

TC7W241FU

NON-INVERTED, 3-STATE OUTPUTS

The TC7W241FU is a high speed C²MOS DUAL BUS BUFFERS fabricated with silicon gate C²MOS technology. It achieve the high speed operation similar to equivalent LSTTL while maintaining the C²MOS low power dissipation.

It is a non-inverting 3-state buffer has one active-high and one active-low output enable.

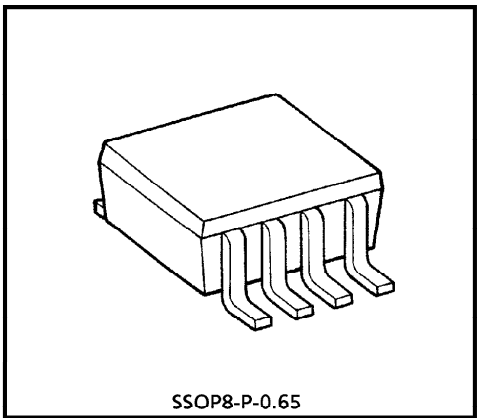
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES

- High Speed $t_{pd} = 10\text{ns}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation $I_{CC} = 2\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- High Noise Immunity $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min.)
- Output Drive Capability 15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 6\text{mA}$ (Min.)
- Balanced Propagation Delays $t_{pLH} \doteq t_{pHL}$
- Wide Operating Voltage Range... $V_{CC}(\text{opr}) = 2 \sim 6\text{V}$

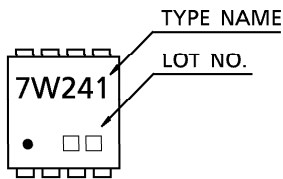
MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC} + 0.5$	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}	± 35	mA
DC V_{CC} / Ground Current	I_{CC}	± 37.5	mA
Power Dissipation	P_D	300	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	$^\circ\text{C}$
Lead Temperature (10s)	T_L	260	$^\circ\text{C}$

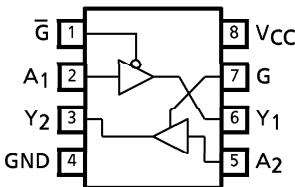


Weight : 0.02g (Typ.)

MARKING



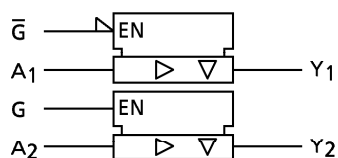
PIN ASSIGNMENT (TOP VIEW)



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LOGIC DIAGRAM



TRUTH TABLE

INPUT			OUTPUT
$\bar{G}$	G	A	Y
L	H	L	L
L	H	H	H
H	L	X	Z

X : Don't Care

Z : High Impedance

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	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

PARAMETER	SYMBOL	TEST CIRCUIT	TEST CONDITION	V_{CC}	$T_a = 25^\circ C$			$T_a = -40 \sim 85^\circ C$		UNIT
					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}	—	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu A$	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
				$I_{OH} = -6mA$	4.5	4.18	4.31	—	4.13	
				$I_{OH} = -7.8mA$	6.0	5.68	5.80	—	5.63	
Low-Level Output Voltage	V_{OL}	—	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20\mu A$	2.0 4.5 6.0	— — —	0.0 0.0 0.0	— — —	0.1 0.1 0.1	V
				$I_{OL} = 6mA$	4.5	—	0.17	—	0.33	
				$I_{OL} = 7.8mA$	6.0	—	0.18	—	0.33	
3-State Output Off-State Current	I_{OZ}	—	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	6.0	—	—	± 0.5	—	± 5.0	μA
Input Leakage Current	I_{IN}	—	$V_{IN} = V_{CC}$ or GND	6.0	—	—	± 0.1	—	± 1.0	
Quiescent Supply Current	I_{CC}	—	$V_{IN} = V_{CC}$ or GND	6.0	—	—	2.0	—	20.0	

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AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CIR- CUIT	TEST CONDITION			Ta = 25°C			Ta = -40~85°C		UNIT
				C _L	V _{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}	—	—	50	2.0	—	25	60	—	75	ns
					4.5	—	7	12	—	15	
					6.0	—	6	10	—	13	
Propagation Delay Time	t_{PLH} t_{pHL}	—	—	50	2.0	—	36	90	—	115	
					4.5	—	12	18	—	23	
					6.0	—	10	15	—	20	
				150	2.0	—	51	130	—	165	
					4.5	—	17	26	—	33	
					6.0	—	14	22	—	28	
Output Enable Time	t_{pZL} t_{pZH}	—	$R_L = 1\text{k}\Omega$	50	2.0	—	48	125	—	155	
					4.5	—	16	25	—	31	
					6.0	—	14	21	—	26	
				150	2.0	—	63	165	—	205	
					4.5	—	21	33	—	41	
					6.0	—	18	28	—	35	
Output Disable Time	t_{pLZ} t_{pHZ}	—	$R_L = 1\text{k}\Omega$	50	2.0	—	32	125	—	155	
					4.5	—	15	25	—	31	
					6.0	—	14	21	—	26	
Input Capacitance	C _{IN}	—	—	—	—	—	5	10	—	10	pF
Output Capacitance	C _{OUT}	—	—	—	—	—	10	—	—	—	
Power Dissipation Capacitance	C _{PD}	—	Note (1)	—	—	—	33	—	—	—	

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 :

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2 \text{ (per Gate)}$$