TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

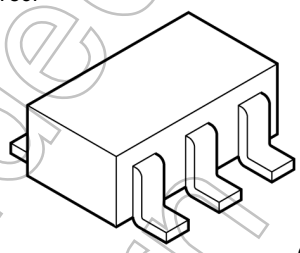
TC7SET86F, TC7SET86FU

Exclusive OR Gate

Features

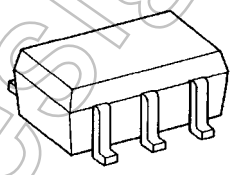
- High speed : t_{pd} = 5.2 ns (typ.) at V_{CC} = 5 V, C_L = 15pF
- Low power dissipation : I_{CC} = 2μA (max) at Ta = 25°C
- Compatible with TTL outputs. : V_{IL} = 0.8V (max), V_{LH} = 2.0V (min)
- 5.5-V tolerant inputs.
- Balanced propagation delays : $t_{pLH} \approx t_{pHL}$

TC7SET86F



SSOP5-P-0.95 (SMV)

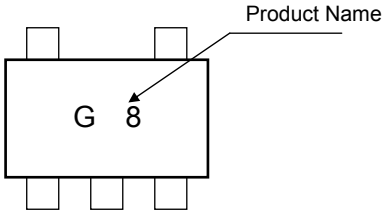
TC7SET86FU



SSOP5-P-0.65A (USV)

Weight
SSOP5-P-0.95 : 0.016 g (typ.)
SSOP5-P-0.65A : 0.006 g (typ.)

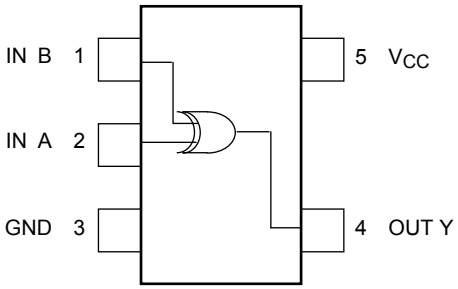
Marking



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 7.0	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 (Note 1)	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC}/ground current	I_{CC}	±50	mA
Power dissipation	P_D	200	mW
Storage temperature	T_{stg}	−65 to150	°C
Lead temperature (10s)	T_L	260	°C

Pin Assignment (top view)

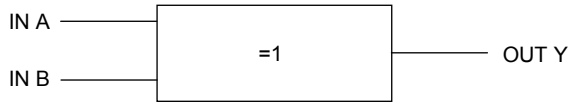


Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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_{OUT} < GND, V_{OUT} > V_{CC}

Start of commercial production
1999-06

IEC Logic Symbol



Truth Table

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

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.5 to 5.5	V
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	−40 to 85	°C
Input rise and fall time	dt/dv	0 to 20	ns/V

Electrical Characteristics

DC Characteristics

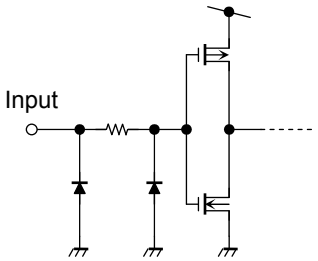
Characteristics	Symbol	Test Condition		V_{CC} (V)	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max	Ta = −40 to 85°C Min	Ta = −40 to 85°C Max	Unit
High-Level Input Voltage	V_{IH}	—		4.5 to 5.5	2.0	—	—	2.0	—	V
Low-Level Input Voltage	V_{IL}	—		4.5 to 5.5	—	—	0.8	—	0.8	V
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50 μA	4.5	4.4	4.5	—	4.4	—	V
			I_{OH} = −8 mA	4.5	3.94	—	—	3.80	—	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50 μA	4.5	—	0.0	0.10	—	0.10	V
			I_{OL} = 8 mA	4.5	—	—	0.36	—	0.44	
Input leakage current	I_{IN}	V_{IN} = 5.5 V or GND		0 to 5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	2.0	—	20.0	μA
	I_{CCT}	PER INPUT : V_{IN} = 3.4V OTHER INPUT : V_{CC} or GND		5.5	—	—	1.35	—	1.5	mA

AC Characteristics (Input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{CC} (V)	C_L (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t_{pLH}	—	5.0 ± 0.5	15	—	5.2	7.5	1.0	11.8	ns
	t_{pHL}			50	—	7.5	10.3	—	11.5	
Input capacitance	C_{IN}	—			—	4	10	—	10	pF
Power dissipation capacitance	C_{PD}	(Note 2)			—	18	—	—	—	pF

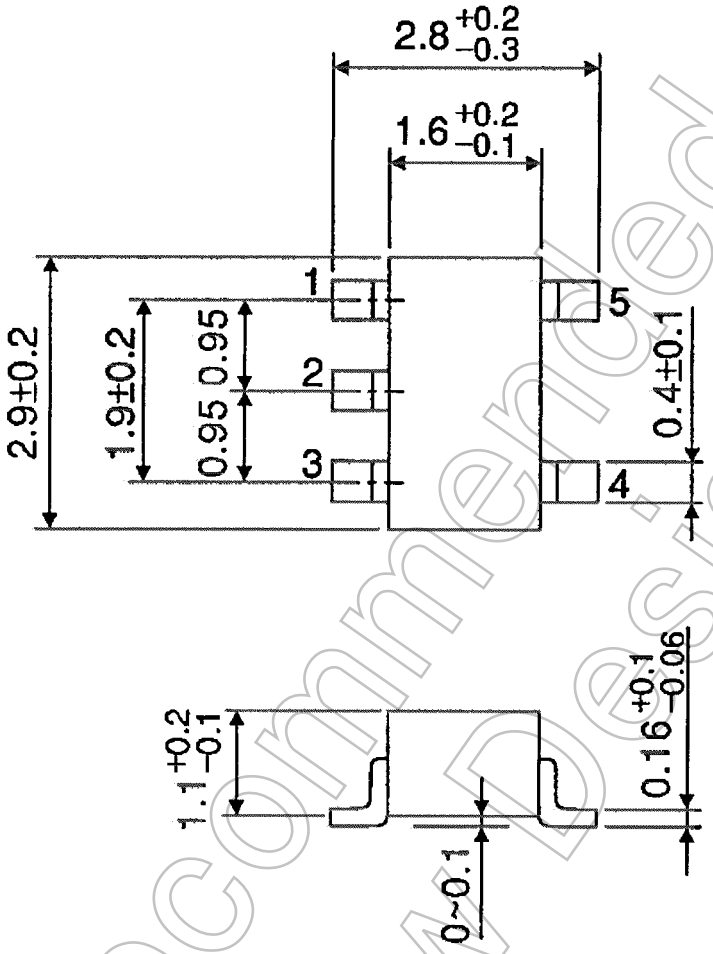
Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation:
$I_{CC\ (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

Input Equivalent Circuit



Package Dimensions

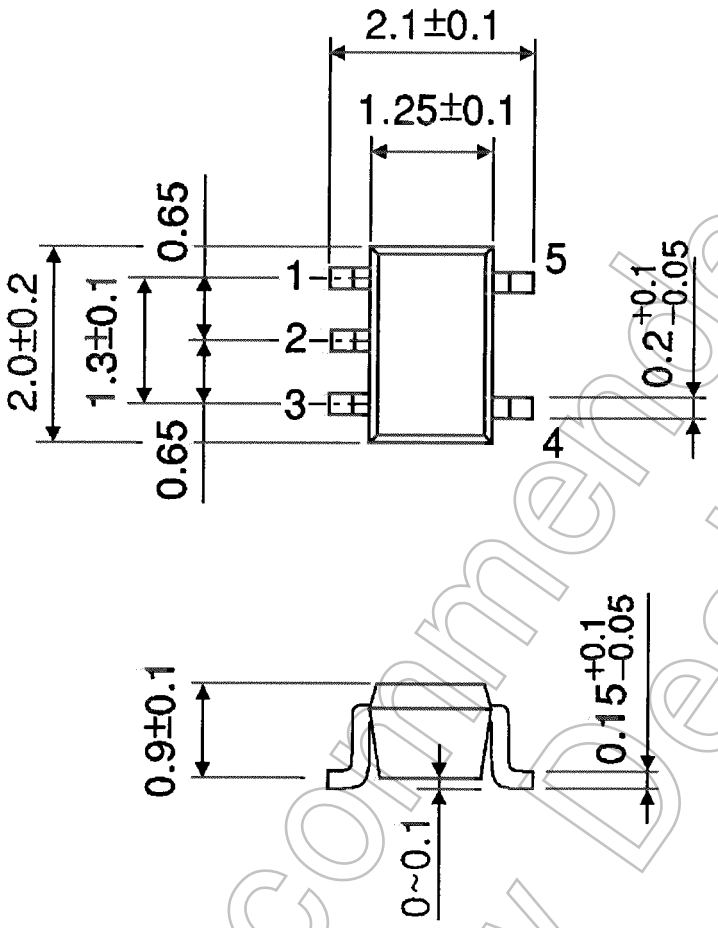
SSOP5-P-0.95 Unit : mm



Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A Unit : mm



Weight: 0.006 g (typ.)

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