770,000	385,000	74	**TC222C740**	1,236,000	618,000	264	408	548
26	**TC222C260**	864,000	432,000	76	**TC222C760**	1,388,000	694,000	280	432	–
28	**TC222C280**	962,000	481,000	78	**TC222C780**	1,546,000	773,000	296	456	–
30	**TC222C300**	1,068,000	534,000	80	**TC222C800**	1,714,000	857,000	312	480	–
32	**TC222C320**	1,178,000	589,000	82	**TC222C820**	1,890,000	945,000	328	504	–
34	**TC222C340**	1,270,000	635,000	84	**TC222C840**	2,048,000	1,024,000	352	540	–
36	**TC222C360**	1,446,000	723,000	86	**TC222C860**	2,332,000	1,166,000	376	576	–
38	**TC222C380**	1,634,000	817,000	88	**TC222C880**	2,634,000	1,317,000	400	612	–
40	**TC222C400**	1,832,000	916,000	90	**TC222C900**	2,954,000	1,477,000	424	648	–
42	**TC222C420**	2,576,000	1,288,000	92	**TC222C920**	4,154,000	2,077,000	504	768	–

System Application Example –Digital Camcorder–

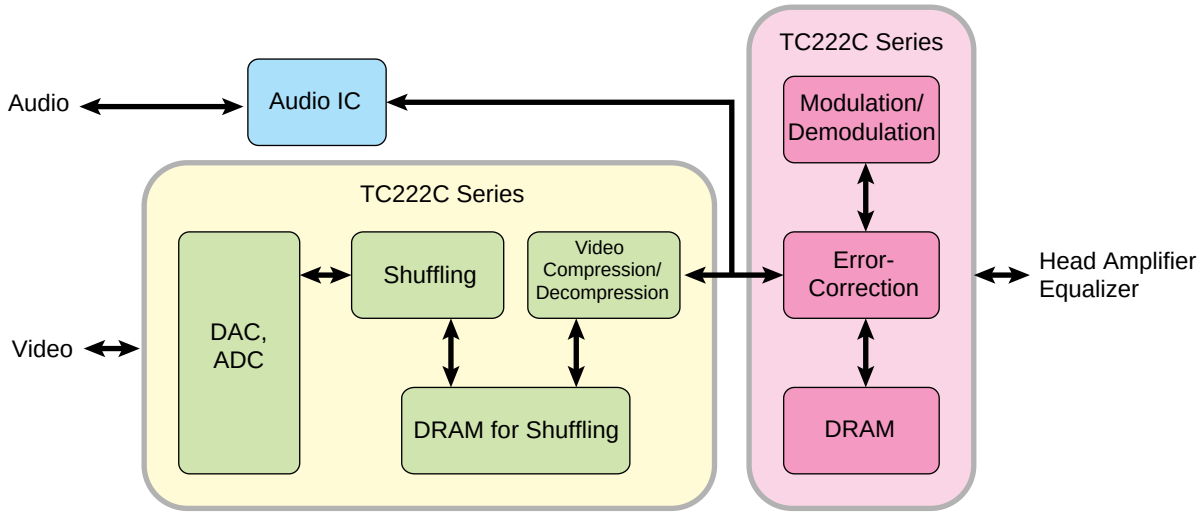
Because customers buying ultraportable devices rank portability and long battery life at the top of their feature preferences, the TC222C Series are ideal for these products.

After the VHS-H and 8-mm Betacam models have long been the mainstay of consumer-use camcorders, digital video cameras (DVC) are now coming on the market. The DVC, expected to become the core equipment in the multimedia era, combines superior video quality with the ability to transmit video to a personal computer and to the Internet.

The high-density and low-power features of the TC222C Series were essential to successfully implement complex designs for the DVC. In the application example depicted below, the TC222C Series turned a five- or seven-piece chip set for the digital signal processing portion of digital camcorders into a two- or three-chip set. The TC222C chips additionally incorporated DRAM chips.

The rewards for designing with the TC222C Series are obvious. The new DVCs are light and easy to carry while the previous models were nearly as large as the early analog camcorders that were hoisted onto the shoulder. In addition, the TC222C implementation helped to dramatically extend battery life.

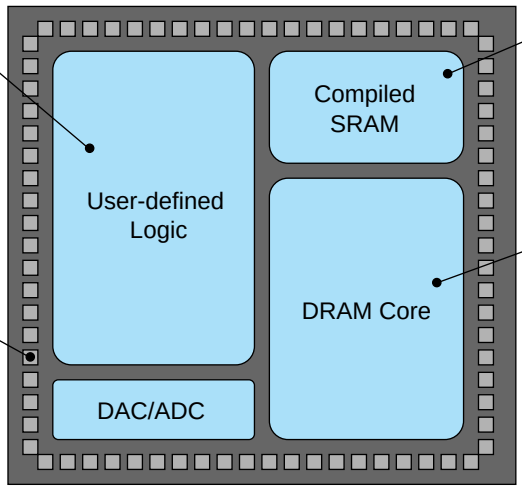
Digital Signal Processing



Chip Layout

Integration allows high-performance specialized blocks for video compression, etc. to be consolidated onto the same chip. Operating at 2V, the TC222C Series reduces power dissipation in large, densely populated chips.

The TC222C operates with a 2V core and offers both 3V and 2V I/Os. The 2V core reduces the power consumption of your design, while the 3V and 2V I/O compatibility offers you flexibility with your system interface design.



The megacell compiler software can generate a wide range of high-density SRAMs and ROMs in low-power models.

The embedded DRAM core is based on our world-leading 64-Mbit DRAM process technology.

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