

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC3W01F, TC3W01FU

## 2-TO-3 LINE DECODER WITH ENABLE

The TC3W01 is a high speed C<sup>2</sup>MOS 2 to 3 LINE DECODER / DEMULTIPLEXER fabricated with silicon gate C<sup>2</sup>MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the C<sup>2</sup>MOS low power dissipation. The active low enable input can be used for gating or it can be used as a data input for demultiplexing applications. When the enable input is held "H", all three outputs are fixed at a high logic level independent of the other inputs. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

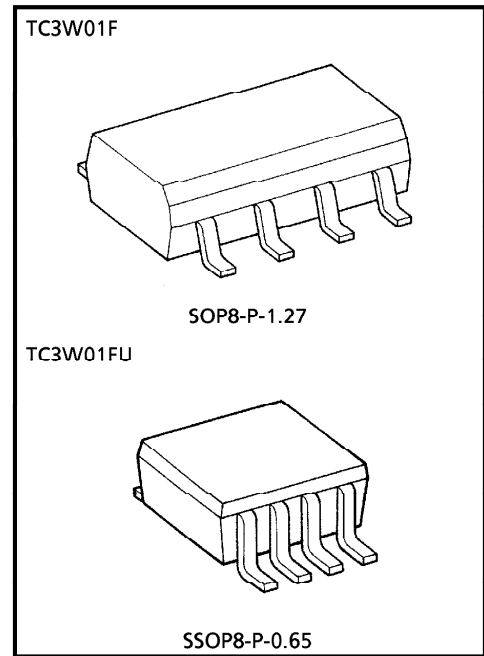
### FEATURES

- High Speed .....  $t_{pd} = 16ns$  (Typ.) at  $V_{CC} = 5V$
- Low Power Dissipation .....  $I_{CC} = 2\mu A$  (Max.) at  $T_a = 25^\circ C$
- High Noise Immunity .....  $V_{NIH} = V_{NIL} = 28\%$ ,  $V_{CC}$  (Min.)
- Output Drive Capability ..... 10 LSTTL Loads
- Symmetrical Output Impedance ...  $|I_{OH}| = I_{OL} = 4mA$  (Min.)
- Balanced Propagation Delays .....  $t_{pLH} \cong t_{pHL}$
- Wide Operating Voltage Range ...  $V_{CC} (opr) = 2\sim 6V$

### TRUTH TABLE

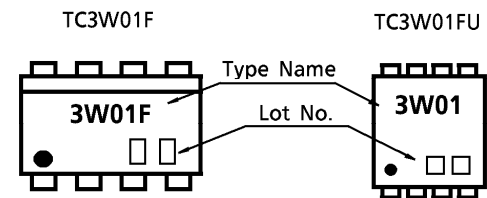
INPUTS			OUTPUTS			SELECTED OUTPUT
ENABLE	SELECT		$\bar{Y}_0$	$\bar{Y}_1$	$\bar{Y}_2$	
$\bar{G}$	B	A				
H	x	x	H	H	H	NONE
L	L	L	L	H	H	$\bar{Y}_0$
L	L	H	H	L	H	$\bar{Y}_1$
L	H	L	H	H	L	$\bar{Y}_2$
L	H	H	H	H	H	NONE

x : Don't care

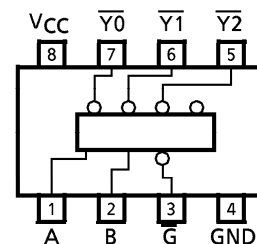


Weight SOP8-P-1.27 : 0.05g (Typ.)  
SSOP8-P-0.65 : 0.02g (Typ.)

### MARKING



### PIN ASSIGNMENT (TOP VIEW)



961001EBA2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent product specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V <sub>CC</sub>	-0.5~7	V
DC Input Voltage	V <sub>IN</sub>	-0.5~V <sub>CC</sub> +0.5	V
DC Output Voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> +0.5	V
Input Diode Current	I <sub>IK</sub>	±20	mA
Output Diode Current	I <sub>OK</sub>	±20	mA
DC Output Current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /Ground Current	I <sub>CC</sub>	±25	mA
Power Dissipation	P <sub>D</sub>	300	mW
Storage Temperature	T <sub>stg</sub>	-65~150	°C
Lead Temperature (10s)	T <sub>L</sub>	260	°C

**RECOMMENDED OPERATING CONDITIONS**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	2~6	V
Input Voltage	V <sub>IN</sub>	0~V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Input Rise and Fall Time	t <sub>r</sub> , t <sub>f</sub>	0~1000 (V <sub>CC</sub> = 2.0V) 0~ 500 (V <sub>CC</sub> = 4.5V) 0~ 400 (V <sub>CC</sub> = 6.0V)	ns

961001EBA2'

- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT					
				VCC	MIN.	TYP.	MAX.	MIN.		MAX.				
High-Level Input Voltage	V <sub>IH</sub>	—		2.0	1.5	—	—	1.5	—	V				
				4.5	3.15	—	—	3.15	—					
				6.0	4.2	—	—	4.2	—					
Low-Level Input Voltage	V <sub>IL</sub>	—		2.0	—	—	0.5	—	0.5	V				
				4.5	—	—	1.35	—	1.35					
				6.0	—	—	1.8	—	1.8					
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20μA	2.0	1.9	2.0	—	1.9	—	V				
				4.5	4.4	4.5	—	4.4	—					
				6.0	5.9	6.0	—	5.9	—					
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20μA	2.0	—	0.0	0.1	—	0.1	V				
				4.5	—	0.0	0.1	—	0.1					
				6.0	—	0.0	0.1	—	0.1					
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		6.0	—	—	±0.1	—	±1.0	μA				
				Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		6.0	—		—	2.0	—	20.0

AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 15pF, V<sub>CC</sub> = 5V, Ta = 25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Transition Time	t <sub>TLH</sub>	—	—	4	8	ns
	t <sub>THL</sub>					
Propagation Delay Time (A, B- $\bar{Y}$ )	t <sub>pLH</sub>	—	—	12	22	
	t <sub>pHL</sub>					
Propagation Delay Time ( $\bar{G}$ - $\bar{Y}$ )	t <sub>pLH</sub>	—	—	10	18	
	t <sub>pHL</sub>					

**AC ELECTRICAL CHARACTERISTICS** ( $C_L = 50\text{pF}$ , Input  $t_r = t_f = 6\text{ns}$ )

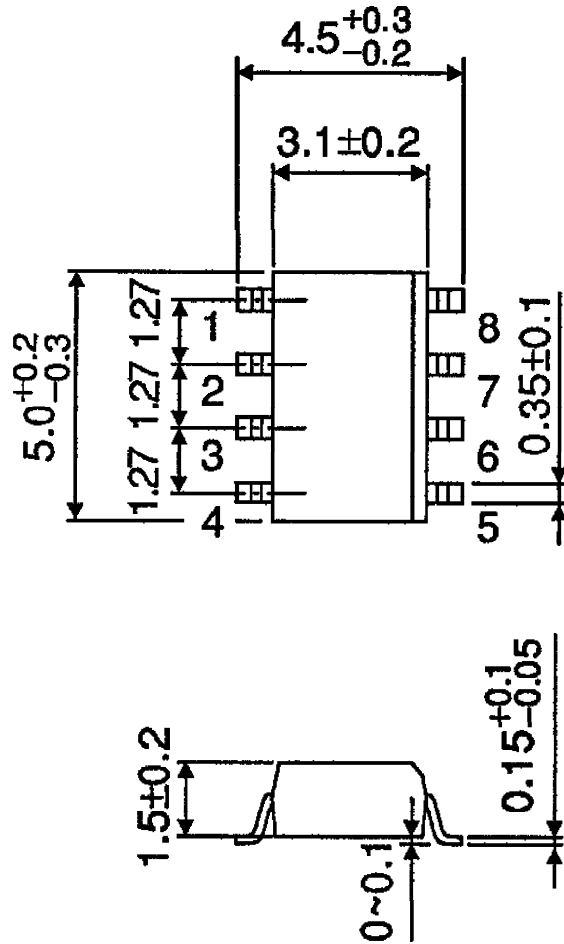
PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT	
			VCC	MIN.	TYP.	MAX.	MIN.		MAX.
Output Transition Time	$t_{TLH}$ $t_{THL}$	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time (A, B- $\bar{Y}$ )	$t_{pLH}$ $t_{pHL}$	—	2.0	—	45	130	—	165	
			4.5	—	15	26	—	33	
			6.0	—	13	22	—	28	
Propagation Delay Time ( $\bar{G}$ -Y)	$t_{pLH}$ $t_{pHL}$	—	2.0	—	39	110	—	140	
			4.5	—	13	22	—	28	
			6.0	—	11	19	—	24	
Input Capacitance	$C_{IN}$	—	—	5	10	—	10	pF	
Power Dissipation Capacitance	$C_{pD}$	(Note 1)	—	46	—	—	—		

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.

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

OUTLINE DRAWING  
SOP8-P-1.27

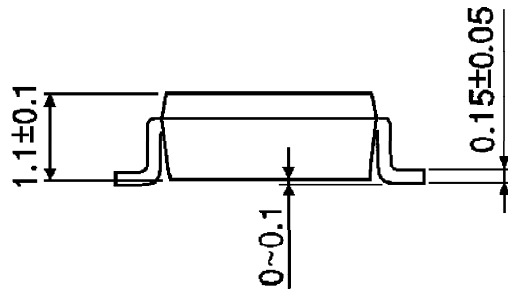
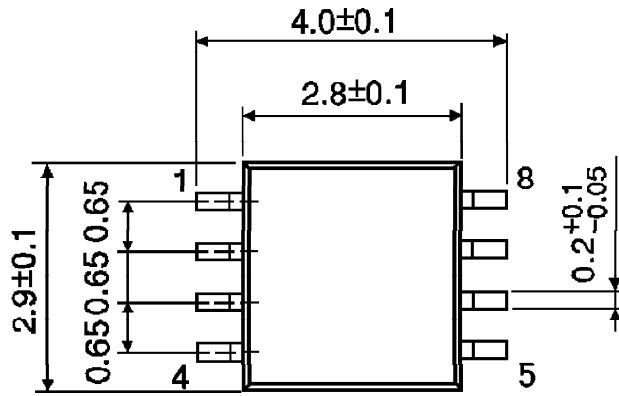
Unit : mm



Weight : 0.05g (Typ.)

OUTLINE DRAWING  
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)