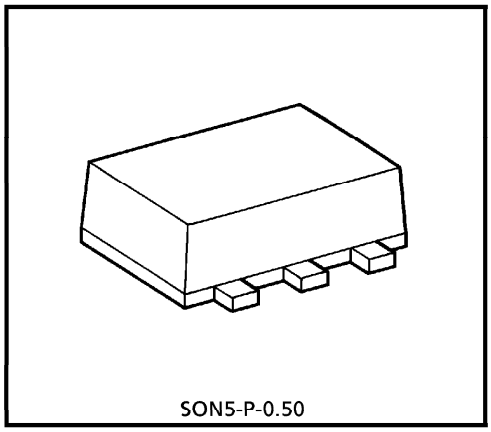
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC7SZ02AFE

2 INPUT NOR GATE

FEATURES

- High Output Drive : ±24 mA (Typ.) @V_{CC} = 3 V
- Super High Speed Operation : t_{PD} 2.4 ns (Typ.) @V_{CC} = 5 V, 50 pF
- Operation Voltage Range : $V_{CC\,(opr)}$ = 1.8~5.5 V
- Supply Voltage Data Retention : V_{CC} = 1.5~5.5 V
- Latch-up Performance : ±500 mA
- ESD Performance : Human Body Model > ±2000 V
  Machine Model > ±200 V
- Power Down Protection is provided on all inputs.
- Matches the Performance of TC74LCX Series when Operated at 3.3 V V_{CC}
- Input Rise and Fall Time (tr, tf) (Recommended Operation Condition)
  @V_{CC} = 1.8 V, 2.5 V ± 0.2 V : 0~20 ns / V
  @V_{CC} = 3.3 V ± 0.3 V : 0~10 ns / V
  @V_{CC} = 5.5 V ± 0.5 V : 0~5 ns / V



SON5-P-0.50

Weight : 0.003 g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	−0.5~6	V
DC Input Voltage	V_{IN}	−0.5~6	V
DC Output Voltage	V_{OUT}	−0.5~V_{CC} + 0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC} / Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	150	mW
Storage Temperature	T_{stg}	−65~150	°C
Lead Temperature (10 s)	T_L	260	°C

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
High-Level Input Voltage	V_{IH}			1.8	0.75 × V_{CC}	—	—	0.75 × V_{CC}	—	V
				2.3 – 5.5	0.7 × V_{CC}	—	—	0.7 × V_{CC}	—	
Low-Level Input Voltage	V_{IL}			1.8	—	—	0.25 × V_{CC}	—	0.25 × V_{CC}	V
				2.3 – 5.5	—	—	0.3 × V_{CC}	—	0.3 × VCC	
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IL}	I_{OH} = −100 μA	1.8	1.7	1.8	—	1.7	—	V
				2.3	2.2	2.3	—	2.2	—	
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I_{OH} = −8 mA	2.3	1.9	2.15	—	1.9	—	
			I_{OH} = −16 mA	3.0	2.4	2.8	—	2.4	—	
			I_{OH} = −24 mA	3.0	2.3	2.68	—	2.3	—	
			I_{OH} = −32 mA	4.5	3.8	4.2	—	3.8	—	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA	1.8	—	0	0.1	—	0.1	V
				2.3	—	0	0.1	—	0.1	
				3.0	—	0	0.1	—	0.1	
				4.5	—	0	0.1	—	0.1	
			I_{OL} = 8 mA	2.3	—	0.1	0.3	—	0.3	
			I_{OL} = 16 mA	3.0	—	0.15	0.4	—	0.4	
			I_{OL} = 24 mA	3.0	—	0.22	0.55	—	0.55	
			I_{OL} = 32 mA	4.5	—	0.22	0.55	—	0.55	
Input Leakage Current	I_{IN}	V_{IN} = 5.5 V or GND		0 – 5.5	—	—	±1	—	±10	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	2	—	20	μA

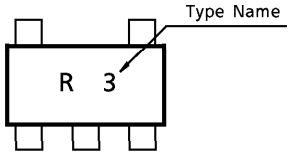
AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3$ ns)

CHARACTERISTIC	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t_{PLH} t_{PHL}	C_L = 15 pF, R_L = 1 MΩ	1.8	2.0	4.4	9.5	2.0	10.0	ns
			2.5 ± 0.2	0.8	2.9	6.5	0.8	7.0	
			3.3 ± 0.3	0.5	2.3	4.5	0.5	4.7	
			5.0 ± 0.5	0.5	1.9	3.9	0.5	4.1	
		C_L = 50 pF, R_L = 500 Ω	3.3 ± 0.3	1.5	2.9	5.0	1.5	5.2	
			5.0 ± 0.5	0.8	2.4	4.3	0.8	4.5	
Input Capacitance	C_{IN}		0 − 5.5	—	4	—	—	—	pF
Power Dissipation Capacitance	C_{PD}	(Note 1)	3.3	—	19	—	—	—	pF
			5.5	—	27	—	—	—	

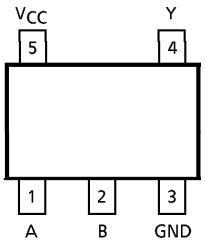
(Note 1) : C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation.

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

MARKING



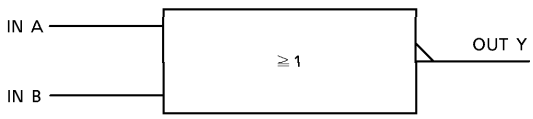
PIN ASSIGNMENT (TOP VIEW)



TRUTH TABLE

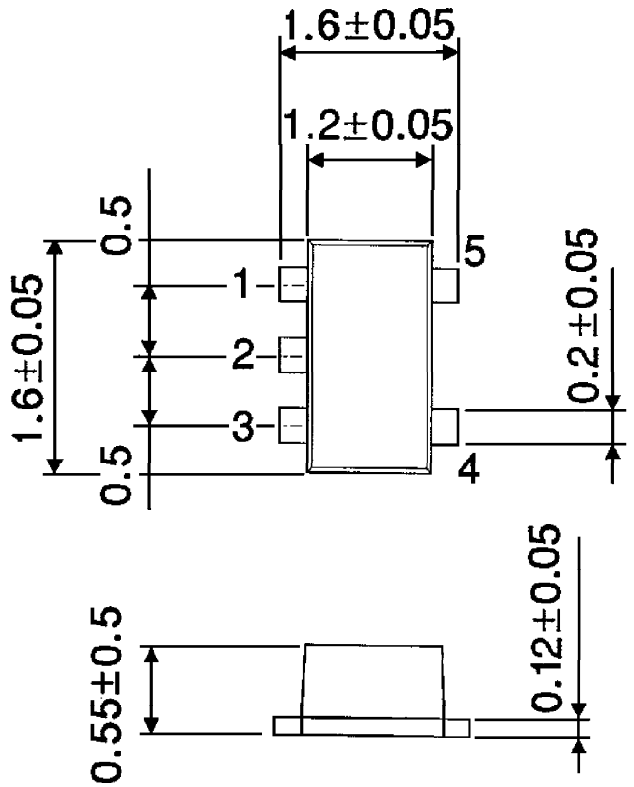
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

LOGIC DIAGRAM



PACKAGE DIMENSIONS

SON5-P-0.50 Unit : mm



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