

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7W240FU

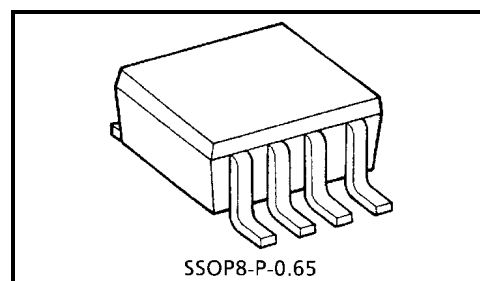
Inverted, 3-State Outputs

The TC7W240FU is a high speed C²MOS Dual Bus Buffers fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the C²MOS low power dissipation.

It is an inverting 3-state buffer having two active-low output enables.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.



SSOP8-P-0.65

Weight: 0.02 g (typ.)

Features

- High speed: $t_{pd} = 10 \text{ ns}$ (typ.) at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 2 \text{ }\mu\text{A}$ (max) at $T_a = 25^\circ\text{C}$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- Output drive capability: 15 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 6 \text{ mA}$ (min)
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range: $V_{CC} \text{ (opr)} = 2 \text{ to } 6 \text{ V}$

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

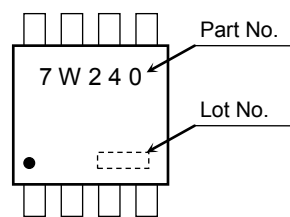
Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to 7	V
DC input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input diode current	I_{IK}	± 20	mA
Output diode current	I_{OK}	± 20	mA
DC output current	I_{OUT}	± 35	mA
DC V_{CC} /ground current	I_{CC}	± 37.5	mA
Power dissipation	P_D	300	mW
Storage temperature range	T_{stg}	-65 to 150	$^\circ\text{C}$
Lead temperature (10 s)	T_L	260	$^\circ\text{C}$

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.

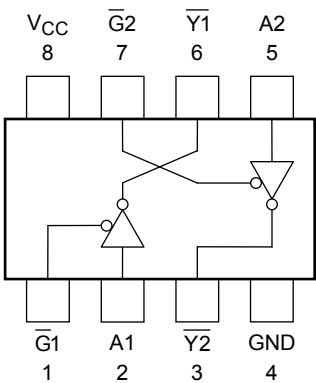
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Start of commercial production
1993-04

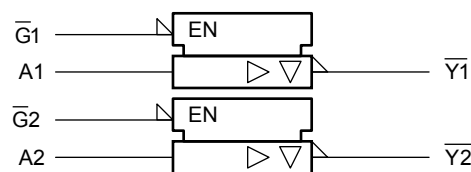
Marking



Pin Configuration (top view)



Logic Diagram



Truth Table

Inputs		Output
$\overline{G}$	A	$\overline{Y}$
L	L	H
L	H	L
H	X	Z

X: Don't care
Z: High impedance

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2 to 6	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature range	T_{opr}	-40 to 85	°C
Input rise and fall time	t_r, t_f	0 to 1000 ($V_{CC} = 2.0$ V)	ns
		0 to 500 ($V_{CC} = 4.5$ V)	
		0 to 400 ($V_{CC} = 6.0$ V)	

Electrical Characteristics
DC Electrical Characteristics

Characteristics		Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit				
					V _{CC} (V)	Min	Typ.	Max	Min		Max			
Input voltage	High level	V _{IH}	—		2.0	1.5	—	—	1.5	—	V			
					4.5	3.15	—	—	3.15	—				
					6.0	4.2	—	—	4.2	—				
	Low level	V _{IL}	—		2.0	—	—	0.5	—	0.5				
					4.5	—	—	1.35	—	1.35				
					6.0	—	—	1.8	—	1.8				
Output voltage	High level	V _{OH}	V _{IN} = V _{IL}	I _{OH} = -20 μA	2.0	1.9	2.0	—	1.9	—	V			
					4.5	4.4	4.5	—	4.4	—				
					6.0	5.9	6.0	—	5.9	—				
				I _{OH} = -6 mA	4.5	4.18	4.31	—	4.13	—				
					I _{OH} = -7.8 mA	6.0	5.68	5.80	—	5.63		—		
						Low level	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 20 μA	2.0		—	0	0.1
	4.5	—	0	0.1						—		0.1		
	6.0	—	0	0.1	—					0.1				
	I _{OL} = 6 mA	4.5	—	0.17	0.26				—	0.33				
		I _{OL} = 7.8 mA	6.0	—	0.18				0.26	—		0.33		
			3-state output off-state current		I _{OZ}				V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND			6.0	—	—
	Input leakage current		I _{IN}	V _{IN} = V _{CC} or GND		6.0	—	—	±0.1	—		±1.0	μA	
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND		6.0	—	—	2.0	—	20.0	μA			

AC Electrical Characteristics (input $t_r = t_f = 6$ ns)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = -40 to 85°C		Unit
			C _L (pF)	V _{CC} (V)	Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH} t_{THL}	—	50	2.0	—	25	60	—	75	ns
				4.5	—	7	12	—	15	
				6.0	—	6	10	—	13	
Propagation delay time	t_{pLH} t_{pHL}	—	50	2.0	—	36	90	—	115	ns
				4.5	—	12	18	—	23	
				6.0	—	10	15	—	20	
			150	2.0	—	51	130	—	165	ns
				4.5	—	17	26	—	33	
				6.0	—	14	22	—	28	
Output enable time	t_{pZL} t_{pZH}	$R_L = 1$ k Ω	50	2.0	—	48	125	—	155	ns
				4.5	—	16	25	—	31	
				6.0	—	14	21	—	26	
			150	2.0	—	63	165	—	205	ns
				4.5	—	21	33	—	41	
				6.0	—	18	28	—	35	
Output disable time	t_{pLZ} t_{pHZ}	$R_L = 1$ k Ω	50	2.0	—	32	125	—	155	ns
				4.5	—	15	25	—	31	
				6.0	—	14	21	—	26	
Input capacitance	C _{IN}	—	—	—	—	5	10	—	10	pF
Output capacitance	C _{OUT}	—	—	—	—	10	—	—	—	pF
Power dissipation capacitance	C _{PD}	(Note)	—	—	—	31	—	—	—	pF

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

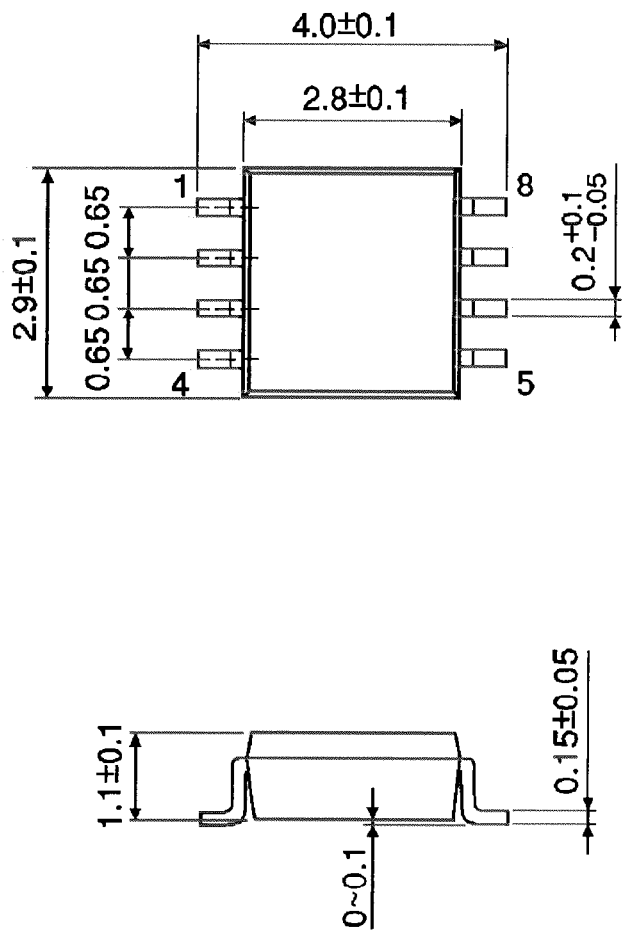
Average operating current can be obtained by the equation:

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2 \text{ (per gate)}$$

Package Dimensions

SSOP8-P-0.65

Unit : mm



Weight: 0.02 g (typ.)

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