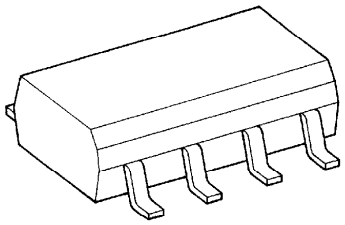
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC7W14F, TC7W14FU, TC7W14FK

SCHMITT INVERTER

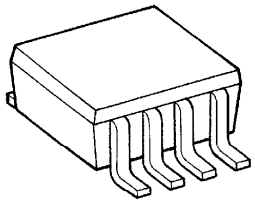
The TC7W14 is high speed C^2MOS SCHMITT INVERTER fabricated with silicon gate C^2MOS technology.
It achieves the high speed operation similar to equivalent LSTTL while maintaining the C^2MOS low power dissipation.
Pin configuration and function are the same as the TC7WU04 but the inputs have 25% V_{CC} hysteresis and with its schmitt trigger function, the TC7W14 can be used as a line receivers which will receive slow input signals.
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

TC7W14F



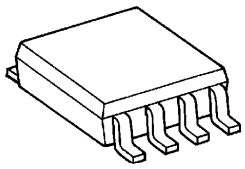
SOP8-P-1.27

TC7W14FU



SSOP8-P-0.65

TC7W14FK



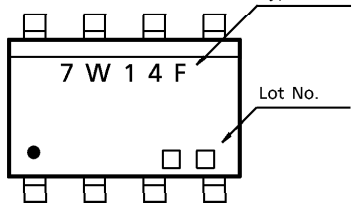
SSOP8-P-0.50A

FEATURES

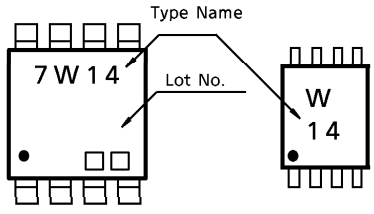
- High Speed ..... t_{pd} = 11ns (Typ.) at V_{CC} = 5V
- Low Power Dissipation ..... I_{CC} = 1μA (Max.) at Ta = 25°C
- High Noise Immunity ..... V_H = 1.1V at V_{CC} = 5V
- Output Drive Capability ..... 10 LSTTL Loads
- Symmetrical Output Impedance ... $|I_{OH}| = I_{OL}$ = 4mA
- Balanced Propagation Delays ..... $t_{pLH} \fallingdotseq t_{pHL}$
- Wide Operating Voltage Range ... $V_{CC\,(opr)}$ = 2~6V

MARKING

TC7W14F



TC7W14FU



TC7W14FK

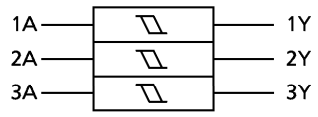
Weight
SOP8-P-1.27 : 0.05g (Typ.)
SSOP8-P-0.65 : 0.02g (Typ.)
SSOP8-P-0.50A : 0.01g (Typ.)

980910EBA1

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 (FM8, SM8)	mW
		200 (US8)	
Storage Temperature	T_{stg}	−65~150	°C
Lead Temperature (10s)	T_L	260	°C

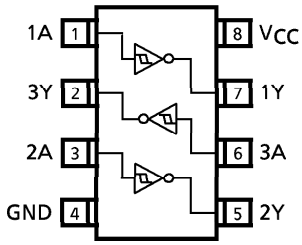
LOGIC DIAGRAM



TRUTH TABLE

A	Y
L	H
H	L

PIN ASSIGNMENT (TOP VIEW)



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

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION		V_{CC}	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
Positive Threshold Voltage	V_P	—		2.0	1.0	1.25	1.5	1.0	1.5	V
				4.5	2.3	2.7	3.15	2.3	3.15	
				6.0	3.0	3.5	4.2	3.0	4.2	
Negative Threshold Voltage	V_N	—		2.0	0.3	0.65	0.9	0.3	0.9	V
				4.5	1.13	1.6	2.0	1.13	2.0	
				6.0	1.5	2.3	2.6	1.5	2.6	
Hysteresis Voltage	V_H	—		2.0	0.3	0.6	1.0	0.3	1.0	V
				4.5	0.6	1.1	1.4	0.6	1.4	
				6.0	0.8	1.2	1.7	0.8	1.7	
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -20\mu A$	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}	$V_{IN} = V_{IH}$	$I_{OL} = 20\mu A$	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	—	—	1.0	—	10.0	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			UNIT
			MIN.	TYP.	MAX.	
Output Transition Time	t_{TLH} t_{THL}	—	—	4	8	ns
Propagation Delay Time	t_{pLH} t_{pHL}	—	—	11	21	ns

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

CHARACTERISTIC	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	t_{pLH} t_{pHL}	—	2.0	—	42	125	—	155	ns
			4.5	—	14	25	—	31	
			6.0	—	12	21	—	26	
Input Capacitance	C_{IN}	—		—	5	10	—	10	pF
Power Dissipation Capacitance	C_{PD}	(Note 1)		—	28	—	—	—	

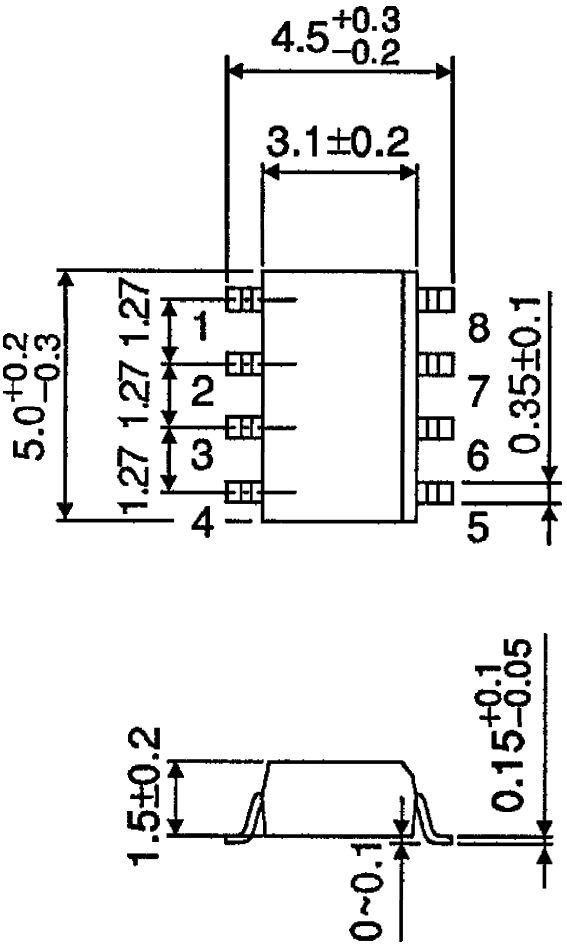
(Note 1) : C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).
Average operating current can be obtained by the equation hereunder.

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

OUTLINE DRAWING

SOP8-P-1.27

Unit : mm

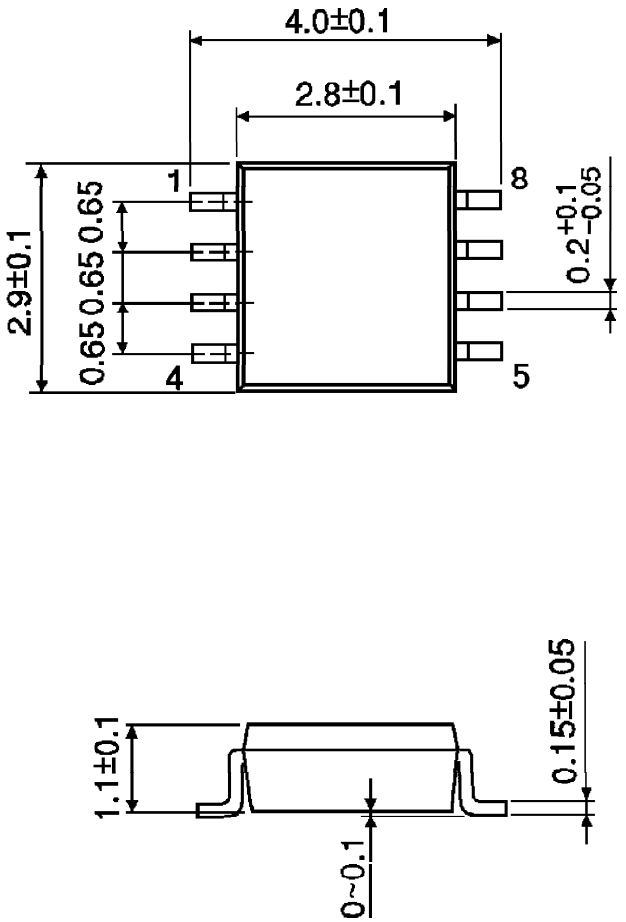


Weight : 0.05g (Typ.)

OUTLINE DRAWING

SSOP8-P-0.65

Unit : mm

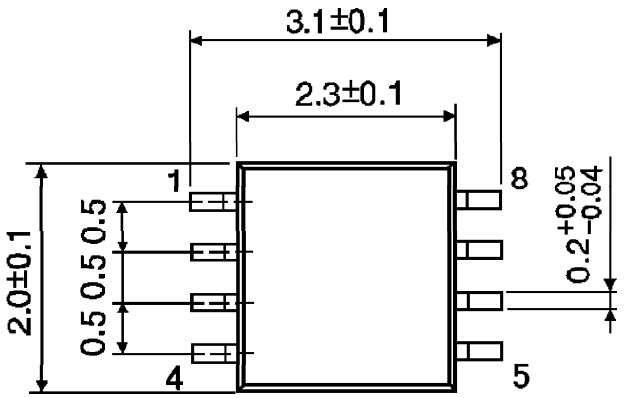


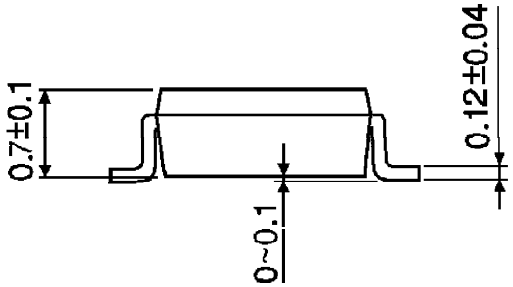
Weight : 0.02g (Typ.)

OUTLINE DRAWING

SSOP8-P-0.50A

Unit : mm





Weight : 0.01g (Typ.)