TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7W02FU, TC7W02FK

Dual 2-Input NOR Gate

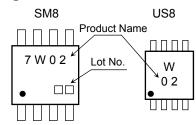
Features

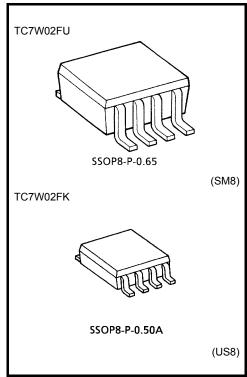
High Speed : t_{pd} = 6ns (typ.) at V_{CC} = 5V
 Low power dissipation : I_{CC} = 1µA (max) at Ta = 25°C
 High noise immunity : V_{NIH} = V_{NIL} = 28% V_{CC} (min)

Output drive capability : 10 LSTTL Loads
 Symmetrical Output Impedance : |I_{OH}| = I_{OL}= 4mA (min)

• Balanced propagation delays : $t_{pLH} = t_{pHL}$ • Wide operating voltage range : $V_{CC} = 2 \text{ to 6V}$

Marking

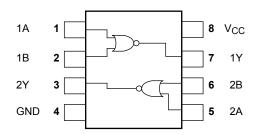




Weight

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

Pin Assignment (top view)



Start of commercial production 1991-09



Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit	
Supply voltage	V _{CC}	-0.5 to 7.0	V	
DC input voltage	V _{IN}	–0.5 to V _{CC} + 0.5	V	
DC output voltage	Vout	−0.5 to V _{CC} + 0.5	V	
Input diode current	IIK	±20	mA	
Output diode current	lok	±20	mA	
DC output current	Гоит	±25	mA	
DC V _{CC} /ground current	Icc	±25	mA	
Douger discipation	D-	300 (SM8)	m\\\	
Power dissipation	P _D	200 (US8)	- mW	
Storage temperature	T _{stg}	-65 to 150	°C	
Lead temperature (10 s)	TL	260	°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).

IEC Logic Symbol



Truth Table

Α	В	Υ
L	L	Н
L	Н	L
Н	L	L
Н	Н	L

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	2.0 to 6.0	V
Input voltage	V _{IN}	0 to V _{CC}	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{opr}	-40 to 85	°C
Input rise and fall time		0 to 1000 (V _{CC} = 2.0 V)	
	t _r , t _f	0 to 500 (V _{CC} = 4.5 V)	ns
		0 to 400 (V _{CC} = 6.0 V)	



Electrical Characteristics

DC Characteristics

Characteristics Symbol Test Condition			Ta = 25°C			Ta = -40 to 85°C		Unit		
		rest Condition		V _{CC} (V)	Min	Тур.	Max	Min	Max	Offic
				2.0	1.5	_	_	1.5	_	
High-level input voltage V _{IH}	V_{IH}	_		4.5	3.15	_		3.15		V
				6.0	4.2	_		4.2		
				2.0	_	_	0.5	_	0.5	
Low-level input voltage V _{IL}	V_{IL}	_		4.5	_	_	1.35	_	1.35	
				6.0	_	_	1.8	_	1.8	
	Vон	$V_{IN} = V_{IL}$	I _{OH} = -20 μA	2.0	1.9	2.0	_	1.9		
				4.5	4.4	4.5	_	4.4	_	
High-level output voltage				6.0	5.9	6.0	_	5.9	_	
			I _{OH} = -4 mA	4.5	4.18	4.31	_	4.13	_	
			$I_{OH} = -5.2 \text{ mA}$	6.0	5.68	5.80	_	5.63	_	V
			I _{OL} = 20 μA	2.0	_	0.0	0.1	_	0.1	V
Low-level output voltage V _{Ol}				4.5	_	0.0	0.1	_	0.1	
	V_{OL}	$V_{IN} = V_{IH}$		6.0	_	0.0	0.1	_	0.1	
			I _{OL} = 4 mA	4.5	_	0.17	0.26	_	0.33	
			I _{OL} = 5.2 mA	6.0	_	0.18	0.26	_	0.33	
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND		6.0	_	_	±0.1	_	±1.0	μΑ
Quiescent supply current	Icc	V _{IN} = V _{CC} or GND		6.0			1.0	_	10.0	μА

3 2014-03-01



AC Characteristics (C_L= 15pF, V_{CC} = 5V, Ta = 25°C)

Characteristics	Symbol	Test Condition		Unit		
	Syllibol	rest Condition	Min	Тур.	Max	Offic
Output Transition Time	t _{TLH}			4	8	20
	t _{THL}	_				ns
Propagation Delay Time	t _{pLH}	_	_	6	12	ne
	t_{pHL}					ns

AC Characteristics (C_L = 50pF, Input: t_r = t_f = 6 ns)

Characteristics	Symbol	Test Condition	_	Ta = 25°C			Ta = -40 to 85°C		Unit
			V _{CC} (V)	Min	Тур.	Max	Min	Max	Offic
Output Transition Time	4	_	2.0		25	75	_	95	
	t _{TLH} t _{THL}		4.5		7	15	_	19	ns
	THL		6.0		6	13	_	16	
Propagation delay time	t _{pLH}	_	2.0	_	25	75	_	95	
			4.5	_	9	15	_	19	ns
			6.0	_	8	13	_	16	
Input capacitance	C _{IN}				5	10	_	10	pF
Power dissipation capacitance	C_{PD}		(Note 1)	_	21	_	_	_	pF

Note 1: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

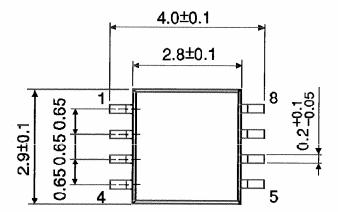
Average operating current can be obtained by the equation:

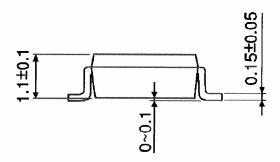
 $I_{CC (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$

TC7W02FU/FK

Package Dimensions

SSOP8-P-0.65 Unit: mm



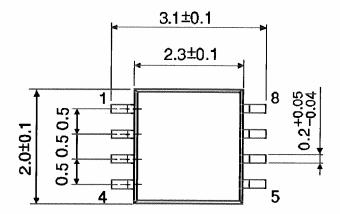


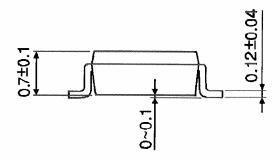
Weight: 0.02 g (typ.)

5 2014-03-01

Package Dimensions

SSOP8-P-0.50A Unit: mm





6

Weight: 0.01 g (typ.)

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