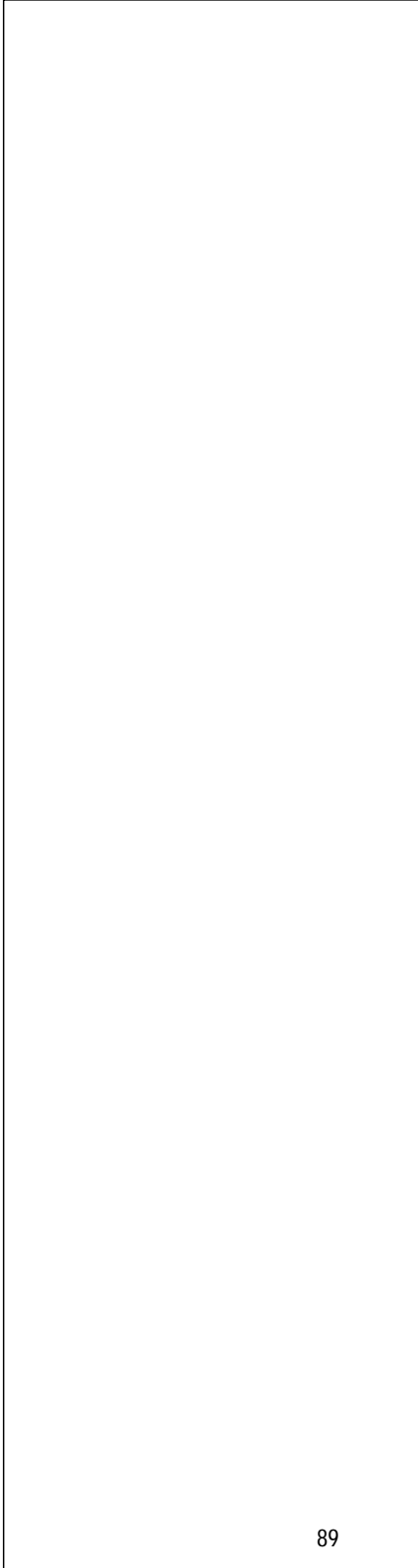




# General-Purpose Logic ICs

- CMOS Logic ICs ● 94
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- CMOS Logic ICs in Ultra-Small US Packages ● 104
- Dual-Supply Level Shifters ● 106
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- One-Gate CMOS (L-MOS) ● 112



## CMOS Logic ICs (74AC, 74VHC, 74HC and Standard Series) Quick Reference

Functions		ACL (TC74AC/ACTxxxSeries)	VHS (TC74VHC/VHCTxxxSeries)
Gates Buffers	NAND	AC00, ACT00, AC10, AC20	VHC00, VHCT00A, VHC03, VHC10, VHC20, VHC132
	NOR	AC02, ACT02	VHC02, VHC27
	AND	AC08, ACT08, AC11	VHC08, VHCT08A, VHC11, VHC21
	OR	AC32, ACT32	VHC32, VHCT32A
	Buffer		
	Inverter	AC04, ACT04, AC05, AC14, ACT14	VHC04, VHCT04A, VHCU04, VHC05, VHC14, VHCT14A
	3-State Buffer	AC125, AC126, AC240, ACT240, AC244, ACT244, AC245, ACT245, AC367, AC540, ACT540, AC541, ACT541, AC640, ACT640	VHC125, VHCT125A, VHC126, VHCT126A, VHC240, VHCT240A, VHC244, VHCT244A, VHC367, VHCT367A, VHC368, VHC540, VHCT540A, VHC541, VHCT541A, VHC245, VHCT245A
	Open Drain	AC05	VHC03, VHC05
	Level Shifter		
	Exclusive-OR	AC86, ACT86	VHC86, VHCT86A
	Exclusive-NOR		
	Schmitt Trigger	AC14, ACT14	VHC14, VHCT14A, VHC132
	Schmitt Buffer		VHC9541
Flip-Flops	AC74, ACT74, AC109, AC112, ACT112, AC174, ACT174, AC175, ACT175, AC273, ACT273, AC374, ACT374, AC377, AC534, AC574, ACT574	VHC74, VHCT74A, VHC174, VHC175, VHC273, VHC374, VHCT374A, VHC574, VHCT574A	
Latches	AC373, ACT373, AC573, ACT573	VHC373, VHCT373A, VHC573, VHCT573A	
Multivibrators		VHC123A, VHC221A	
Decoders	AC138, ACT138, AC139, ACT139	VHC138, VHCT138A, VHC139, VHCT139A, VHC238	
Encoders			
Drivers	LED		
	LCD		
	Others		
Registers	Shift	AC164, ACT164, AC166, AC299, ACT299	VHC164, VHC165, VHC299, VHC595
	Storage		
Counters	Binary	AC161, ACT161, AC163, ACT163, AC393	VHC161, VHC163, VHC393, VHC4040, VHC4020
	Decade	AC390	
	N-Digit Decade		
	Divider		
	Others		
Multiplexers	Analog		VHC4051A, VHC4052A, VHC4053A
	Digital	AC151, ACT151, AC153, ACT153, AC157, ACT157, AC257, ACT257, AC258	VHC153, VHC157, VHC257
Arithmetic Circuits	Adder	AC283	
	Comparator	AC521, ACT521	
	Parity Tree	AC280, ACT280	
	Rate Multiplier		
FIFO Memories			
Others	Timer		
	Analog Switch		VHC4066A

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

HS-CMOS (TC74HC/HCTxxxSeries)	Standard CMOS (TC4000/4500 Series)
HC00A, HCT00A, HC03A, HC10A, HC20A, HC30A, HC132A, HC133A	4011B
HC02A, HCT02A, HC27A, HC4002A, HC4078A	4001B
HC08A, HCT08A, HC11A, HC21A	4081B
HC32A, HCT32A, HC4072A, HC4075A, HC4078A	4071B
HC07A, HC4050A, HCT7007A	4050B
HC04A, HCT04A, HCU04A, HC05A, HC14A, HC4049A	4069UB, 4049B
HC125A, HC126A, HC240A, HCT240A, HC241A, HC244A, HCT244A, HC245A, HCT245A, HC365A, HC366A, HC367A, HC368A, HC540A, HCT540A, HC541A, HCT541A, HC640A, HC7240A, HC7244A	
HC03A, HC05A, HC07A	
HC4049A, HC4050A	4049B, 4050B
HC86A, HCT86A	4030B
HC7266A	
HC14A, HC132A	4093B, 4584B
HC74A, HCT74A, HC107A, HC109A, HC112A, HC174A, HCT174A, HC175A, HC273A, HCT273A, HC374A, HCT374A, HC377A, HC564A, HC574A, HCT574A, HC646A, HCT646A, HC652A, HCT652A	4013B, 4027B
HC259A, HC279A, HC373A, HCT373A, HC375A, HC573A, HCT573A	4044B
HC123A, HC221A, HC423A, HC4538A	4538B
HC42A, HC138A, HCT138A, HC139A, HCT139A, HC154A, HC155A, HC237A, HC238A, HC4028A, HC4511A, HC4514A	4028B, 4511B
HC148A	
HC4511A	4511B
HC164A, HC165A, HC166A, HC173A, HC299A, HC595A, HC597A, HC670A, HC4094A, HC40105A	4015B, 4021B, 4094B
HC161A, HC163A, HC191A, HC193A, HC393A, HC590A, HC592A, HC697A, HC4020A, HC4040A, HC4520A	4520B, 4020B, 4024B, 4040B
HC390A	
HC4020A, HC4024A, HC4040A, HC4060A, HC40102A, HC40103A, HC7292A	4020B, 4024B, 4040B, 4521B
HC4017A	4017B
HC4051A, HC4052A, HC4053A, HCT4053A	4051B, 4052B, 4053B
HC151A, HC153A, HC157A, HCT157A, HC158A, HC251A, HC253A, HC257A	4512B
HC283A	
HC85A, HC688A, HCT688A	
HC280A	
HC40105A	
HC4066A	4066B

## Low-Voltage CMOS Logic ICs (74VCX, 74LCX and 74LVX Series) Quick Reference

Functions		VCX (TC74VCXxxxSeries)	LCX (TC74LCXxxxSeries)	LVX (TC74LVXxxxSeries)
Gates Buffers	NAND	VCX00	LCX00	LVX00
	NOR	VCX02	LCX02	LVX02
	AND	VCX08	LCX08	LVX08
	OR	VCX32	LCX32	LVX32
	Inverter	VCX04	LCX04	LVX04
	Bus Buffer	VCX125, VCX2125, VCX244, VCX2244, VCX541, VCX2541, VCX16244, VCX162244, VCX16827, VCX162827, VCXH16244, VCXH162244, VCXH16827, VCXH162827	LCX125, LCX126, LCX240, LCX244, LCX540, LCX541, LCX16240, LCX16244	LVX125, LVX240, LVX244
	Bus Transceiver	VCX245, VCXR2245, VCX16245, VCXR162245, VCX16500, VCXR162500, VCX16501, VCXR162501, VCX16543, VCXR162543, VCX16600, VCXR162600, VCX16601, VCXR162601, VCX16646, VCXR162646, VCX16652, VCXR162652, VCXH16245, VCXHR162245, VCXH16543, VCXHR162543, VCXH16646, VCXHR162646, VCXH16652, VCXHR162652, VCXH16500, VCXH16501, VCXH16600, VCXH16601, VCXHR162500, VCXHR162501, VCXHR162600, VCXHR162601	LCX245, LCX646, LCX652, LCX16646A, LCX16245, LCX16652A	LVX245
	Dual Supply	VCX163245, VCX164245	LCX163245, LCXR163245, LCX164245, LCXR164245	LVX4245, LVXC3245
	Exclusive-OR	VCX86	LCX86	LVX86
	Schmitt Trigger	VCX14	LCX14	LVX14
	Open-Drain		LCX05, LCX07	
Flip-Flops		VCX74, VCX374, VCX2374, VCX574, VCX2574, VCX16374, VCX162374, VCX16721, VCX162721, VCX16821, VCX162821, VCX16823, VCX162823, VCX16834, VCX162834, VCX16835, VCX162835, VCXH16374, VCXH162374	LCX74, LCX273, LCX374, LCX574, LCX16374	LVX74, LVX174, LVX273, LVX374
Latches		VCX373, VCX2373, VCX573, VCX2573, VCX16373, VCX162373, VCX16841, VCX162841, VCX16843, VCX162843, VCXH16373, VCXH162373	LCX373, LCX573, LCX16373	LVX373, LVX573
Decoders		VCX138	LCX138	LVX138
Multiplexers	Digital	VCX157, VCX257	LCX157, LCX257	LVX157
	Analog			LVX4051, LVX4052, LVX4053

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## CMOS Logic ICs in Ultra-Small US Packages Quick Reference

Functions		TC74VHC Series	TC74VHCT Series	TC74LCX Series	TC74VCX Series
Gates	NAND	00, 03, 20	00A	00	00
	NOR	02, 27**		02**	02
	AND	08, 21	08A	08	08
	OR	32	32	32	32
	Inverter	04	04A, 14A	04	04
	Open Drain	03, 05		05, 07	
	Exclusive-OR	86		86	86
	Schmitt Trigger	14, 132		14	14
Buffers	Bus Buffer	125, 126 240, 244 367, 368 540, 541, 9541	125A, 126A 240A, 244A 540A, 541A	125, 126 240, 244 540, 541	125, 2125 244, 2244 541, 2541
	Bus Transceiver	245	245A	245	245, R2245
Flip-Flops	D-type	74, 273 574, 174**, 374**	374A, 574A	74, 273 374, 574	74, 374, 2374 574, 2574
Latches	D-type	373, 573	373A, 573A	373, 573	373, 2373 573, 2573
Decoders		138, 238, 139	138A, 139A	138	138
Multiplexers	Digital	153, 157, 257		157, 257**	157, 257
	Analog	4051A, 4052A 4053A			
Shift Registers		164, 165 595			
Binary Counters		161, 163, 393 4040, 4020			
Multivibrators		123A, 221A			
Others	Analog Switch	4066A			

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*\* : Under development

# CMOS Logic ICs

## 74AC, 74VHC, 74HC and Standard Series

No. (xxx)	Number of Pins	Functions	Part Number	ACL								
				TC74AC				TC74ACT				
				xxxP	xxxF	xxxFN	xxxFT	xxxP	xxxF	xxxFN	xxxFT	
Package	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP				
00	14	Quad 2-Input NAND Gate		○	□	⊙	○	○	○	□	⊙	○
02	14	Quad 2-Input NOR Gate		○	□	⊙	○	○	○	□	⊙	○
03	14	Quad 2-Input NAND Gate (Open-Drain)										
04	14	Hex Inverter		○	□	⊙	○	○	○	□	⊙	○
U04	14	Hex Inverter										
05	14	Hex Inverter (Open-Drain)		○	□	⊙						
07	14	Hex Buffer (Open-Drain)										
08	14	Quad 2-Input AND Gate		○	□	⊙	○	○	○	□	⊙	○
10	14	Triple 3-Input NAND Gate		○	□	⊙						
11	14	Triple 3-Input AND Gate		○	□	⊙						
14	14	Hex Schmitt Inverter		○	□	⊙	○	○	○	□	⊙	○
20	14	Dual 4-Input NAND Gate		○	□	⊙						
21	14	Dual 4-Input AND Gate										
27	14	Triple 3-Input NOR Gate										
30	14	8-Input NAND Gate										
32	14	Quad 2-Input OR Gate		○	□	⊙	○	○	○	□	⊙	○
42	16	BCD-to-Decimal Decoder										
74	14	Dual D-Type Flip-Flop with Preset and Clear		○	□	⊙	○	○	○	□	⊙	○
85	16	4-Bit Magnitude Comparator										
86	14	Quad Exclusive-OR Gate		○	□	⊙	○	○	○	□	⊙	○
107	14	Dual J-K Flip-Flop with Clear										
109	16	Dual J-K Flip-Flop with Preset and Clear		○	□	⊙						
112	16	Dual J-K Flip-Flop with Preset and Clear		○	□	⊙		○	○	□	⊙	
123A	16	Dual Monostable Multivibrator (tw out = 1.0 Cx · Rx)										
125	14	Quad Bus Buffer (3-State)		○	□	⊙	○					
126	14	Quad Bus Buffer (3-State)		○	□	⊙						
132	14	Quad 2-Input Schmitt NAND Gate										
133	16	13-Input NAND Gate										
138	16	3-to-8 Line Decoder		○	□	⊙	○	○	○	□	⊙	○
139	16	Dual 2-to-4 Line Decoder		○	□	⊙	○	○	○	□	⊙	○
148	16	8-to-3 Line Priority Encoder										
151	16	8-Channel Multiplexer		○	□	⊙		○	○	□	⊙	
153	16	Dual 4-Channel Multiplexer		○	□	⊙		○	○	□	⊙	
154	24	4-to-16 Line Decoder										
155	16	Dual 2-to-4 Line Decoder										
157	16	Quad 2-Channel Multiplexer		○	□	⊙	○	○	○	□	⊙	○
158	16	Quad 2-Channel Multiplexer (Inv.)										
161	16	Sync. Binary Counter with Async. Clear		○	□	⊙	○	○	○	□	⊙	
163	16	Sync. Binary Counter with Sync. Clear		○	□	⊙	○	○	○	□	⊙	
164	14	8-Bit Serial-In / Parallel-Out Shift Register		○	□	⊙	○	○	○	□	⊙	○
165	16	8-Bit Parallel-In / Serial-Out Shift Register										
166	16	8-Bit Parallel-In / Serial-Out Shift Register		○	□	⊙						
173	16	Quad D-Type Register (3-State)										
174	16	Hex D-Type Flip-Flop with Clear		○	□	⊙	○	○	○	□	⊙	
175	16	Quad D-Type Flip-Flop with Clear		○	□	⊙	○	○	○	□	⊙	
191	16	4-Bit Binary Up/Down Counter										
193	16	Sync. Up/Down Binary Counter										
221A	16	Dual Monostable Multivibrator (tw out = 1.0 Cx · Rx)										

○: In mass production at domestic and overseas fabs.

□: In mass production only at domestic fabs.

⊙: In mass production only at the overseas fabs.

(\*) The part number suffix is 123AP or 123AF, not 123AAP or 123AAF.

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.



74AC, 74VHC, 74HC and Standard Series (Continued)

No. (xxx)	Number of Pins	Functions	Part Number	ACL							
				TC74AC				TC74ACT			
				xxxP DIP	xxxF SOP	xxxFN SOL	xxxFT TSSOP	xxxP DIP	xxxF SOP	xxxFN SOL	xxxFT TSSOP
237	16	3-to-8 Line Decoder/Latch									
238	16	3-to-8 Line Decoder									
240	20	Octal Bus Buffer (3-State, Inverted)		□		○	□	□			○
241	20	Octal Bus Buffer (3-State)		□		○	□	□			○
244	20	Octal Bus Buffer (3-State)		□	□		○	□	□		○
245	20	Octal Bus Transceiver (3-State)		□	□		○	□	□		○
251	16	8-Channel Multiplexer (3-State)									
253	16	Dual 4-Channel Multiplexer (3-State)									
257	16	Quad 2-Channel Multiplexer (3-State)		○	□	⊙	○	□		⊙	
258	16	Quad 2-Channel Multiplexer (3-State, Inverted)		○	□	⊙					
259	16	8-Bit Addressable Latch									
273	20	Octal D-Type Flip-Flop with Clear		□	□		○	□	□		
279	16	Quad S-R Latch									
280	14	9-Bit Parity Generator/Checker		○	□	⊙	○	□		⊙	
283	16	4-Bit Binary Full Adder		○	□	⊙					
299	20	8-Bit PIPO Shift Register		□	□			□	□		
365	16	Hex Bus Buffer (3-State)									
366	16	Hex Bus Buffer (3-State, Inverted)									
367	16	Hex Bus Buffer (3-State)		○	□	⊙	○				
368	16	Hex Bus Buffer (3-State, Inverted)									
373	20	Octal D-Type Latch (3-State)		□	□		○	□	□		○
374	20	Octal D-Type Flip-Flop (3-State)		□	□		○	□	□		○
375	16	Quad D-Type Latch									
377	20	Octal D-Type Flip-Flop		□	□						
390	16	Dual Decade Counter		○	□	⊙					
393	14	Dual Binary Counter		○	□	⊙	○				
423A	16	Dual Monostable Multivibrator (tw out = 1.0 Cx · Rx)									
521	20	8-Bit Equality Comparator		□	□			□	□		
534	20	Octal D-Type Flip-Flop (3-State, Inverted)		□	□						
540	20	Octal Bus Buffer (3-State, Inverted)		□	□		○	□	□		○
541	20	Octal Bus Buffer (3-State)		□	□		○	□	□		○
564	20	Octal D-Type Flip-Flop (3-State, Inverted)									
573	20	Octal D-Type Latch (3-State)		□	□		○	□	□		○
574	20	Octal D-Type Flip-Flop (3-State)		□	□		○	□	□		○
590	16	8-Bit Binary Counter/register (3-State)									
592	16	8-Bit Register/Binary Counter									
595	16	8-Bit Shift Register/Latch (3-State)									
597	16	8-Bit Latch/Shift Register									
640	20	Octal Bus Transceiver (3-State, Inverted)		□	□		○	□	□		○
646	24	Octal Bus Transceiver/Register (3-State)									
652	24	Octal Bus Transceiver/Register (3-State)									
670	16	4-Word x 4-Bit Register File (3-State)									
688	20	8-Bit Equality Comparator									
697	20	U/D 4-Bit Binary Counter/Register (3-State)									
4001	14	Quad 2-Input Positive NOR Gate									
4002	14	Dual 4-Input Positive NOR Gate									

○: In mass production at domestic and overseas fabs.

□: In mass production only at domestic fabs.

⊙: In mass production only at the overseas fabs.

(\*): The part number suffix is 423AP or 423AF, not 423AAP or 423AAF.

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.



VHS								HS-CMOS								Standard			
TC74VHC				TC74VHCT				TC74HC				TC74HCT				TC			
xxxF	xxxFN	xxxFt	xxxFK	xxxAF	xxxAFN	xxxAFt	xxxAFK	xxxAP	xxxAF	xxxAFN	xxxAFt	xxxAP	xxxAF	xxxAFN	xxxAFt	xxxBP	xxxBF	xxxBFN	xxxBFT
SOP	SOL	TSSOP	US	SOP	SOL	TSSOP	US	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP
<input type="checkbox"/>	⊙	○	<input type="checkbox"/>				**	○	<input type="checkbox"/>										
<input type="checkbox"/>		○	<input type="checkbox"/>	<input type="checkbox"/>		○	<input type="checkbox"/>	○	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/>	⊙	○	<input type="checkbox"/>					○	<input type="checkbox"/>	⊙									
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<input type="checkbox"/>		○	<input type="checkbox"/>	<input type="checkbox"/>		○	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/>	⊙	○	<input type="checkbox"/>					○	<input type="checkbox"/>	⊙									
								○	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>						
								○	<input type="checkbox"/>							○	<input type="checkbox"/>	○	○

\*\* : Under development

74AC, 74VHC, 74HC and Standard Series (Continued)

No. (xxx)	Number of Pins	Functions	Part Number	ACL									
				TC74AC				TC74ACT					
				xxxP	xxxF	xxxFN	xxxFT	xxxP	xxxF	xxxFN	xxxFT		
Package	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP					
4011	14	Quad 2-Input Positive NAND Gate											
4013	14	Dual D-Type Flip-Flop											
4015	16	Dual 4-Stage Static Shift Register											
4017	16	Decade Counter/Divider											
4020	16	14-Stage Binary Counter											
4021	16	8-Bit Parallel-In, Serial-Out Shift Register											
4024	14	7-Stage Binary Counter											
4027	16	Dual J-K Master-Slave Flip-Flop											
4028	16	BCD-to-Decimal Decoder											
4030	14	Quad Exclusive-OR Gate											
4040	16	12-Stage Binary Counter											
4044	16	Quad Positive NAND R/S Latch											
4049	16	Hex-Inverting Buffer/Converter											
4050	16	Hex Non-Inverting Buffer/Converter											
4051	16	Single 8-Channel Analog Multiplexer/Demultiplexer											
4051A	16	Single 8-Channel Analog Multiplexer/Demultiplexer											
4052	16	Dual 4-Channel Analog Multiplexer/Demultiplexer											
4052A	16	Dual 4-Channel Analog Multiplexer/Demultiplexer											
4053	16	Triple 2-Channel Analog Multiplexer/Demultiplexer											
4053A	16	Triple 2-Channel Analog Multiplexer/Demultiplexer											
4060	16	14-Stage Binary Counter/Oscillator											
4066	14	Quad Bilateral Switch											
4066A	14	Quad Bilateral Switch											
4069U	14	Hex Inverter											
4071	14	Quad 2-Input Positive OR Gate											
4072	14	Dual 4-Input Positive OR Gate											
4075	14	Triple 3-Input Positive OR Gate											
4078	14	8-Input Positive OR/NOR Gate											
4081	14	Quad 2-Input AND Gate											
4093	14	Quad 2-Input NAND Schmitt Trigger											
4094	16	8-Stage Shift-and-Store Bus Register											
40102	16	Dual BCD Programmable down Counter											
40103	16	8-Bit Binary Programmable down Counter											
40105	16	4-Bit x 16-Word FIFO Register											
4511	16	BCD-to-7-Segment Latch/Decoder/Driver											
4512	16	8-Channel Data Selector											
4514	24	4-Bit Latch/4-to-16 Line Decoder											
4520	16	Dual Binary up Counter											
4521	16	24-Stage Frequency Divider											
4538	16	Dual Precision Mono Multivibrator											
4584	14	Hex Schmitt Trigger											
7007	14	Hex Buffer											
7240	20	Octal Bus Buffer (3-State, Inverted)											
7244	20	Octal Bus Buffer (3-State)											
7266	14	Quad Exclusive-NOR Gate											
7292	16	Programmable Divider/Timer											
9541	20	Octal Universal Schmitt Buffer (3-State)											

○: In mass production at domestic and overseas fabs.

□: In mass production only at domestic fabs.

⊙: In mass production only at the overseas fabs.

★: Housed in the DIP package.

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

VHS								HS-CMOS								Standard			
TC74VHC				TC74VHCT				TC74HC				TC74HCT				TC			
xxxF	xxxFN	xxxFt	xxxFK	xxxAF	xxxAFN	xxxAFt	xxxAFK	xxxAP	xxxAF	xxxAFN	xxxAFt	xxxAP	xxxAF	xxxAFN	xxxAFt	xxxBP	xxxBF	xxxBFN	xxxBFT
SOP	SOL	TSSOP	US	SOP	SOL	TSSOP	US	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP	DIP	SOP	SOL	TSSOP
								○	□	⊙						○	□	⊙	○
								○	□							○	□	⊙	
								○	□							○	□	⊙	
□	⊙	○	□					○	□	⊙	○					○	□	⊙	
								○	□		○					○	□	⊙	○
□		□	□					○	□	⊙	○		□	⊙	○	○	□	⊙	○
□		□	□					○	□	⊙	○					○	□	⊙	○
								○	□							○	□	⊙	
								○	□	⊙						○	□	⊙	
								○	□							○	□	⊙	
								○	□							○	□	⊙	
								○	□	⊙	□					○	□	⊙	
								□	□			○	□			○	□	⊙	
								□	□			○	□			○	□	⊙	
□★		□	□					○	□										

# Low-Voltage CMOS Logic ICs

## 74VCX, 74LCX and 74LVX Series

No. (xxx)	Number of Pins	Functions	Part Number	Low-Voltage CMOS									
				TC74VCX			TC74LCX				TC74LVX		
				xxxFT	xxxFK	xxxFTG	xxxF	xxxFN	xxxFT	xxxFK	xxxF	xxxFN	xxxFT
Package	TSSOP	US	VOON	SOP	SOL	TSSOP	US	SOP	SOL	TSSOP	US		
00	14	Quad 2-Input NAND Gate		○	□		□	◎	○	□	□	◎	○
02	14	Quad 2-Input NOR Gate		○	□		□	◎	○	**	□	◎	○
04	14	Hex Inverter		○	□		□	◎	○	□	□	◎	○
05	14	Hex Inverter (Open-Drain)					□	◎	○	□			
07	14	Hex Buffer (Open-Drain)					□	◎	○	□			
08	14	Quad 2-Input AND Gate		○	□		□	◎	○	□	□	◎	○
14	14	Hex Schmitt Inverter		○	□		□	◎	○	□	□	◎	○
32	14	Quad 2-Input OR Gate		○	□		□	◎	○	□	□	◎	○
74	14	Dual D-Type Flip-Flop with Preset and Clear		○	□		□	◎	○	□	□	◎	○
86	14	Quad Exclusive-OR Gate		○	□		□	◎	○	□	□	◎	○
125	14	Quad Bus Buffer (3-State)		○	□		□	◎	○	□	□	◎	○
126	14	Quad Bus Buffer (3-State)					□		○	□			
2125	14	Quad Bus Buffer with Series Resistor (3-State)		○	□								
138	16	3-to-8 Line Decoder		○	□	**	□	◎	○	□	□	◎	○
157	16	Quad 2-Channel Multiplexer		○	□	**	□	◎	○	□	□	◎	○
174	16	Hex D-Type Flip-Flop with Clear							○	□	□	◎	○
240	20	Octal Bus Buffer (3-State/Inverting)					□		○	□	□		○
244	20	Octal Bus Buffer (3-State)		○	□		□		○	□	□		○
2244	20	Octal Bus Buffer with Series Resistor (3-State)		○	□								
245	20	Octal Bus Transceiver (3-State)		○	□	□	□		○	□	□		○
R2245	20	Octal Bus Transceiver with Series Resistor (3-State)		○	□	□							
257	16	Quad 2-Channel Multiplexer (3-State)		○	□			◎	○	**			
273	20	Octal D-Type Flip-Flop with Clear					□		○	□	□		○
367	16	Hex Bus Buffer (3-State)											
373	20	Octal D-Type Latch (3-State)		○	□		□		○	□	□		○
2373	20	Octal D-Type Latch with Series Resistor (3-State)		○	□								
374	20	Octal D-Type Flip-Flop (3-State)		○	□		□		○	□	□		○
2374	20	Octal D-Type Flip-Flop with Series Resistor (3-State)		○	□								
540	20	Octal Bus Buffer (3-State/Inverting)					□		○	□			
541	20	Octal Bus Buffer (3-State)		○	□	□	□		○	□	□		
2541	20	Octal Bus Buffer with Series Resistor (3-State)		□	□	□							
573	20	Octal D-Type Latch (3-State)		○	□		□		○	□	□		○
2573	20	Octal D-Type Latch with Series Resistor (3-State)		○	□								
574	20	Octal D-Type Flip-Flop (3-State)		○	□		□		○	□			
2574	20	Octal D-Type Flip-Flop with Series Resistor (3-State)		○	□								
646	24	Octal Bus Transceiver/Register (3-State)							□★				
652	24	Octal Bus Transceiver/Register (3-State)							□★				
C3245	24	Dual Supply Octal Bus Transceiver (3-State)										□★	
4245	24	Dual Supply Octal Bus Transceiver (3-State)										□★	
4051	16	8-Channel Analog Multiplexer/Demultiplexer								□		□	□
4052	16	Dual 4-Channel Analog Multiplexer/Demultiplexer								□		□	□
4053	16	Triple 2-Channel Analog Multiplexer/Demultiplexer								□		□	□
16240	48	16-Bit Bus Buffer (3-State/Inverting)							□				
16244	48	16-Bit Bus Buffer (3-State)		□					□				
H16244	48	16-Bit Bus Buffer with Bushold		□									
162244	48	16-Bit Bus Buffer with Series Resistor (3-State)		□									
H162244	48	16-Bit Bus Buffer with Bushold/Series Resistor		□									
16245	48	16-Bit Bus Transceiver (3-State)		□					□				
H16245	48	16-Bit Bus Transceiver with Bushold		□									
R162245	48	16-Bit Bus Transceiver with Series Resistor (3-State)		□									
HR162245	48	16-Bit Bus Transceiver with Bushold/Series Resistor		□									
16373	48	16-Bit D-Type Latch (3-State)		□					□				
H16373	48	16-Bit D-Type Latch with Bushold		□									
162373	48	16-Bit D-Type Latch with Series Resistor (3-State)		□									
H162373	48	16-Bit D-Type Latch with Bushold/Series Resistor		□									
16374	48	16-Bit Bus Flip-Flop (3-State)		□					□				
H16374	48	16-Bit Bus Flip-Flop with Bushold		□									
162374	48	16-Bit Bus Flip-Flop with Series Resistor (3-State)		□									
H162374	48	16-Bit Bus Flip-Flop with Bushold/Series Resistor		□									

○: In mass production at domestic and overseas fabs.

□: In mass production only at domestic fabs.

◎: In mass production only at the overseas fabs.

★: Housed in the SSOP package

• For package dimensions and standard codes, please refer to pages 102 to 103.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

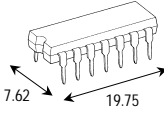
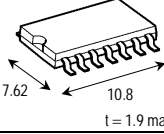
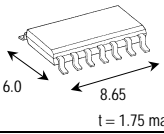
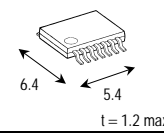
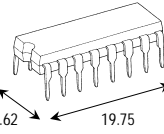
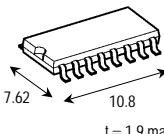
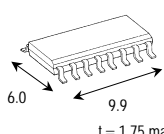
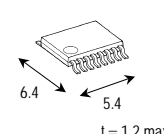
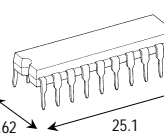
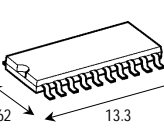
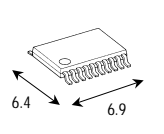
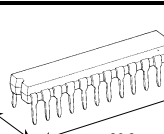
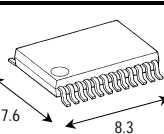
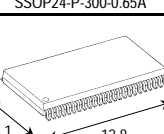
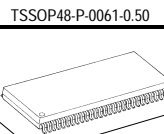
\*\* : Under development

No. (xxx)	Number of Pins	Functions	Part Number	Low-Voltage C <sup>MOS</sup>												
				TC74VCX			TC74LCX				TC74LVX					
				xxxFT	xxxFK	xxxFTG	xxxF	xxxFN	xxxFT	xxxFK	xxxF	xxxFN	xxxFT	xxxFK		
Package	TSSOP	US	VOON	SOP	SOL	TSSOP	US	SOP	SOL	TSSOP	US					
16500	56	18-Bit Universal Bus Transceiver (3-State)		<input type="checkbox"/>												
H16500	56	18-Bit Universal Bus Transceiver with Bushold (3-State)		<input type="checkbox"/>												
R162500	56	18-Bit Universal Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>												
HR162500	56	18-Bit Universal Bus Transceiver with Bushold/Series Resistor (3-State)		<input type="checkbox"/>												
16501	56	18-Bit Universal Bus Transceiver (3-State)		<input type="checkbox"/>												
H16501	56	18-Bit Universal Bus Transceiver with Bushold (3-State)		<input type="checkbox"/>												
R162501	56	18-Bit Universal Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>												
HR162501	56	18-Bit Universal Bus Transceiver with Bushold/Series Resistor (3-State)		<input type="checkbox"/>												
16543	56	16-Bit Registered Transceiver (3-State)		<input type="checkbox"/>												
H16543	56	16-Bit Registered Transceiver with Bushold		<input type="checkbox"/>												
R162543	56	16-Bit Registered Transceiver with Series Resistor (3-State)		<input type="checkbox"/>												
HR162543	56	16-Bit Registered Transceiver with Bushold/Series Resistor		<input type="checkbox"/>												
16600	56	18-Bit Universal Bus Transceiver (3-State)		<input type="checkbox"/>												
H16600	56	18-Bit Universal Bus Transceiver with Bushold (3-State)		<input type="checkbox"/>												
R162600	56	18-Bit Universal Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>												
HR162600	56	18-Bit Universal Bus Transceiver with Bushold/Series Resistor (3-State)		<input type="checkbox"/>												
16601	56	18-Bit Universal Bus Transceiver (3-State)		<input type="checkbox"/>												
H16601	56	18-Bit Universal Bus Transceiver with Bushold (3-State)		<input type="checkbox"/>												
R162601	56	18-Bit Universal Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>												
HR162601	56	18-Bit Universal Bus Transceiver with Bushold/Series Resistor (3-State)		<input type="checkbox"/>												
16646	56	16-Bit Bus Transceiver/Register (3-State)		<input type="checkbox"/>												
16646A	56	16-Bit Bus Transceiver/Register (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						
H16646	56	16-Bit Bus Transceiver/Register with Bushold		<input type="checkbox"/>												
R162646	56	16-Bit Bus Transceiver/Register with Series Resistor (3-State)		<input type="checkbox"/>												
HR162646	56	16-Bit Bus Transceiver with Bushold/Series Resistor		<input type="checkbox"/>												
16652	56	16-Bit Bus Transceiver/Register (3-State)		<input type="checkbox"/>												
16652A	56	16-Bit Bus Transceiver/Register (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						
H16652	56	16-Bit Bus Transceiver/Register with Bushold		<input type="checkbox"/>												
R162652	56	16-Bit Bus Transceiver/Register with Series Resistor (3-State)		<input type="checkbox"/>												
HR162652	56	16-Bit Bus Transceiver/Register with Bushold/Series Resistor		<input type="checkbox"/>												
16721	56	20-Bit D-Type Flip-Flop (3-State)		<input type="checkbox"/>												
162721	56	20-Bit D-Type Flip-Flop with Series Resistor (3-State)		<input type="checkbox"/>												
16821	56	20-Bit D-Type Flip-Flop (3-State)		<input type="checkbox"/>												
162821	56	20-Bit D-Type Flip-Flop with Series Resistor (3-State)		<input type="checkbox"/>												
16823	56	18-Bit D-Type Flip-Flop (3-State)		<input type="checkbox"/>												
162823	56	18-Bit D-Type Flip-Flop with Series Resistor (3-State)		<input type="checkbox"/>												
16827	56	20-Bit Bus Buffer (3-State)		<input type="checkbox"/>												
H16827	56	20-Bit Bus Buffer with Bushold		<input type="checkbox"/>												
162827	56	20-Bit Bus Buffer with Series Resistor (3-State)		<input type="checkbox"/>												
H162827	56	20-Bit Bus Buffer with Bushold/Series Resistor		<input type="checkbox"/>												
16834	56	18-Bit Universal Bus Driver (3-State)		<input type="checkbox"/>												
162834	56	18-Bit Universal Bus Driver with Series Resistor (3-State)		<input type="checkbox"/>												
16835	56	18-Bit Universal Bus Driver (3-State)		<input type="checkbox"/>												
162835	56	18-Bit Universal Bus Driver with Series Resistor (3-State)		<input type="checkbox"/>												
16841	56	20-Bit D-Type Latch (3-State)		<input type="checkbox"/>												
162841	56	20-Bit D-Type Latch with Series Resistor (3-State)		<input type="checkbox"/>												
16843	56	18-Bit D-Type Latch (3-State)		<input type="checkbox"/>												
162843	56	18-Bit D-Type Latch with Series Resistor (3-State)		<input type="checkbox"/>												
163245	48	Dual Supply 16-Bit Bus Transceiver (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						
R163245	48	Dual Supply 16-Bit Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						
164245	48	Dual Supply 16-Bit Bus Transceiver (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						
R164245	48	Dual Supply 16-Bit Bus Transceiver with Series Resistor (3-State)		<input type="checkbox"/>						<input type="checkbox"/>						

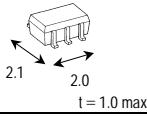
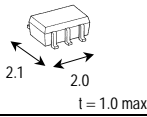
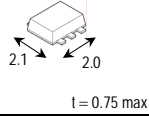
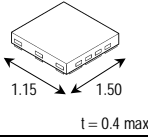

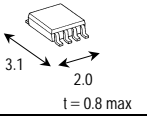
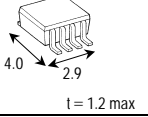
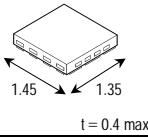
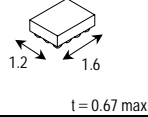
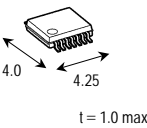
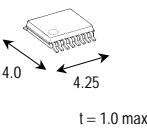
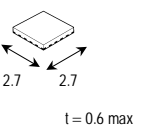
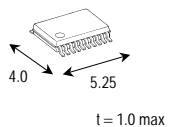
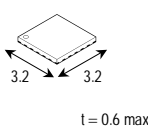
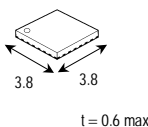
: In mass production only at domestic fabs.

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Package Dimensions (Unit: mm) For details, please refer to the relevant technical datasheets or databooks.

Package Pin Count	DIP (xxxP)	SOP (xxxF)	SOL (xxxFN ... 14/16-Pin)	TSSOP (xxxFT) SSOP (xxxFS)
5-Pin				
Standard Code				
6-Pin				
Standard Code				
8-Pin				
Standard Code				
14-Pin				
Standard Code	DIP14-P-300-2.54	SOP14-P-300-1.27A	SOL14-P-150-1.27	TSSOP14-P-0044-0.65A
16-Pin				
Standard Code	DIP16-P-300-2.54A	SOP16-P-300-1.27A	SOL16-P-150-1.27	TSSOP16-P-0044-0.65A
20-Pin				
Standard Code	DIP20-P-300-2.54A	SOP20-P-300-1.27A		TSSOP20-P-0044-0.65A
24-Pin				
Standard Code	DIP24-P-300-2.54			SSOP24-P-300-0.65A
48-Pin				
Standard Code				TSSOP48-P-0061-0.50
56-Pin				
Standard Code				TSSOP56-P-0061-0.50

- All values are typical.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Package Pin Count	US (xxxFU) ... 5/6-Pin (xxxFK) ... 8/14/16/20-Pin	UF (xxxTU) ... 6-Pin SM (xxxFU) ... 8-Pin	VQON (xxxFTG) ... 16/20/24-Pin CST (xxxFC) ... 6/8-Pin	WCSP (xxxWBG) ... 6/10-Pin
5-Pin				
Standard Code	SSOP5-P-0.65A			
6-Pin				
Standard Code	SSOP6-P-0.65A	—	CSON6-P-0.45	S-WFBGA6-0102-0.40A01
8-Pin				
Standard Code	SSOP8-P-0.50A	SSOP8-P-0.65	CSON8-P-0.4	
10-Pin				
Standard Code				S-WFBGA10-0202-0.40A01
14-Pin				
Standard Code	VSSOP14-P-0030-0.50			
16-Pin				
Standard Code	VSSOP16-P-0030-0.50		VQON16-P-0303-0.50	
20-Pin				
Standard Code	VSSOP20-P-0030-0.50		VQON20-P-0404-0.50	
24-Pin				
Standard Code			VQON24-P-0404-0.50	

- All values are typical.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

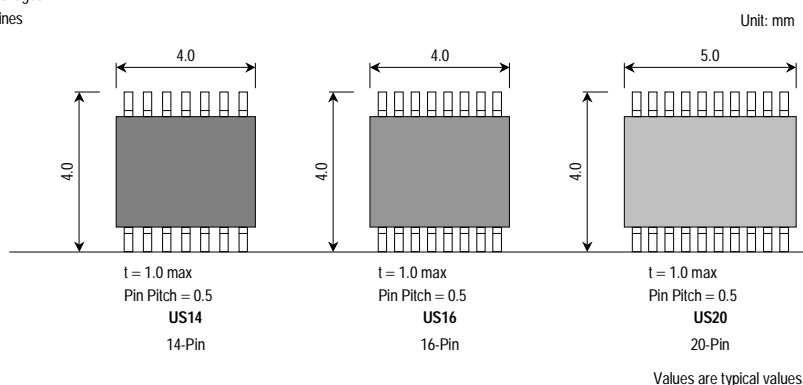
# CMOS Logic ICs in Ultra-Small US Packages

## Overview

The 14-, 16- and 20-pin US packages are among the industry's smallest packages with these lead counts. These packages help to reduce the size, weight and thickness of today's electronic systems.

## Features

- (1) Ultra-small packages  
Package Outlines



- (2) Easy board mounting  
The 0.5-mm pin pitch facilitates board mounting.
- (3) High quality and high reliability  
IR reflow soldering can be used, but not near-infrared reflow soldering. (For further details, please contact your local Toshiba sales representative.) To facilitate storage and handling, the devices are not dry-packed.

## Substitutes for the TC7MA/MZ/MH/MET Series

In place of the TC7MA/MZ/MH/MET Series, Toshiba recommends the TC74VCX/LCX/VHC/VHCTxxxFK Series for new designs, which are identical in electrical performance and packaging availability.

Discontinued Series	Recommended Substitutes
TC7MA Series	TC74VCX Series
TC7MZ Series	TC74LCX Series
TC7MH Series	TC74VHC Series
TC7MET Series	TC74VHCT Series

## TC74VHC/VHCT/LCX/VCX Series

No. (xxx)	Number of Pins	Functions	TC74VHC xxxFK	TC74VHCT xxxAFK	TC74LCX xxxFK	TC74VCX xxxFK
			US14/16/20			
			Mass Production	Mass Production	Mass Production	Mass Production
00	14	Quad 2-Input NAND Gate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02	14	Quad 2-Input NOR Gate	<input type="checkbox"/>		**	<input type="checkbox"/>
03	14	Quad 2-Input NAND Gate (Open-Drain)	<input type="checkbox"/>			
04	14	Hex Inverter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
05	14	Hex Inverter (Open-Drain)	<input type="checkbox"/>		<input type="checkbox"/>	
07	14	Hex Buffer (Open-Drain)			<input type="checkbox"/>	
08	14	Quad 2-Input AND Gate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	14	Hex Schmitt Inverter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	14	Dual 4-Input NAND Gate	<input type="checkbox"/>			
21	14	Dual 4-Input AND Gate	<input type="checkbox"/>			
27	14	Triple 3-Input NOR Gate	**			
32	14	Quad 2-Input OR Gate	<input type="checkbox"/>	**	<input type="checkbox"/>	<input type="checkbox"/>
74	14	Dual D-Type Flip-Flop with Preset and Clear	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
86	14	Quad Exclusive-OR Gate	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
125	14	Quad Bus Buffer (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
126	14	Quad Bus Buffer (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
132	14	Quad 2-Input Schmitt NAND Gate	<input type="checkbox"/>			
164	14	8-Bit Serial-In/Parallel-Out Shift Register	<input type="checkbox"/>			
393	14	Dual Binary Counter	<input type="checkbox"/>			
2125	14	Quad Bus Buffer with Series Resistor (3-State)				<input type="checkbox"/>

: In mass production only at domestic fabs.

\*\*:: Under development

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.



No. (xxx)	Number of Pins	Functions	TC74VHC xxxFK	TC74VHCT xxxAFK	TC74LCX xxxFK	TC74VCX xxxFK
			US14/16/20			
			Mass Production	Mass Production	Mass Production	Mass Production
123A	16	Dual Monostable Multivibrator ( $t_{w out} = 1.0 Cx \cdot Rx$ )	<input type="checkbox"/>			
138	16	3-to-8 Line Decoder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
139	16	Dual 2-to-4 Line Decoder	<input type="checkbox"/>	<input type="checkbox"/>		
153	16	Dual 4-Channel Multiplexer	<input type="checkbox"/>			
157	16	Quad 2-Channel Multiplexer	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
161	16	Sync. Binary Counter with Async. Clear	<input type="checkbox"/>			
163	16	Sync. Binary Counter with Sync. Clear	<input type="checkbox"/>			
165	16	8-Bit Parallel-In/Serial-Out Shift Register	<input type="checkbox"/>			
174	14	Triple 3-Input NOR Gate	**			
175	16	Quad D-Type Flip-Flop with Clear	<input type="checkbox"/>			
221A	16	Dual Monostable Multivibrator ( $t_{w out} = 1.0 Cx \cdot Rx$ )	<input type="checkbox"/>			
238	16	3-to-8 Line Decoder	<input type="checkbox"/>			
240	20	Octal Bus Buffer (3-State/Inverted)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
244	20	Octal Bus Buffer (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
245	20	Octal Bus Transceiver (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
257	16	Quad 2-Channel Multiplexer (3-State)	<input type="checkbox"/>		**	<input type="checkbox"/>
273	20	Octal D-Type Flip-Flop with Clear	<input type="checkbox"/>		<input type="checkbox"/>	
367	16	Hex Bus Buffer (3-State)	<input type="checkbox"/>			
368	16	Hex Bus Buffer (3-State/Inverted)	<input type="checkbox"/>			
373	20	Octal D-Type Latch (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
374	20	Octal D-Type Flip-Flop (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
540	20	Octal Bus Buffer (3-State/Inverted)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
541	20	Octal Bus Buffer (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
573	20	Octal D-Type Latch (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
574	20	Octal D-Type Flip-Flop (3-State)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
595	16	8-Bit Shift Register/Latch (3-State)	<input type="checkbox"/>			
2244	20	Octal Bus Buffer with Series Resistor (3-State)				<input type="checkbox"/>
R2245	20	Octal Bus Transceiver with Series Resistor (3-State)				<input type="checkbox"/>
2373	20	Octal D-Type Latch with Series Resistor (3-State)				<input type="checkbox"/>
2374	20	Octal D-Type Flip-Flop with Series Resistor (3-State)				<input type="checkbox"/>
2541	20	Octal Bus Buffer with Series Resistor (3-State)				<input type="checkbox"/>
2573	20	Octal D-Type Latch with Series Resistor (3-State)				<input type="checkbox"/>
2574	20	Octal D-Type Flip-Flop with Series Resistor (3-State)				<input type="checkbox"/>
4020	16	14-Stage Ripple-Carry Binary Counter	<input type="checkbox"/>			
4040	16	12-Stage Ripple-Carry Binary Counter	<input type="checkbox"/>			
4051	16	Single 8-Channel Analog Multiplexer/Demultiplexer				
4051A	16	Single 8-Channel Analog Multiplexer/Demultiplexer	<input type="checkbox"/>			
4052	16	Dual 4-Channel Analog Multiplexer/Demultiplexer				
4052A	16	Dual 4-Channel Analog Multiplexer/Demultiplexer	<input type="checkbox"/>			
4053	16	Triple 2-Channel Analog Multiplexer/Demultiplexer				
4053A	16	Triple 2-Channel Analog Multiplexer/Demultiplexer	<input type="checkbox"/>			
4066A	14	Quad Bilateral Switch	<input type="checkbox"/>			
9541	20	Octal Universal Schmitt Buffer (3-State)	<input type="checkbox"/>			

: In mass production only at domestic fabs.

\*\* : Under development

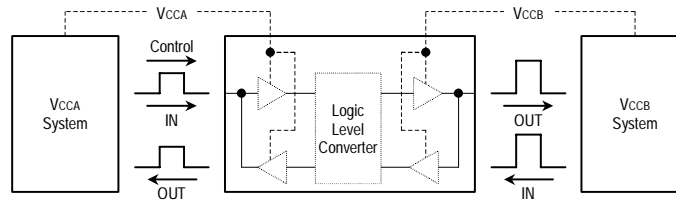
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# Dual-Supply Level Shifters

With two separate  $V_{CC}$  supplies, the dual-supply level shifters are suitable for communication between different interface voltages. Toshiba offers a wide range of bit-width options in ultra-small, thin packages and industry-standard TSSOP.

## Application example in which a bidirectional level shifter is needed

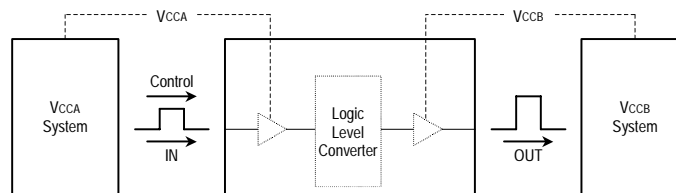
The dual-supply bidirectional level shifter is suitable for mixed-voltage systems and provides bidirectional voltage translation between a wide range of voltage levels.



## Application example in which unidirectional level shifter is needed

The dual-supply unidirectional level shifter is suitable for mixed-voltage systems and provides unidirectional voltage translation between a wide range of voltage levels.

( $V_{CCA} < V_{CCB}$ )



# Dual-Supply Level Shifters

Direction	Part Number	Number of Pins	Bit Width	Functions						Mass Production									
				Sleep Mode	Bushold	Low Noise	Series Resistor	A-Bus (V)	B-Bus (V)	TSSOP 48	SSOP 24	VOON 24	US16	VQON 16	US8	CST8	UF6	CST6C	WCSP6
										xxxFT	xxxFS	xxxFTG	xxxFK	xxxFTG	xxxFK	xxxFC	xxxTU	xxxFC	xxxWBG
Bidirectional	TC74VCX163245	48	16					2.5	1.8	<input type="checkbox"/>									
	TC74VCX164245							3.3	2.5	<input type="checkbox"/>									
	TC74LCX163245							1.8	2.5	<input type="checkbox"/>									
	TC74LCXR163245						○	2.5	3.3	<input type="checkbox"/>									
	TC74LCX164245							3.3	5	<input type="checkbox"/>									
	TC74LCXR164245						○	5	5	<input type="checkbox"/>									
	TC74LVXC3245	24	8					3.3	5		<input type="checkbox"/>								
	TC74LVX4245							5	3.3		<input type="checkbox"/>								
	TC7MP3245			○				1.2	1.8				<input type="checkbox"/>						
	TC7MPH3245			○	○			1.5	2.5				<input type="checkbox"/>						
	TC7MPN3245			○		○		1.8	3.3				<input type="checkbox"/>						
	TC7MPS3245			○				2.5					<input type="checkbox"/>						
	TC7MP3125	16	4	○				1.2	1.8				<input type="checkbox"/>	<input type="checkbox"/>					
	TC7MPH3125			○	○			1.5	2.5				<input type="checkbox"/>	<input type="checkbox"/>					
	TC7MPN3125			○		○		1.8	3.3				<input type="checkbox"/>						
	TC7MPS3125			○				2.5					<input type="checkbox"/>						
Unidirectional	TC7WP3125	8	2	○				1.2	1.8					<input type="checkbox"/>	<input type="checkbox"/>				
	TC7WPN3125			○		○							<input type="checkbox"/>	<input type="checkbox"/>					
	TC7SP3125	6	1	○				1.5	2.5						<input type="checkbox"/>		**		
	TC7SPN3125			○		○		1.8	3.3						<input type="checkbox"/>		**		
	TC7SP3125C			○				2.5								<input type="checkbox"/>			
	TC7SPN3125C			○		○										<input type="checkbox"/>			

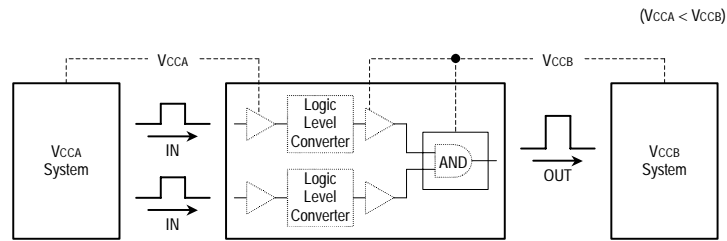
: In mass production only at domestic fabs.

\*\* : Under development

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Logic gate with level-shifting function

The TC7SP Series integrates a level shifter and a logic gate into a single chip to help save board space. It is housed in the ultra-small WCSP6 package.



Direction	Part Number	Number of Pins	Bit Width	Functions			Mass Production		
				Function	A-Bus (V)	B-Bus (V)	WCSP6	xxxWBG	
Unidirectional	TC7SP300	6	1	NAND	1.2	1.8			**
	TC7SP302			NOR					**
	TC7SP308			AND			1.5	2.5	**
	TC7SP332			OR			1.8	3.3	**
	TC7SP381			Exclusive-NOR			2.5		**
	TC7SP386			Exclusive-OR					**

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

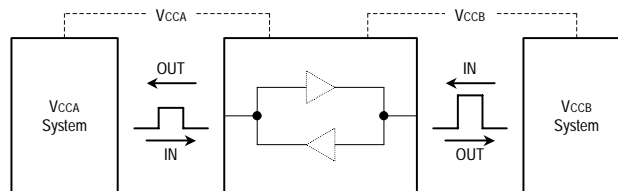
\*\* : Under development

## Dual-supply bidirectional level shifters without a direction control signal

The TC7LX Series allows bidirectional voltage translation without a direction control signal.

The TC7LX Series supports data rates of up to 80 Mbps, making it ideal for voltage translation of high-speed signals.

With reduced pin count, the TC7LX Series is offered in ultra-small WCSP packages, saving board space.



Direction	Part Number	Number of Pins	Bit Width	Functions					Mass Production		
				Auto Direction Sensing	Sleep Mode	ESD Protection (Note)	A-Bus (V)	B-Bus (V)	WCSP12	WCSP8	WCSP6
									xxxWBG	xxxWBG	xxxWBG
Bidirectional	TC7LX1101	6	1	○	○		1.2	1.2			**
	TC7LX1102	8	2	○	○		1.5	1.5			
							1.8	1.8		**	
	TC7LXE1104	12	4	○	○	○	2.5	3.3	**		

Note: IEC 61000-4-2, Level 4

\*\* : Under development

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# CMOS Bus Switch ICs

## Overview

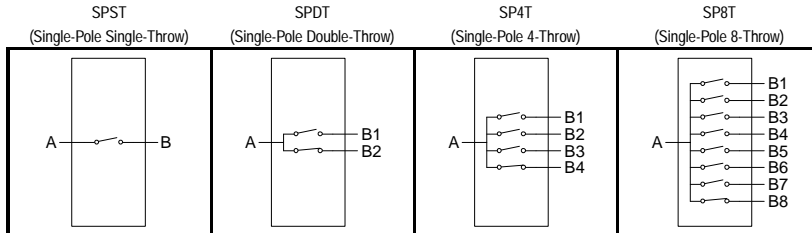
The ultra-high-speed switching characteristics and a variety of I/O interface options make Toshiba's bus switches an ideal solution for a wide range of high-speed computing and telecommunication applications such as notebook PCs, computer servers and networking equipment.

Toshiba offers a wide variety of bus switches, including 5-V bus switches, low-voltage bus switches, level-shifting bus switches, analog switches and reference voltage selector switches. These bus switches are available in 1-bit, 2-bit, 4-bit, 8-bit and multiplexer configurations in industry's top-class small packages.

## Features

### Switch Types

Toshiba's bus switches are available in SPST (single-pole, single-throw) and/or multi-throw (SPDT, SP4T, SP8T) configurations.



Series	Part Number	Supply Voltage (V)	Features
Standard 5-V Bus Switches	MB/WB/SBxxxx	4.5 to 5.5	5-V bus switches Consists of N-channel MOSFET transistors.
Level-Shifting Bus Switches	MBD/WBD/SBDxxxxA	4.5 to 5.5	5-V bus switches Allows voltage translation from 5.0 V to 3.3 V.
	MPB/WPB/SPBxxxx	1.8 to 5.5	Bus switches designed for mixed-voltage systems (1.8 to 3.3 V or 2.5 to 5.0 V) The internal level-shifting circuit allows a wide range of bidirectional voltage translation.
Low-Voltage Bus Switches	MBL/WBL/SBLxxxA	2.0 to 3.6	3.3-V bus switches Consists of P-channel and N-channel MOSFET transistors.
	MBLxxxxS MBL/SBLxxxxC	1.65 to 3.6	3.3-V bus switches Bus switches with reduced switch capacitances for high-speed bus applications

# CMOS Bus Switch ICs Quick Reference

Type	Function		#Circuits	Control Input	Series	Function Number					Number of Pins	Mass Production											
						Standard 5 V	Level Shift 5 V ↔ 3.3 V	Level Shift 5 V → 3.3 V	Low Voltage 3 V	Low Voltage /Low Cap. 3 V		TSSOP 14/16/20	US8/14 /16/20	VQON 16/20	UF6	USV	CST8						
												xxxFT	xxxFK	xxxFTG	xxxTU	xxxFU	xxxFC						
Single Power Supply	Analog Switch	SPST	Single	Active-high	TC7SBxxx	66					5												
			Dual	Active-high		TC7WBxxx	66																
	Bus Switch	SPST	Single	Active-low	TC7SBxxx	384		D384A	L384A		5												
				Active-high		385		D385A		L384C													
			Dual	Active-low	TC7WBxxx	125		D125A	L125A			8											
				Active-high		126		D126A	L126A														
			Quad	Active-low	TC7MBxxx								14										
				Active-high																			
				Active-low (one per 4 switches)																			
			Active-low (for all 8 switches)																				
			Multiplexer /Demultiplexer	SPDT	Dual	Active-low	TC7MBxxx						14										
					Quad	Active-low																	
	SP4T	Dual		Active-low								16											
		SP8T		Single	Active-low																		
	Demultiplexer	SPDT	Single	—	TC7PBxxx				53		6												
		SP3T	Single	—	TC7PBxxx				54														
Bus Exchange Switch		Single	Active-low	TC7WBxxx	383					8													
Dual Power Supply	Analog Switch	SPST	Single	Active-low	TC7SPxxx				3067	6													
				Active-high				3066															
	Voltage Level Translator	Single	Active-low	TC7SPBxxx			9307				6												
					Active-high			9306															
			Dual	Active-low	TC7WPBxxx			307				8											
				Active-high				306															
		Dual	Active-low	TC7WPBxxx			9307				8												
			Active-high				9306																
		Octal	Active-low	TC7MPBxxx			9307				20												

□: In mass production only at domestic fabs.

\*\* : Under development

★ : Housed in the VQON16 package.

⊙ : Available only in US packages.

• The xxx in part numbers is replaced by a function number. e.g.) Function number: 384, series: TC7SBxxxFU → part number: TC7SB384FU

• For package dimensions and standard codes, please refer to pages 102 to 103.

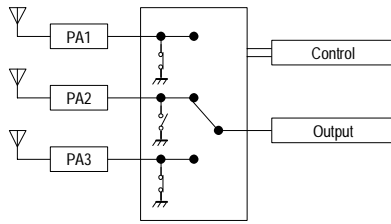
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# Application-Specific Logic

Toshiba is rolling out new ICs designed for cell phones, flat-panel displays (FPDs), car navigation systems and so on that are optimized for high-speed, low voltage and mixed supply-voltage applications. These ICs help to save board space and reduce system noise.

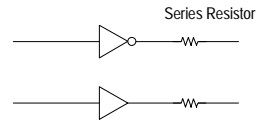
## Reference Voltage Switch (for PA Signal Switching for Cell Phones)

TC7PB53/54



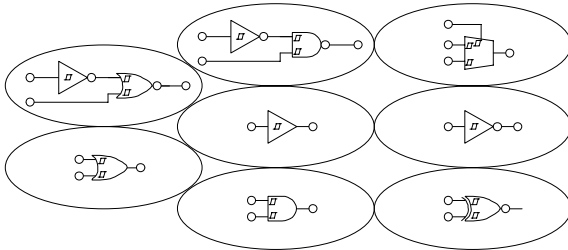
## Logic Gates with Resistors (for Reflective Noise Reduction)

TC7MP85400/85410



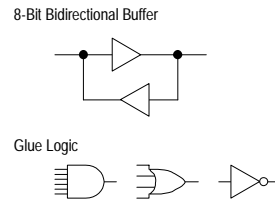
## Multi-Function Gates (Configurable from Seven Logic Gates)

TC7MP97/98, TC7SP57/58/97/98



## Low-Power Logic (for PDAs)

TC7MP01/245



## TC7PB/MP Series



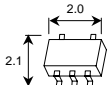
Part Number	Number of Pins	Functions	Mass Production					
			TSSOP14/20	US6/8/14/16/20	VQON20	CST8	UF6	WCSP6
			xxxFT	xxxFU/FK	xxxFTG	xxxFC	xxxTU	xxxWBG
TC7PB53	6	Single 1-of-2 Demultiplexer (Pch Type)						
TC7PB54	8	Single 1-of-3 Demultiplexer (Pch Type)		□		□		
TC7MP85400	20	Octal Bus Buffer with Output Series Resistor	□					
TC7MP85410	20	Octal Bus Buffer with Output Series Resistor	□					
TC7MP97	14	Low-Voltage Triple Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs	□	□				
TC7MP98	14	Low-Voltage Triple Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs	□	□				
TC7SP97	6	Low-Voltage Single Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs					□	**
TC7SP98	6	Low-Voltage Single Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs					□	**
TC7SP57	6	Low-Voltage Single Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs		□				**
TC7SP58	6	Low-Voltage Single Configurable Multiple-Function Gate with 3.6-V Tolerant Inputs and Outputs		□				**
TC7MP01	16	Low-Voltage Triple Gate (6-input AND + 4-input OR + Inverter)		□				
TC7MP245	20	Low-Voltage/Low-Power Octal Bus Transceiver with Bushold)		□	□			

□: In mass production only at domestic fabs.

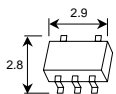
\*\* : Under development

- For package dimensions and standard codes, please refer to pages 102 to 103.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# One-Gate CMOS (L-MOS)

Package	FSV		ESV			USV			
Outline Dimensions (mm)									
Functions	VHS Series	LVP Series	VHS Series	SHS Series	LVP Series	Standard Series	High-Speed Series	VHS Series TTL-Level Input Series	
NAND	TC7SH00FS	TC7SG00AFS	TC7SH00FE	TC7SZ00AFE	TC7SG00FE		<b>TC7S00FU</b>	<b>TC7SH00FU</b>	<b>TC7SET00FU</b>
NAND (Unbuffered)									
NAND (Open-Drain)									
AND	TC7SH08FS	TC7SG08AFS	TC7SH08FE	TC7SZ08AFE	TC7SG08FE		<b>TC7S08FU</b>	<b>TC7SH08FU</b>	<b>TC7SET08FU</b>
NOR	TC7SH02FS	TC7SG02AFS	TC7SH02FE	TC7SZ02AFE	TC7SG02FE		<b>TC7S02FU</b>	<b>TC7SH02FU</b>	<b>TC7SET02FU</b>
OR	TC7SH32FS	TC7SG32AFS	TC7SH32FE	TC7SZ32AFE	TC7SG32FE		<b>TC7S32FU</b>	<b>TC7SH32FU</b>	<b>TC7SET32FU</b>
Exclusive-OR	TC7SH86FS	TC7SG86AFS	TC7SH86FE		TC7SG86FE		<b>TC7S86FU</b>	<b>TC7SH86FU</b>	<b>TC7SET86FU</b>
Inverter	TC7SH04FS	TC7SG04AFS	TC7SH04FE	TC7SZ04AFE	TC7SG04FE		<b>TC7S04FU</b>	<b>TC7SH04FU</b>	<b>TC7SET04FU</b>
Inverter (Unbuffered)	TC7SHU04FS	TC7SGU04AFS	TC7SHU04FE	TC7SZU04AFE	TC7SGU04FE		<b>TC7SU04FU</b>	<b>TC7SHU04FU</b>	
Inverter (Open-Drain)	TC7SH05FS	TC7SG05AFS	TC7SH05FE		TC7SG05FE				
Non-Inverter (Open-Drain)	TC7SH07FS	TC7SG07AFS	TC7SH07FE	TC7SZ07AFE	TC7SG07FE				
Schmitt Inverter	TC7SH14FS	TC7SG14AFS	TC7SH14FE		TC7SG14FE		<b>TC7S14FU</b>	<b>TC7SH14FU</b>	<b>TC7SET14FU</b>
Schmitt Buffer		TC7SG17AFS			TC7SG17FE			TC7SH17FU	TC7SET17FU
Non-Inverter	TC7SH34FS	TC7SG34AFS	TC7SH34FE		TC7SG34FE			TC7SH34FU	TC7SET34FU
Analog Switch						TC4S66FU	<b>TC7S66FU</b>		
Analog Multiplexer									
D-Type Flip-Flop									
D-Type Flip-Flop with Clear									
3-State Buffer	TC7SH125FS	TC7SG125AFS	TC7SH125FE	TC7SZ125AFE	TC7SG125FE			TC7SH125FU	TC7SET125FU
3-State Buffer	TC7SH126FS	TC7SG126AFS	TC7SH126FE	TC7SZ126AFE	TC7SG126FE			TC7SH126FU	TC7SET126FU
3-State Inverting Buffer									
3-State Buffer									
Bus Transceiver									
Bus Transceiver (Open-Drain)									
Monostable Multivibrator									
Digital Multiplexer									
D-Type Latch with 3-State									
D-Type Flip-Flop with 3-State									
2-to-4 Decoder									
2-to-3 Decoder with Enable									
2-to-3 Decoder with Enable									
Oscillator & Divider									
D-Type Flip-Flop with Clear									
1-to-2 Decoder									



- The outputs of the SHS Series devices in the ESV package and the LVP Series devices in the FSV package are not overvoltage-tolerant.
- The products shown in bold are also manufactured in offshore fabs.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

		SMV						
								
SHS Series	AHS Series	LVP Series	Standard Series	High-Speed Series	VHS Series		SHS Series	AHS Series
						TTL-Level Input Series		
TC7SZ00FU	TC7SA00FU	TC7SG00FU	TC4S11F TC4SU11F	TC7S00F	TC7SH00F	TC7SET00F	TC7SZ00F	TC7SA00F
TC7SZ38FU							TC7SZ38F	
TC7SZ08FU	TC7SA08FU	TC7SG08FU	TC4S81F	TC7S08F	TC7SH08F	TC7SET08F	TC7SZ08F	TC7SA08F
TC7SZ02FU		TC7SG02FU	TC4S01F	TC7S02F	TC7SH02F	TC7SET02F	TC7SZ02F	
TC7SZ32FU	TC7SA32FU	TC7SG32FU	TC4S71F	TC7S32F	TC7SH32F	TC7SET32F	TC7SZ32F	TC7SA32F
TC7SZ86FU		TC7SG86FU	TC4S30F	TC7S86F	TC7SH86F	TC7SET86F	TC7SZ86F	
TC7SZ04FU	TC7SA04FU	TC7SG04FU	TC4S69F	TC7S04F	TC7SH04F	TC7SET04F	TC7SZ04F	TC7SA04F
TC7SZU04FU	TC7SAU04FU	TC7SGU04FU	TC4SU69F	TC7SU04F	TC7SHU04F		TC7SZU04F	TC7SAU04F
TC7SZ05FU	TC7SA05FU						TC7SZ05F	TC7SA05F
TC7SZ07FU							TC7SZ07F *	
TC7SZ14FU		TC7SG14FU	TC4S584F	TC7S14F	TC7SH14F	TC7SET14F	TC7SZ14F	
		TC7SG17FU			TC7SH17F	TC7SET17F		
	TC7SA34FU	TC7SG34FU			TC7SH34F	TC7SET34F		TC7SA34F
			TC4S66F	TC7S66F				
TC7SZ125FU		TC7SG125FU			TC7SH125F	TC7SET125F	TC7SZ125F	
TC7SZ126FU		TC7SG126FU			TC7SH126F	TC7SET126F	TC7SZ126F	

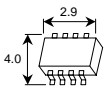
\*: New product



# One-Gate CMOS (L-MOS) (Continued)

Package	ES6			US6		CST8		US8	
Outline Dimensions (mm)									
Functions	AHS Series	VHS Series	LVP Series	AHS Series	LVP Series	VHS Series	LVP Series	High-Speed Series	VHS Series
NAND						TC7WH00FC	TC7WG00FC	TC7W00FK	TC7WH00FK
NAND (Unbuffered)									
NAND (Open-Drain)									
AND						TC7WH08FC	TC7WG08FC	TC7W08FK	TC7WH08FK
NOR						TC7WH02FC	TC7WG02FC	TC7W02FK	TC7WH02FK
OR						TC7WH32FC	TC7WG32FC	TC7W32FK	TC7WH32FK
Exclusive-OR									
Inverter		TC7PH04FE	TC7PG04AFE	<b>TC7PA04FU</b>	TC7PG04FU	TC7WH04FC	TC7WG04FC	TC7W04FK	TC7WH04FK
Inverter (Unbuffered)			TC7PGU04AFE	<b>TC7PAU04FU</b>	TC7PGU04FU		TC7WGU04FC	TC7WU04FK	TC7WHU04FK
Inverter (Open-Drain)				<b>TC7PA05FU</b>					
Non-Inverter (Open-Drain)									
Schmitt Inverter			TC7PG14AFE	<b>TC7PA14FU</b>	TC7PG14FU		TC7WG14FC	TC7W14FK	TC7WH14FK
Schmitt Buffer			TC7PG17AFE	<b>TC7PA17FU</b>	TC7PG17FU		TC7WG17FC		
Non-Inverter		TC7PH34FE	TC7PG34AFE	<b>TC7PA34FU</b>	TC7PG34FU	TC7WH34FC	TC7WG34FC	TC7W34FK	TC7WH34FK
Analog Switch								TC7W66FK	
Analog Multiplexer				<b>TC7PA53FU</b>				TC7W53FK	
D-Type Flip-Flop						TC7WH74FC	TC7WG74FC	TC7W74FK	TC7WH74FK
D-Type Flip-Flop with Clear				<b>TC7PA175FU</b>					
3-State Buffer							TC7WG125FC		TC7WH125FK
3-State Buffer							TC7WG126FC		TC7WH126FK
3-State Inverting Buffer									TC7WH240FK
3-State Buffer									TC7WH241FK
Bus Transceiver									TC7WH245FK
Bus Transceiver (Open-Drain)									
Monostable Multivibrator									TC7WH123FK
Digital Multiplexer						TC7WH157FC			TC7WH157FK
D-Type Latch with 3-State									
D-Type Flip-Flop with 3-State									
2-to-4 Decoder									
2-to-3 Decoder with Enable									
2-to-3 Decoder with Enable									
Oscillator & Divider									
D-Type Flip-Flop with Clear									
1-to-2 Decoder	TC7PA19AFE			<b>TC7PA19FU</b>					

- The products shown in bold are also manufactured in offshore fabs.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

SM8							
							
SHS Series	LVP Series	Standard Series	High-Speed Series		VHS Series	SHS Series	LVP Series
				TTL-Level Input Series			
TC7WZ00FK	TC7WG00FK		TC7W00FU		TC7WH00FU	TC7WZ00FU	TC7WG00FU
TC7WZ38FK						TC7WZ38FU	
TC7WZ08FK	TC7WG08FK		TC7W08FU		TC7WH08FU	TC7WZ08FU	TC7WG08FU
TC7WZ02FK	TC7WG02FK		TC7W02FU		TC7WH02FU	TC7WZ02FU	TC7WG02FU
TC7WZ32FK	TC7WG32FK		TC7W32FU		TC7WH32FU	TC7WZ32FU	TC7WG32FU
TC7WZ04FK	TC7WG04FK		TC7W04FU		TC7WH04FU	TC7WZ04FU	TC7WG04FU
TC7WZU04FK	TC7WGU04FK		TC7WU04FU		TC7WHU04FU	TC7WZU04FU	TC7WGU04FU
TC7WZ05FK						TC7WZ05FU	
TC7WZ14FK	TC7WG14FK		TC7W14FU		TC7WH14FU	TC7WZ14FU	TC7WG14FU
	TC7WG17FK						TC7WG17FU
TC7WZ34FK	TC7WG34FK		TC7W34FU		TC7WH34FU	TC7WZ34FU	TC7WG34FU
		TC4W66FU	TC7W66FU				
		TC4W53FU	TC7W53FU				
TC7WZ74FK	TC7WG74FK		TC7W74FU	TC7WT74FU	TC7WH74FU	TC7WZ74FU	TC7WG74FU
	TC7WG125FK		TC7W125FU	TC7WT125FU	TC7WH125FU		TC7WG125FU
	TC7WG126FK		TC7W126FU	TC7WT126FU	TC7WH126FU		TC7WG126FU
			TC7W240FU	TC7WT240FU	TC7WH240FU		
			TC7W241FU	TC7WT241FU	TC7WH241FU		
TC7WZ245FK					TC7WH245FU	TC7WZ245FU	
TC7WZ246FK						TC7WZ246FU	
					TC7WH123FU		
					TC7WH157FU		
			TC7W139FU				
			TC3W01FU				
			TC3W02FU				
			TC3W03FU				