

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC7W139F, TC7W139FU

2-TO-4 LINE DECODER

The TC7W139 is a high speed C²MOS 2 to 4 LINE DECODER / DEMULTIPLEXER fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the C²MOS low power dissipation.

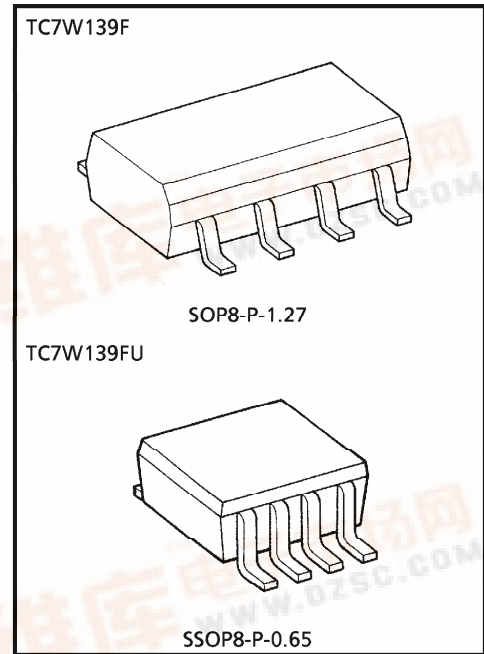
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES

- High Speed $t_{pd} = 6\text{ns}$ (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 10 LSTTL Loads
- Symmetrical Output Impedance $|I_{OH}| = I_{OL} = 4\text{mA}$
- Balanced Propagation Delays $t_{pLH} \cong t_{pHL}$
- Wide Operating Voltage Range ... $V_{CC}(\text{opr}) = 2\text{V} \sim 6\text{V}$

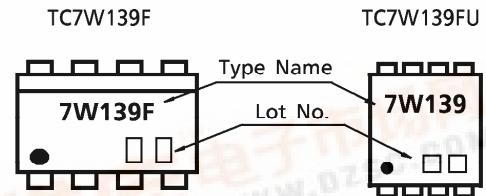
TRUTH TABLE

INPUTS		OUTPUTS				SELECTED OUTPUT
SELECT		\bar{Y}_0	\bar{Y}_1	\bar{Y}_2	\bar{Y}_3	
B	A					
L	L	L	H	H	H	\bar{Y}_0
L	H	H	L	H	H	\bar{Y}_1
H	L	H	H	L	H	\bar{Y}_2
H	H	H	H	H	L	\bar{Y}_3

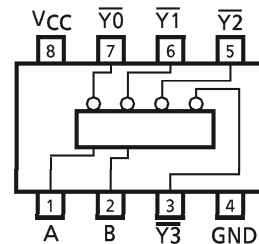


Weight SOP8-P-1.27 : 0.05g (Typ.)
SSOP8-P-0.65 : 0.02g (Typ.)

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)	ns
		0~ 500 (V _{CC} = 4.5V)	
		0~ 400 (V _{CC} = 6.0V)	

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DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT		
			V _{CC}	MIN.	TYP.	MAX.	MIN.		MAX.	
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} = -20μA	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
			I _{OH} = -4mA I _{OH} = -5.2mA	4.5	4.18	4.31	—	4.13	—	
				6.0	5.68	5.80	—	5.63	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 20μA	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
			I _{OL} = 4mA I _{OL} = 5.2mA	4.5	—	0.17	0.26	—	0.33	
				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}	—	—	4	8	ns
	t _{THL}					
Propagation Delay Time (A, B-Y)	t _{pLH}	—	—	12	22	
	t _{pHL}					

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

PARAMETER	SYMBOL	TEST CONDITION	V _{CC}	Ta = 25°C			Ta = -40~85°C		UNIT
				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	ns
			4.5	—	15	26	—	33	
			6.0	—	13	22	—	28	
Input Capacitance	C _{IN}	—		—	5	10	—	10	pF
Power Dissipation Capacitance	C _{PD}	(Note 1)		—	46	—	—	—	

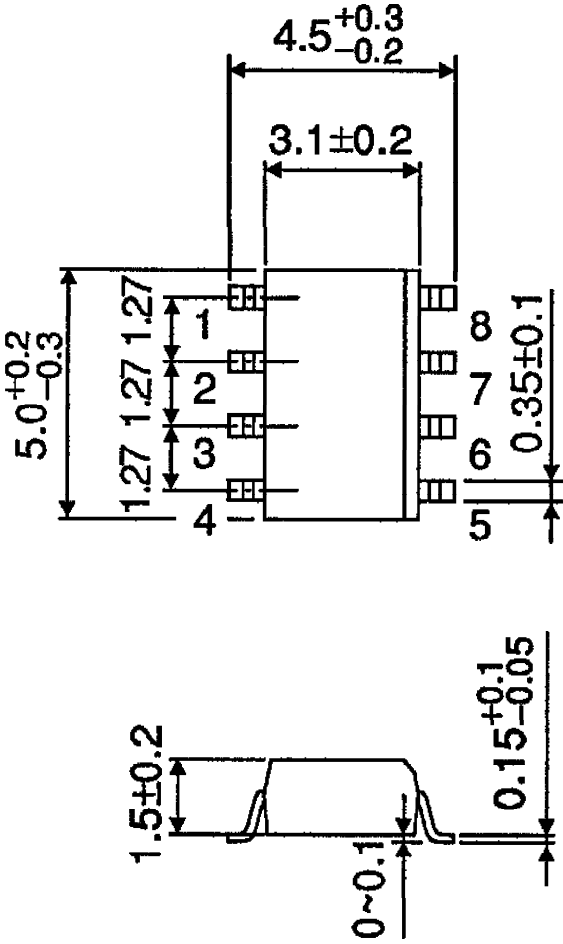
Note 1 : C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation.

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

OUTLINE DRAWING
SOP8-P-1.27

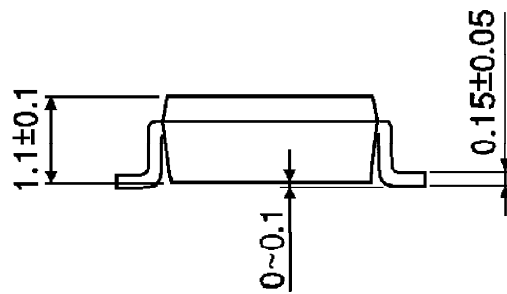
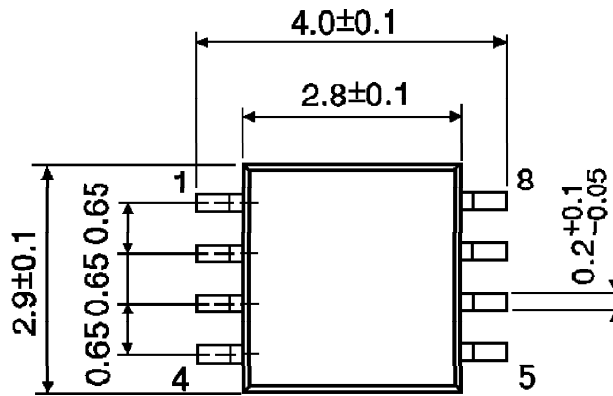
Unit : mm



Weight : 0.05g (Typ.)

OUTLINE DRAWING
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)