TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7WG34FU,TC7WG34FK

Triple NON-Inverter

Features

High output current : ±8 mA (min) at V_{CC} = 3 V

• Super high speed operation: t_{pd} = 2.7 ns (typ.)

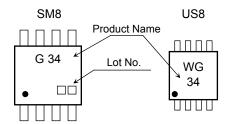
at $V_{CC} = 3.3 \text{ V}, 15 \text{pF}$

• Operating voltage range : V_{CC} = 0.9 to 3.6 V

• 5.5-V tolerant inputs

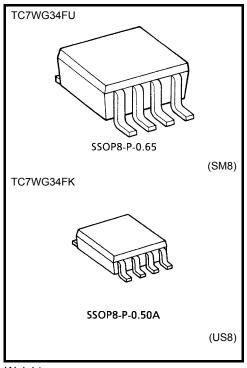
• 3.6-V power down protection outputs

Marking



Absolute Maximum Ratings (Ta = 25°C)

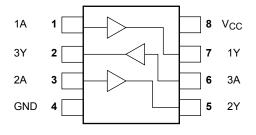
Characteristics	Symbol	Rating	Unit
Supply voltage	V _C C	-0.5 to 4.6	V
DC input voltage	V _{IN}	−0.5 to 7.0	V
DC output voltage	V _{OUT}	-0.5 to 4.6 (Note1)	.,
		-0.5 to VCC+0.5 (Note2)	V
Input diode current	I _{IK}	-20	mA
Output diode current	lok	-20 (Note3)	mA
DC output current	lout	±25	mA
DC V _{CC} /GND current	Icc	±50	mA
Power dissipation	P _D	300 (SM8) 200 (US8)	mW
Storage temperature	T _{stg}	-65 to 150	°C



Weight

SSOP8-P-0.65 : 0.02 g (typ.) SSOP8-P-0.50A : 0.01 g (typ.)

Pin Assignment (top view)



Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: $V_{CC} = 0 V$

Note 2: High or Low State. Do not exceed I_{OUT} of absolute maximum ratings.

Note 3: VOUT < GND

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IEC Logic Symbol

Truth Table



Α	Υ
L	L
Н	Н

Operating Ranges

Characteristics	Symbol	Rating	Unit		
Supply voltage	V _{CC}	0.9 to 3.6	V		
Input voltage	V _{IN}	0 to 5.5	V		
Output voltage	V	0 to 3.6 (Note 4)	V		
	V _{OUT}	0 to V _{CC} (Note 5)	V		
Output current		± 8.0 (Note 6)			
	I _{OH} /I _{OL}	± 4.0 (Note 7)	mA		
		± 3.0 (Note 8)			
		± 1.7 (Note 9)			
		± 0.3 (Note 10)			
		± 0.02 (Note 11)			
Operating temperature	T _{opr}	-40 to 85	°C		
Input rise and fall time	dt/dv	0 to 10 (Note 12)	ns/V		

Note 4: $V_{CC} = 0V$

Note 5: High or Low state.

Note 6: $V_{CC} = 3.0 \text{ to } 3.6 \text{ V}$

Note 7: $V_{CC} = 2.3 \text{ to } 2.7 \text{ V}$

Note 8: $V_{CC} = 1.65 \text{ to } 1.95 \text{ V}$

Note 9: $V_{CC} = 1.4 \text{ to } 1.6 \text{ V}$

Note 10: $V_{CC} = 1.1 \text{ to } 1.3 \text{ V}$

Note 11: $V_{CC} = 0.9 \text{ V}$

Note 12: $V_{IN} = 0.8$ to 2.0 V, $V_{CC} = 3.0$ V



Electrical Characteristics

DC Characteristics

Characteristics Symbol Test Condition			Condition		Ta = 25°C		;	Ta = -40 to 85°C		Unit
Characteristics Symbol		Test Condition		V _{CC} (V)	Min	Тур.	Max	Min	Max	Unit
High-level input V _{II}				0.9	V_{CC}	_	_	V _{CC}	_	
		_		1.1 to 1.3	V _{CC} × 0.7	_	_	V _{CC} × 0.7	_	V
	V _{IH}			1.4 to 1.6	V _{CC} × 0.65		_	V _{CC} × 0.65	_	
				1.65 to 1.95	V _{CC} × 0.65	ı	_	V _{CC} × 0.65	_	
				2.3 to 2.7	1.7	_	_	1.7	_	
				3.0 to 3.6	2.0		_	2.0	_	
				0.9		_	GND	_	GND	
Low-level input voltage							V _{CC} × 0.3	_	V _{CC} × 0.3	
	V _{IL}		_	1.4 to 1.6	١	١	V _{CC} × 0.35	_	V _{CC} × 0.35	V
				1.65 to 1.95	ı	١	V _{CC} × 0.35	_	V _{CC} × 0.35	
				2.3 to 2.7			0.7		0.7	
				3.0 to 3.6			0.8		0.8	
		V _{IN} = V _{IH}	I _{OH} =-0.02 mA	0.9	0.75		_	0.75	_	V
High-level output			$I_{OH} = -0.3 \text{ mA}$	1.1 to 1.3	V _{CC} × 0.75	١	_	V _{CC} × 0.75		
	V _{OH}		$I_{OH} = -1.7 \text{ mA}$	1.4 to 1.6	V _{CC} × 0.75	ı	_	V _{CC} × 0.75	_	
voltage			$I_{OH} = -3.0 \text{ mA}$	1.65 to 1.95	V _{CC} -0.45	I	_	V _{CC} -0.45		
			$I_{OH} = -4.0 \text{ mA}$	2.3 to 2.7	2.0		_	2.0	_	
			$I_{OH} = -8.0 \text{ mA}$	3.0 to 3.6	2.48		_	2.48	_	
			$I_{OL} = 0.02 \text{ mA}$	0.9			0.1		0.1	V
Low-level output V _O			$I_{OL} = 0.3 \text{ mA}$	1.1 to 1.3			V _{CC} × 0.25	_	V _{CC} × 0.25	
	V _{OL}	$V_{IN} = V_{IL}$	I _{OL} = 1.7 mA	1.4 to 1.6			V _{CC} × 0.25		V _{CC} × 0.25	
			I _{OL} = 3.0 mA	1.65 to 1.95	_	_	0.45	_	0.45	
			I _{OL} = 4.0 mA	2.3 to 2.7			0.4	_	0.4	
			I _{OL} = 8.0 mA	3.0 to 3.6		_	0.4	_	0.4	
Input leakage current	I _{IN}	V _{IN} = 0 to 5.5V		0 to 3.6		_	±0.1	_	±1.0	μΑ
Power off leakage current	l _{OFF}	V _{IN} = 0 to 5.5V V _{OUT} = 0 to 3.6V		0		_	1.0	_	10.0	μА
Quiescent supply current	Icc	V _{IN} = V _{CC} or GND		3.6	_	_	1.0	_	10.0	μΑ

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AC Characteristics (unless otherwise specified, Input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition		Ta = 25°C		Ta = -40 to 85°C		Unit	
Ondracteristics Sylli		rest Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Offic
		$C_L = 10 \text{ pF},$ $R_L = 1 \text{ M}\Omega$	0.9	_	24.4	_	_	_	
			1.1 to 1.3	_	11.6	21.7	1.0	40.5	
			1.4 to 1.6	_	6.5	9.8	1.0	11.6	
			1.65 to 1.95	_	4.9	7.0	1.0	7.6	
			2.3 to 2.7	_	3.2	4.4	1.0	4.9	
			3.0 to 3.6	_	2.4	3.5	1.0	4.1	
			0.9	_	26.9		_	_	
	^t pLH ^t pHL	C_L = 15 pF, R_L = 1 M Ω	1.1 to 1.3	_	12.7	24.2	1.0	42.1	ns
			1.4 to 1.6	_	7.1	10.7	1.0	12.9	
Propagation delay time			1.65 to 1.95	_	5.3	7.5	1.0	7.7	
			2.3 to 2.7	_	3.5	4.8	1.0	5.5	
			3.0 to 3.6	_	2.7	3.8	1.0	4.4	
		$C_L = 30 \text{ pF},$ $R_L = 1 \text{ M}\Omega$	0.9	_	37.0	1	_	_	
			1.1 to 1.3	_	17.1	33.9	1.0	64.1	
			1.4 to 1.6	_	9.3	14.3	1.0	17.4	
			1.65 to 1.95	_	6.9	9.8	1.0	10.2	
			2.3 to 2.7	_	4.6	6.2	1.0	6.6	
			3.0 to 3.6	_	3.7	4.8	1.0	5.2	
Input capacitance	C _{IN}	_	3.6	_	3		_	_	pF
Power dissipation capacitance	C _{PD}	(Note13)	0.9 to 3.6	_	10	_	_	_	pF

Note 13: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

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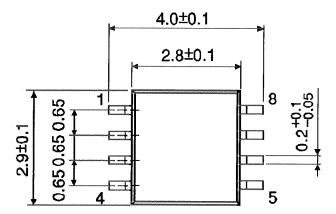
Average operating current can be obtained by the equation:

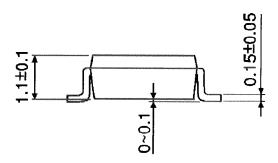
 $I_{CC (opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/3$



Package Dimensions

SSOP8-P-0.65 Unit: mm



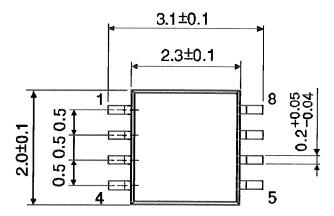


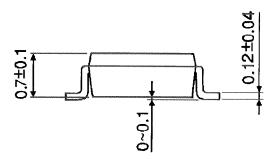
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Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A Unit: mm





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Weight: 0.01 g (typ.)

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