TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC7SL02F, TC7SL02FU

2-INPUT NOR GATE

The TC7SL02 is a low voltage operative C²MOS 2-INPUT NOR GATE fabricated with silicon gate C²MOS technology.

Operating voltage (VCC (opr)) is 1~3V equivalent to 1pc or 2pcs of dry cell battery and it achives low power dissipation.

The internal circuit is composed of 3 stages including buffer output, which enables high noise immunity and stable output.

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

FEATURES

- High Speed t_{pd} = 10ns (Typ.) at $V_{CC} = 3V$
- Low Power Dissipation $I_{CC} = 1\mu A$ (Max.) at $Ta = 25^{\circ}C$
- High Noise Immunity ······ V_{NIH} = V_{NIL} = 28% V_{CC} (Min.)
- Symmetrical Output Impedance |IOH| = IOL = 1mA
- Balanced Propagation Delay Time ··· t_{pLH}≒t_{pHL}
- Low Voltage Operating ···············V_{CC} (opr) = 1~3.6V

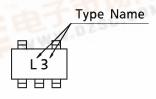
TC7SL02F SSOP5-P-0.95 TC7SL02FU SSOP5-P-0.65A

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

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V _C C	-0.5~5	V
DC Input Voltage	V _{IN}	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	Vout	$-0.5 \sim V_{CC} + 0.5$	V
Input Diode Current	IK	± 20	mA
Output Diode Current	lok	± 20	mA
DC Output Current	IOUT	± 12.5	mA
DC V _{CC} /Ground Current	lcc	± 25	mA
Power Dissipation	PD	200	mW
Storage Temperature	T _{stg}	- 65~150	°C
Lead Temperature (10s)	TL	260	°C

MARKING



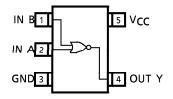
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TOSHIBA TC7SL02F/FU

LOGIC DIAGRAM

PIN CONNECTION (TOP VIEW)





RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT	
Supply Voltage	Vcc	1~3.6	V	
Input Voltage	V _{IN}	0~V _{CC}	V	
Output Voltage	VOUT	0~V _{CC}	V	
Operating Temperature	T _{opr}	- 40~85	°C	
Input Rise and Fall Time		0~1000 (V _{CC} = 1.0V)		
	t _r , t _f	0∼ 500 (V _{CC} = 1.5V)	ns	
		0~ 400 (V _{CC} = 3.0V)		

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC SYMBOL		TEST	CIR- TEST CONDITION			Т	a = 25°	С	Ta = -4	l0∼85°C	LINUT
		CUIT			Vcc	MIN.	TYP.	МАХ.	MIN.	MAX.	UNIT
High Lovel Input					1.0	0.75	_	_	0.75	_	
High-Level Input V Voltage	VIH	 		_	1.5	1.05	—	—	1.05	<u> </u>	V
Voltage					3.0	2.10	_	_	2.10	_	
Low-Level Input			_		1.0	—	_	0.25	_	0.25	
Voltage	V _{IL}	—			1.5	—	—	0.45	—	0.45	V
Voltage					3.0	_	_	0.90	<u> </u>	0.90	
				Ι _{ΟΗ} = -20μΑ	1.0	0.9	1.0	<u> </u>	0.9		
High-Level			V _{IN} = V _{IL}		1.5	1.4	1.5	l —	1.4		
Output Voltage	VOH	—			3.0	2.9	3.0	_	2.9	_	V
Output voltage				$I_{OH} = -1mA$	1.5	1.07	1.23	_	0.99		
				$I_{OH} = -2.6mA$	3.0	2.61	2.68	—	2.55	_	
	V _{OL}				1.0	_	0.0	0.1	_	0.1	
l ann land			V _{IN} = V _{IH} or V _{IL}	$I_{OL} = 20 \mu A$	1.5	—	0.0	0.1	—	0.1	
Low-Level Output Voltage		 			3.0	—	0.0	0.1	—	0.1	V
Output voitage				$I_{OL} = 1mA$	1.5	—	0.23	0.31	—	0.37] [
				$I_{OL} = 2.6 mA$	3.0	—	0.23	0.31	<u> </u>	0.33	
Input Leakage Current	IN	_	V _{IN} = V _{CC} or GND		3.6			± 0.1		± 1.0	
Quiescent Supply Current	^l cc		V _{IN} = V _{CC}	or GND	3.6			1.0		10.0	μΑ

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TOSHIBA TC7SL02F/FU

CHARACTERISTIC SYMBOL		TEST CIR- CUIT	TEST CONDITION	7	UNIT		
	STIVIBOL			MIN.	TYP.	MAX.	UNIT
Output Transition	tTLH				5.0	9.0	ns
Time	tTHL		_		3.0	3.0	113
Propagation	^t PLH				7.5	13.0	ns
Delay Time	t _{PHL}		_	_	7.3	13.0	113

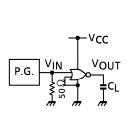
AC ELECTRICAL CHARACTERISTICS ($C_L = 25pF$, Input $t_r = t_f = 6ns$)

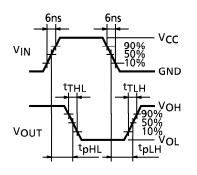
CHARACTERISTIC SYMBOL		TEST	TEST CONDITION		Ta = 25°C		Ta = -4			
	CIR- CUIT	۷cc		MIN.	TYP.	MAX.	MIN.	MAX.	UNIT	
Output Transition	+			1.0	_	70	170	_	240	
Time	t _{TLH}	_	_	1.5	_	25	45		55	ns
Time	tTHL			3.0		10	15		20	
Propagation	+			1.0	_	70	170	_	210	
Propagation Delay Time	t _{PLH}	—	_	1.5	_	25	45	l —	55	ns
Delay Time	^t PHL			3.0	_	10	15	_	20	
Input Capacitance	CIN	_	_			5	10		10	
Power Dissipation Capacitance	C _{PD}	_	Note (1)		_	10	_	_	_	рF

Note (1): CpD defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).

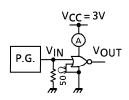
Average operating current can be obtained by the equation as follows. $I_{CC}(opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

SWITCHING CHARACTERISTICS TEST CIRCUIT





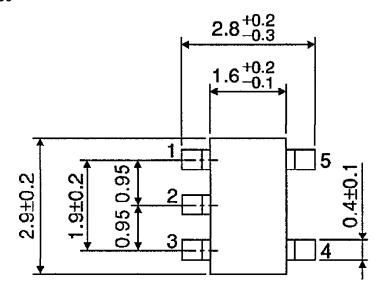
ICC (opr) TEST CIRCUIT

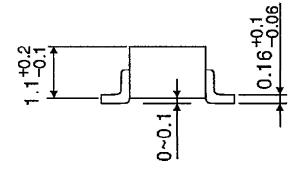


Input waveform is the same as that in case of switching characteristics test.

OUTLINE DRAWING SSOP5-P-0.95

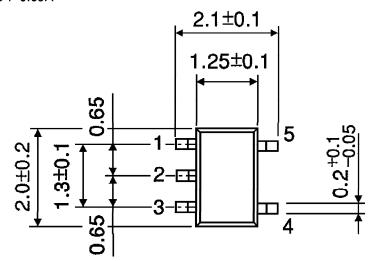
Unit: mm



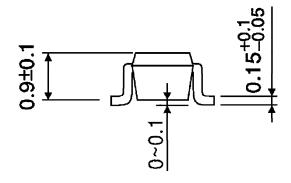


Weight: 0.016g (Typ.)

OUTLINE DRAWING SSOP5-P-0.65A



Unit: mm



Weight: 0.006g (Typ.)