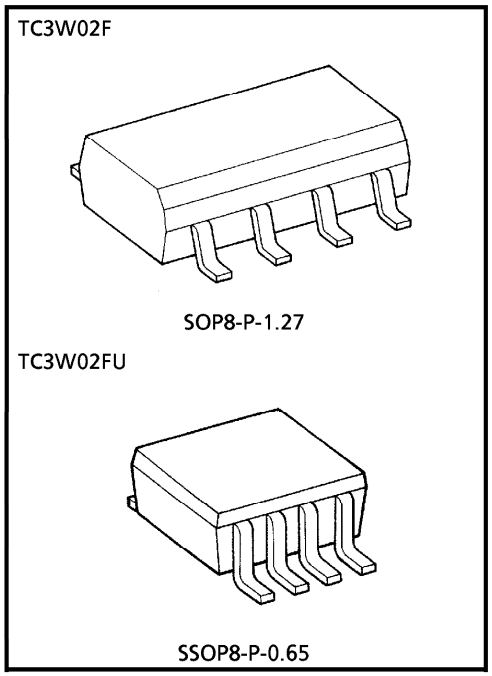
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC3W02F, TC3W02FU

2-TO-3 LINE DECODER WITH ENABLE

The TC3W02 is a high speed C^2MOS 2 to 3 LINE DECODER / DEMULTIPLEXER fabricated with silicon gate C^2MOS technology.
It achieves the high speed operation similar to equivalent LSTTL while maintaining the C^2MOS 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 trasient excess voltage.



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

FEATURES

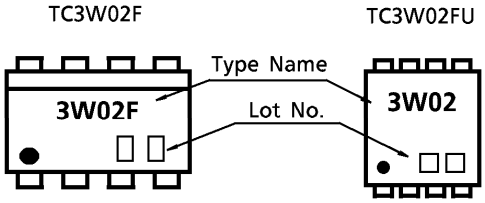
- High Speed ..... t_{pd} = 16ns (Typ.) at V_{CC} = 5V
- Low Power Dissipation ..... I_{CC} = 2μA (Max.) at Ta = 25°C
- High Noise Immunity ..... $V_{NIH} = V_{NIL}$ = 28%, V_{CC} (Min.)
- Output Drive Capability ..... 10 LSTTL Loads
- Symmetrical Output Impedance ... $|I_{OH}| = I_{OL}$ = 4mA (Min.)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

TRUTH TABLE

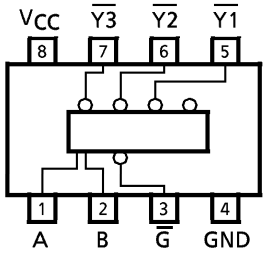
INPUTS			OUTPUTS			SELECTED OUTPUT
ENABLE	SELECT					
$\overline{G}$	B	A	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	
H	×	×	H	H	H	NONE
L	L	L	H	H	H	NONE
L	L	H	L	H	H	$\overline{Y1}$
L	H	L	H	L	H	$\overline{Y2}$
L	H	H	H	H	L	$\overline{Y3}$

× : Don't care

MARKING



PIN ASSIGNMENT (TOP VIEW)



MAXIMUM RATINGS (Ta = 25°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	°C
Lead Temperature (10s)	T_L	260	°C

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	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

CHARACTERISTIC	SYMBOL	TEST CONDITION		V_{CC}	Ta = 25°C MIN.	TYP.	MAX.	Ta = −40~85°C MIN.	MAX.	UNIT
High-Level Input Voltage	V_{IH}	—		2.0	1.5	—	—	1.5	—	V
				4.5	3.15	—	—	3.15	—	
				6.0	4.2	—	—	4.2	—	
Low-Level Input Voltage	V_{IL}	—		2.0	—	—	0.5	—	0.5	V
				4.5	—	—	1.35	—	1.35	
				6.0	—	—	1.8	—	1.8	
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu A$	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	—	
			$I_{OH} = -4mA$	4.5	4.18	4.31	—	4.13	—	
			$I_{OH} = -5.2mA$	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	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
				6.0	—	0.0	0.1	—	0.1	
			$I_{OL} = 4mA$	4.5	—	0.17	0.26	—	0.33	
			$I_{OL} = 5.2mA$	6.0	—	0.18	0.26	—	0.33	
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	—	—	2.0	—	20.0	

AC ELECTRICAL CHARACTERISTICS ($C_L = 15pF$, $V_{CC} = 5V$, Ta = 25°C)

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

AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, Input $t_r = t_f$ = 6ns)

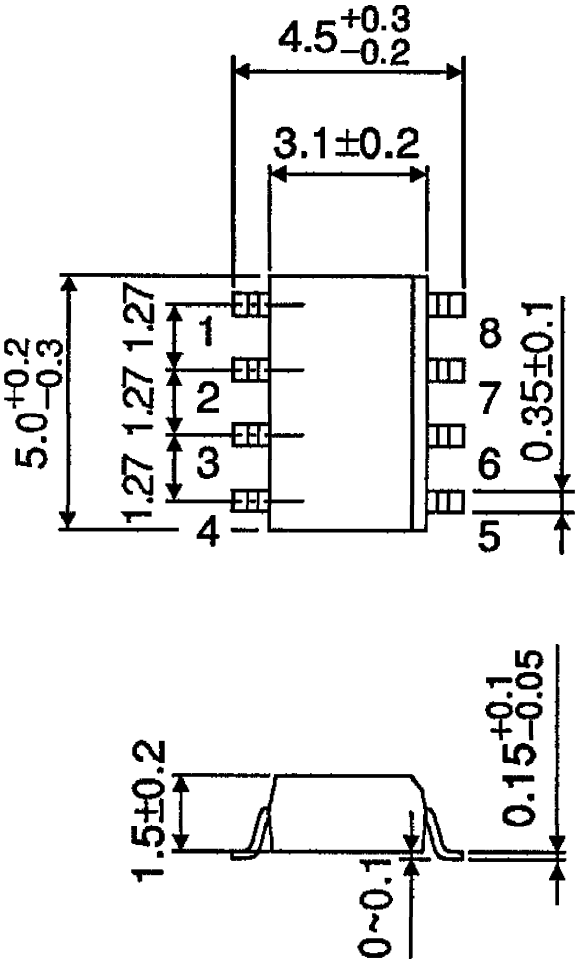
PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time (A, B-$\overline{Y}$)	t_{pLH} t_{pHL}	—	2.0	—	45	130	—	165	
			4.5	—	15	26	—	33	
			6.0	—	13	22	—	28	
Propagation Delay Time ($\overline{G}$-$\overline{Y}$)	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.

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

PACKAGE DIMENSIONS

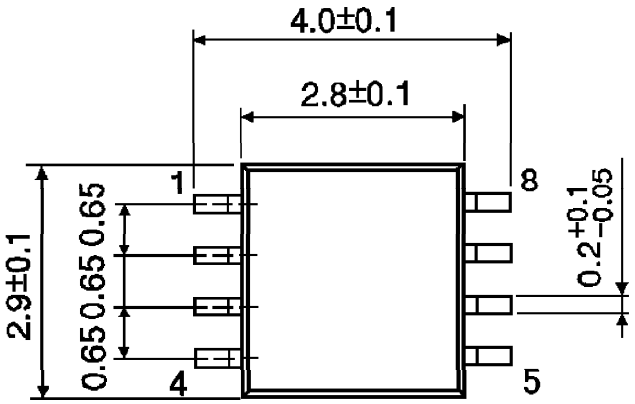
SOP8-P-1.27 Unit : mm

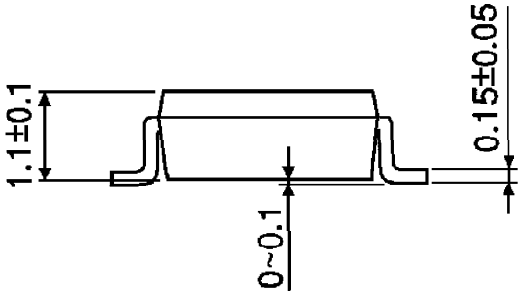


Weight : 0.05g (Typ.)

PACKAGE DIMENSIONS

SSOP8-P-0.65 Unit : mm





Weight : 0.02g (Typ.)

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