

TC7W04F, TC7W04FU

3 INVERTERS

The TC7W04 is high speed C²MOS BUFFER fabricated with silicon gate C²MOS technology.

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

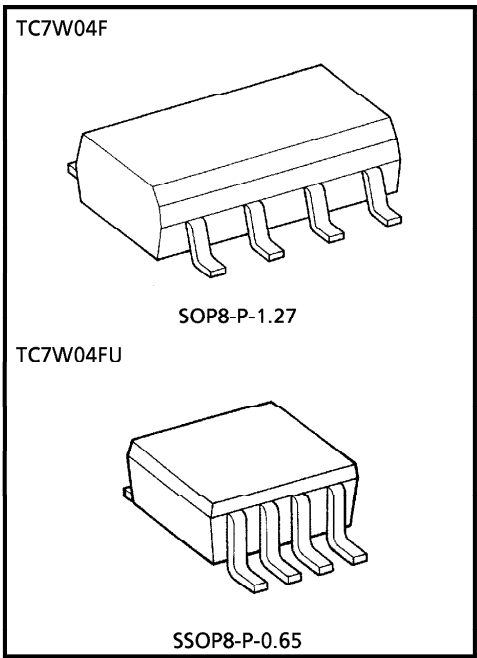
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES

- High Speed $t_{pd} = 6\text{ns}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation $I_{CC} = 1\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- High Noise Immunity $V_{NIH} = V_{NIL}$
= 28% V_{CC} (Min.)
- Output Drive Capability 10 LSTTL Loads
- Symmetrical Output Impedance ... $|I_{OH}| = I_{OL} = 4\text{mA}$ (Min.)
- Balanced Propagation Delays $t_{PLH} \cong t_{PHL}$
- Wide Operating Voltage Range ... $V_{CC}(\text{opr}) = 2 \sim 6\text{V}$

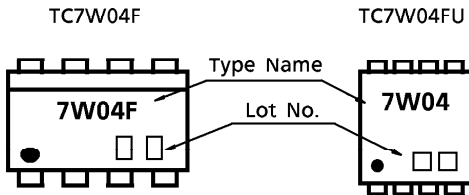
MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	-0.5~7	V
DC Input Voltage	V_{IN}	-0.5~ $V_{CC} + 0.5$	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}	± 25	mA
DC V_{CC} / Ground Current	I_{CC}	± 25	mA
Power Dissipation	P_D	300	mW
Storage Temperature	T_{stg}	-65~150	$^\circ\text{C}$
Lead Temperature (10s)	T_L	260	$^\circ\text{C}$



Weight SOP8-P-1.27 : 0.05g (Typ.)
SSOP8-P-0.65 : 0.02g (Typ.)

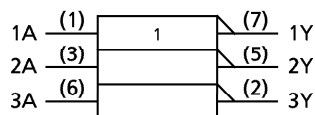
MARKING



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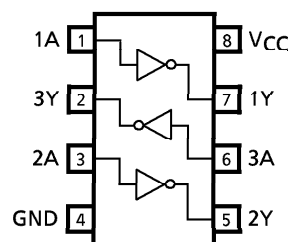
LOGIC DIAGRAM



TRUTH TABLE

A	Y
L	H
H	L

PIN ASSIGNMENT (TOP VIEW)



RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	2~6	V
Input Voltage	V_{IN}	0~ V_{CC}	V
Output Voltage	V_{OUT}	0~ V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	t_r, t_f	0~1000 ($V_{CC}=2.0V$) 0~500 ($V_{CC}=4.5V$) 0~400 ($V_{CC}=6.0V$)	ns

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	$T_a = 25^\circ\text{C}$				$T_a = -40 \sim 85^\circ\text{C}$		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Input Voltage	V_{IH}	—	2.0 4.5 6.0	1.5 3.15 4.2	— — —	— — —	1.5 3.15 4.2	— — —	V
Low-Level Input Voltage	V_{IL}	—	2.0 4.5 6.0	— — —	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	V
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IL}$ $I_{OH} = -20\mu\text{A}$	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	— — —	V
			4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
			4.5 6.0	— —	— —	— —	— —	— —	
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ $I_{OL} = 20\mu\text{A}$	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
			4.5 6.0	— —	— —	— —	— —	— —	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	6.0	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	6.0	—	—	1.0	—	10.0	

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AC ELECTRICAL CHARACTERISTICS (CL = 15pF, VCC = 5V, Ta = 25°C)

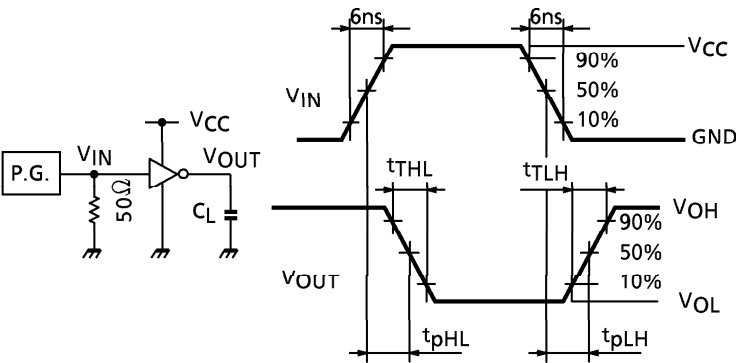
CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			UNIT
			MIN.	TYP.	MAX.	
Output Transition Time	tTLH tTHL	—	—	4	8	ns
Propagation Delay Time	tPLH tPHL	—	—	6	12	ns

AC ELECTRICAL CHARACTERISTICS (CL = 50pF, Input tr = tf = 6ns)

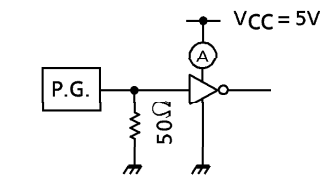
CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.
Output Transition Time	tTLH tTHL	—	2.0	—	30	75	—	95
			4.5	—	8	15	—	19
			6.0	—	7	13	—	16
Propagation Delay Time	tPLH tPHL	—	2.0	—	27	75	—	95
			4.5	—	9	15	—	19
			6.0	—	8	13	—	16
Input Capacitance	CIN	—	—	5	10	—	10	pF
Power Dissipation Capacitance	CpD	(Note 1)	—	20	—	—	—	

Note 1 : CpD is 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 hereunder.
 $I_{CC} (opr) = C_{pD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 3$ (per gate)

SWITCHING CHARACTERISTICS
TEST CIRCUIT



OPERATING CURRENT CONSUMPTION
TEST CIRCUIT



This input waveform is equal to SWITCHING CHARACTERISTICS TEST CIRCUIT input waveform.