

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC3W02F, TC3W02FU

## 2-TO-3 LINE DECODER WITH ENABLE

The TC3W02 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.

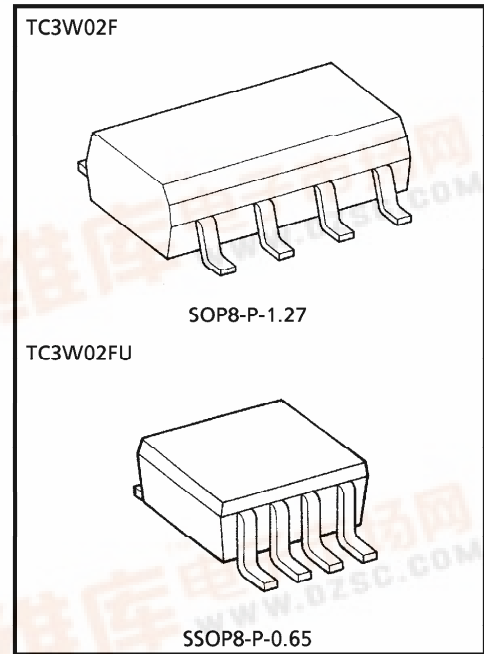
### FEATURES

- 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 .....  $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range ...  $V_{CC} (opr) = 2\sim 6V$

### TRUTH TABLE

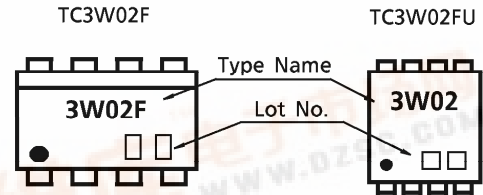
INPUTS			OUTPUTS			SELECTED OUTPUT
ENABLE	SELECT		$\bar{Y}1$	$\bar{Y}2$	$\bar{Y}3$	
$\bar{G}$	B	A				
H	x	x	H	H	H	NONE
L	L	L	H	H	H	NONE
L	L	H	L	H	H	$\bar{Y}1$
L	H	L	H	L	H	$\bar{Y}2$
L	H	H	H	H	L	$\bar{Y}3$

x : Don't care

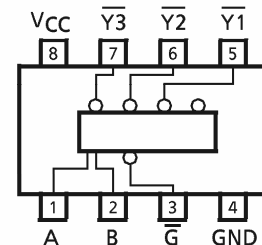


Weight SOP8-P-1.27 : 0.05g (Typ.)  
SSOP8-P-0.65 : 0.02g (Typ.)

### MARKING



### PIN ASSIGNMENT (TOP VIEW)



961001EBA2

**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

**DC ELECTRICAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT		
			V <sub>CC</sub>	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	—	
			I <sub>OH</sub> = -4mA I <sub>OH</sub> = -5.2mA	4.5	4.18	4.31	—	4.13	—	
				6.0	5.68	5.80	—	5.63	—	
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	
			I <sub>OL</sub> = 4mA I <sub>OL</sub> = 5.2mA	4.5	—	0.17	0.26	—	0.33	
				6.0	—	0.18	0.26	—	0.33	
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	
			V <sub>CC</sub>	MIN.	TYP.	MAX.	MIN.		MAX.
Output Transition Time	t <sub>TLH</sub> t <sub>THL</sub>	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time (A, B- $\bar{Y}$ )	t <sub>pLH</sub> t <sub>pHL</sub>	—	2.0	—	45	130	—	165	
			4.5	—	15	26	—	33	
			6.0	—	13	22	—	28	
Propagation Delay Time ( $\bar{G}$ - $\bar{Y}$ )	t <sub>pLH</sub> t <sub>pHL</sub>	—	2.0	—	39	110	—	140	
			4.5	—	13	22	—	28	
			6.0	—	11	19	—	24	
Input Capacitance	C <sub>IN</sub>	—	—	5	10	—	10	pF	
Power Dissipation Capacitance	C <sub>PD</sub>	(Note 1)	—	46	—	—	—		

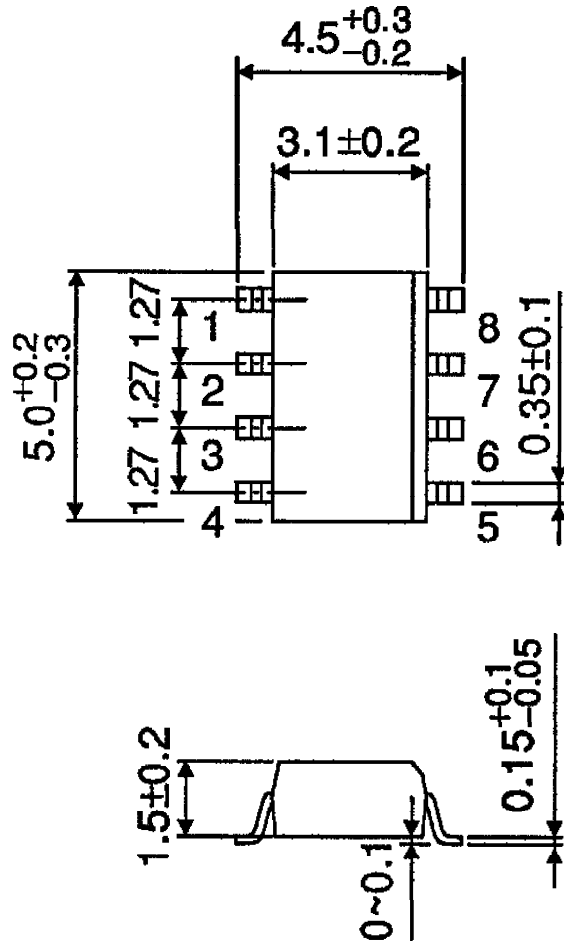
Note 1 : C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

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

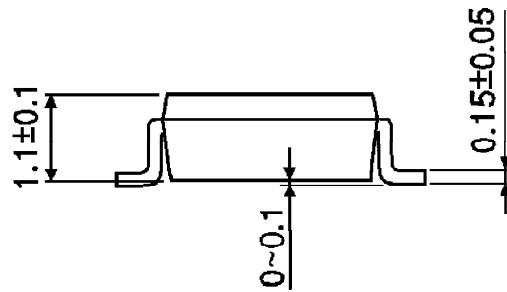
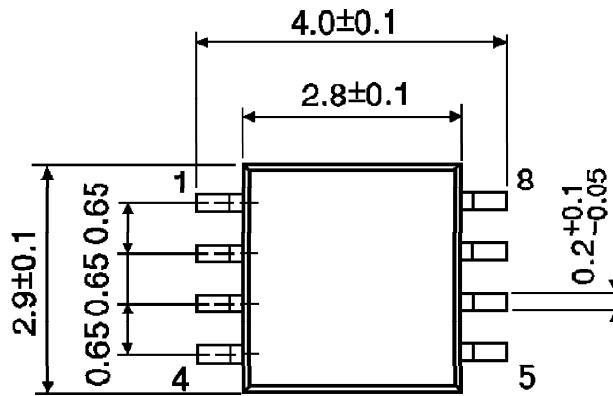
Unit : mm



Weight : 0.05g (Typ.)

OUTLINE DRAWING  
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)