

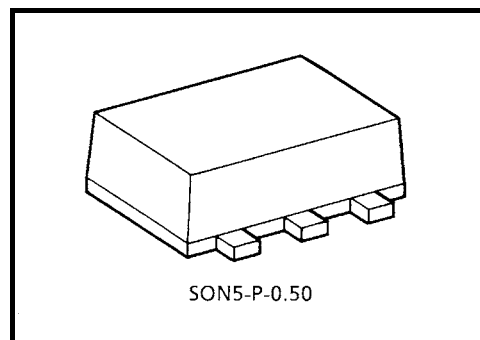
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7SH86FE

Exclusive OR Gate

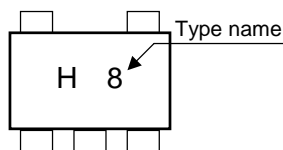
Features

- Super high speed operation : $t_{PD} = 4.8 \text{ ns (typ.)}$
@ $V_{CC} = 5 \text{ V}$
- Low power dissipation : $I_{CC} = 2 \mu\text{A (Max.)}$
@ $T_a = 25^\circ\text{C}$
- High noise immunity : $V_{NIH} = V_{NIH}$
 $= 28\% V_{CC} \text{ (Min.)}$
- 5.5V tolerant input.
- Wide operation voltage range : $V_{CC} \text{ (opr)} = 2 \sim 5.5 \text{ V}$

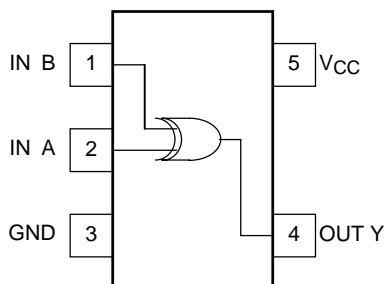


Weight: 0.003 g (typ.)

Marking



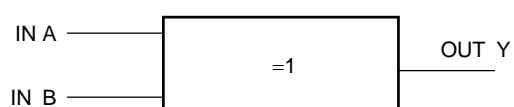
Pin Assignment (top view)



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

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	$-0.5 \sim 7$	V
DC input voltage	V_{IN}	$-0.5 \sim 7$	V
DC output voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$	V
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20	mA
DC output current	I_{OUT}	± 25	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	150	mW
Storage temperature	T_{stg}	$-65 \sim 150$	$^\circ\text{C}$

Logic Diagram



Truth Table

A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2~5.5	V
Input voltage	V_{IN}	0~5.5	V
Output voltage	V_{OUT}	0~ V_{CC}	V
Operating temperature	T_{opr}	-40~85	°C
Input rise and fall time	dt/dv	0~100 ($V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$)	ns/V
		0~20 ($V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$)	

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C				Ta = -40~85°C		Unit	
					VCC (V)	Min	Typ.	Max	Min	Max		
High-level input voltage	VIH	—	—		2.0	1.5	—	—	1.5	—	V	
					3.0~5.5	VCC × 0.7	—	—	VCC × 0.7	—		
Low-level input voltage	VIL	—	—		2.0	—	—	0.5	—	0.5	V	
					3.0~5.5	—	—	VCC × 0.3	—	VCC × 0.3		
High-level output voltage	VOH	—	VIN = VIH or VIL	IOH = -50 μA	2.0	1.9	2.0	—	1.9	—	V	
					3.0	2.9	3.0	—	2.9	—		
					4.5	4.4	4.5	—	4.4	—		
					IOH = -4 mA	3.0	2.58	—	—	2.48		—
					IOH = -8 mA	4.5	3.94	—	—	3.80		—
Low-level output voltage	VOL	—	VIN = VIH or VIL	IOL = 50 μA	2.0	—	0	0.1	—	0.1	V	
					3.0	—	0	0.1	—	0.1		
					4.5	—	0	0.1	—	0.1		
					IOL = 4 mA	3.0	—	—	0.36	—		0.44
					IOL = 8 mA	4.5	—	—	0.36	—		0.44
Input leakage current	IIN	—	VIN = 5.5 V or GND		0~5.5	—	—	±0.1	—	±1.0	μA	
Quiescent supply current	ICC	—	VIN = VCC or GND		5.5	—	—	2.0	—	20.0	μA	

AC Characteristics (input: $t_r = t_f = 3\text{ ns}$)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit
		V _{CC} (V)	C _L (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t _{PLH} t _{PHL}	3.3 ± 0.3	15	—	7.0	11.0	1.0	13.0	ns
			50	—	9.5	14.5	1.0	16.5	
		5.0 ± 0.5	15	—	4.8	6.8	1.0	8.0	
			50	—	6.3	8.8	1.0	10.0	
Input capacitance	C _{IN}			—	4	10	—	10	pF
Power dissipation capacitance	C _{PD}	(Note)		—	18	—	—	—	pF

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

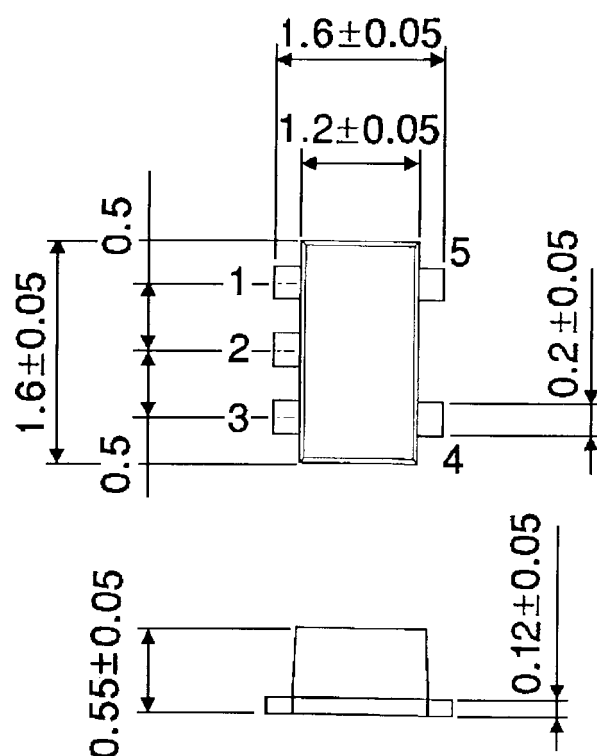
Average operating current can be obtained by the equation.

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

Package Dimensions

SON5-P-0.50

Unit : mm



Weight: 0.003 g (typ.)

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