TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7WH126FU, TC7WH126FK

## **DUAL BUS BUFFER**

The TC7WH126 is an advanced high speed CMOS DUAL BUS BUFFERS fabricated with silicon gate CMOS technology.

They achieve the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

The require 3-state control input G to be set high to place the output into the impedance.

This device is designed to be used with 3-state memory address drivers, etc.

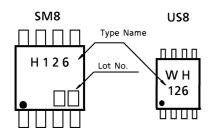
An input protection circuit ensures that 0 to 7V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V system and two supply system such as battery back up.

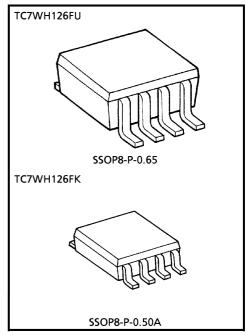
This circuit prevents device destruction due to mismatched supply and input voltages.

#### **FEATURES**

- ◆ High Speed ······ t<sub>pd</sub> = 3.8ns (Typ.) at
  V<sub>CC</sub> = 5V
- Low Power Dissipation  $\cdots I_{CC} = 2\mu A$  (Max.) at  $Ta = 25^{\circ}C$
- High Noise Immunity ...... V<sub>NIH</sub> = V<sub>NIL</sub> = 28%
  V<sub>CC</sub> (Min.)
- Power Down Protection is provided on all inputs.
- Balanced Propagation Delays ······ t<sub>pLH</sub>≒t<sub>pHL</sub>
- Wide Operation Voltage Range  $\cdots$   $\dot{V}_{CC}$  (opr) = 2~5.5V
- Low Noise ...... V<sub>OLP</sub> = 0.8V (Max.)

#### MARKING

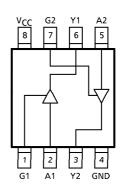




Weight

SSOP8-P-0.65 : 0.02g (Typ.) SSOP8-P-0.50A : 0.01g (Typ.)

#### **PIN ASSIGNMENT (TOP VIEW)**



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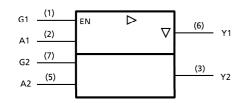
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TOSHIBA TC7WH126FU/FK

#### **MAXIMUM RATINGS** (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT	
Supply Voltage Range	V <sub>C</sub> C	-0.5~7.0	V	
DC Input Voltage	VIN	-0.5~7.0	٧	
DC Output Voltage	Vout	-0.5~V <sub>CC</sub> +0.5	V	
Input Diode Current	lικ	<b>– 20</b>	mΑ	
Output Diode Current	lok	± 20	mΑ	
DC Output Current	lout	± 25	mΑ	
DC V <sub>CC</sub> /Ground Current	lcc	± 50	mΑ	
Bower Dissination	D-	300 (SM8)	mW	
Power Dissipation	PD	200 (US8)	IIIVV	
Storage Temperature	T <sub>stg</sub>	<b>-65∼150</b>	°C	
Lead Temperature (10 s)	TL	260	°C	

#### **LOGIC DIAGRAM**



#### TRUTH TABLE

INPUTS		OUTPUTS
G	Α	Υ
L	×	Z
Н	L	L
Н	H	Н

x : Don't CareZ : High Impedance

## **RECOMMENDED OPERATING CONDITIONS**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	2~5.5	V
Input Voltage	VIN	0~5.5	<b>\</b>
Output Voltage	Vout	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	<b>- 40∼85</b>	°C
Input Rise and Fall Time	dt/dv	$0 \sim 100 \text{ (V}_{CC} = 3.3 \pm 0.3 \text{V)}$	ns / V
	at/av	$0\sim20 \ (V_{CC} = 5 \pm 0.5V)$	115/V

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## DC ELECTRICAL CHARACTERISTICS

						$Ta = 25^{\circ}C$ $Ta = -40 \sim 85^{\circ}C$					
CHARACTERISTIC	SYMBOL	TEST C	ONDITION	V <sub>C</sub> C (V)						→ UNII I	
					MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level				2.0	1.5		_	1.5	_		
Input Voltage V <sub>I</sub>	VIH		_	3.0~	$V_{CC}$			Vcc		V	
Impat voltage				5.5	×0.7			×0.7			
Low-Level		_		2.0	_		0.5	_	0.5		
Input Voltage	V <sub>IL</sub>			3.0~			Vcc		۷cc	7 v [	
Imput voltage				5.5	_	_	×0.3	_	×0.3		
				2.0	1.9	2.0	_	1.9		V	
restata at	Voн	V <sub>IN</sub> = V <sub>IH</sub>	$I_{OH} = -50\mu A$	3.0	2.9	3.0	_	2.9			
High-Level Output Voltage				4.5	4.4	4.5	_	4.4			
			$I_{OH} = -4mA$	3.0	2.58		_	2.48			
			I <sub>OH</sub> = -8mA	4.5	3.94	_	_	3.8	_		
	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 50μA	2.0	_	0.0	0.1	_	0.1	V	
l				3.0	_	0.0	0.1	_	0.1		
Low-Level				4.5	_	0.0	0.1	_	0.1		
Output Voltage			I <sub>OL</sub> = 4mA	3.0	_		0.36	_	0.44		
			I <sub>OL</sub> = 8mA	4.5	_		0.36	_	0.44		
3-State Output		VIN=VIH O								_	
Off-State Current	loz	V <sub>OUT</sub> = V <sub>CC</sub> or GND		5.5	_	_	± 0.25	_	± 2.5	$\mu$ A	
Input Leakage	1	V <sub>IN</sub> = V <sub>CC</sub> or GND		0~			404		±10		
Current	IN			5.5	_	_   _	± 0.1		± 1.0	$\mu$ A	
Quiescent Supply Current	lcc	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	_	_	2.0	_	20.0	$\mu$ A	

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

CLIADA CTEDICTIC	TEST (		CONDITION		Ta = 25°C			Ta = -4	LINUT	
CHARACTERISTIC	SYMBOL		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	MIN.	TYP.	MAX.	MIN.	MAX.	UNIT
Propagation Delay	<sup>t</sup> pLH		3.3 ± 0.3	15	_	5.6	8.0	1.0	9.5	
				50	_	8.1	11.5	1.0	13.0	
Time	tpHL		5.0 ± 0.5	15	_	3.8	5.5	1.0	6.5	ns
			3.0 ± 0.5	50	_	5.3	7.5	1.0	8.5	
		$R_L = 1k\Omega$	3.3 ± 0.3	15	_	5.4	8.0	1.0	9.5	- ns
3-State Output	3-State Output tpZL Enable Time tpZH			50	_	7.9	11.5	1.0	13.0	
Enable Time			5.0 ± 0.5	15	_	3.6	5.1	1.0	6.0	
				50	_	5.1	7.1	1.0	8.0	
3-State Output	<sup>t</sup> pLZ	D. 1k()	3.3 ± 0.3	50	_	9.5	13.2	1.0	15.0	ns
Disable Time	t <sub>pHZ</sub>	$R_L = 1k\Omega$	5.0 ± 0.5	50	_	6.1	8.8	1.0	10.0	ns
Output to Output	tosLH	(Note 1)	3.3 ± 0.3	50	_	_	1.5	_	1.5	ns
Skew	tosHL	(Note I)	5.0 ± 0.5	50	_	_	1.0	_	1.0	ns
Input Capacitance	CIN				_	4	10	_	10	рF
Output Capacitance	COUT		·			6		_	_	рF
Power Dissipation Capacitance (Note 2)	C <sub>PD</sub>					15	_	_	_	pF

(Note 1) : Parameter guaranteed by design.  $t_{OSLH} = |t_{pLHm} - t_{pLHn}| \setminus t_{OSHL} = |t_{pHLm} - t_{pHLn}|$  (Note 2) : CpD is defined as the value of the internal equivalent capacitance which is

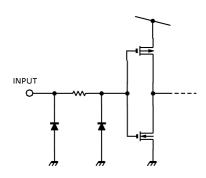
calculated from the operating current consumption without load. Average operating current can be obtained by the equation :

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

## NOISE CHARACTERISTICS (Ta = $25^{\circ}$ C, Input $t_r = t_f = 3$ ns)

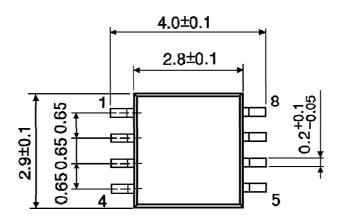
CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	TYP.	IMIT	UNIT
Quiet Output Maximum Dynamic V <sub>OL</sub>	V <sub>OLP</sub>	C <sub>L</sub> = 50pF	5.0	0.3	0.8	V
Quiet Output Minimum Dynamic V <sub>OL</sub>	V <sub>OLV</sub>	C <sub>L</sub> = 50pF	5.0	-0.3	-0.8	V
Minimum High Level Dynamic Input Voltage	V <sub>IHD</sub>	C <sub>L</sub> = 50pF	5.0	_	3.5	٧
Maximum Low Level Dynamic Input Voltage	V <sub>ILD</sub>	C <sub>L</sub> = 50pF	5.0	_	1.5	V

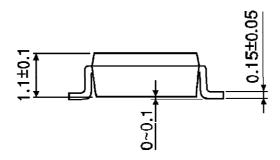
## INPUT EQUIVALENT CIRCUIT



### OUTLINE DRAWING SSOP8-P-0.65

Unit: mm

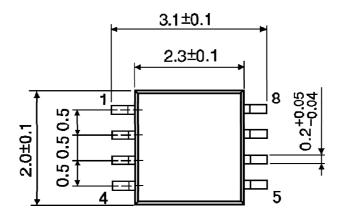


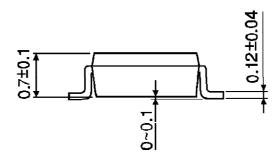


Weight: 0.02g (Typ.)

## OUTLINE DRAWING SSOP8-P-0.50A

Unit: mm





Weight: 0.01g (Typ.)