

TC7WH245FU, TC7WH245FK

DUAL BUS TRANSCEIVER

The TC7WH245 is an advanced high speed CMOS DUAL BUS TRANSCEIVER fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

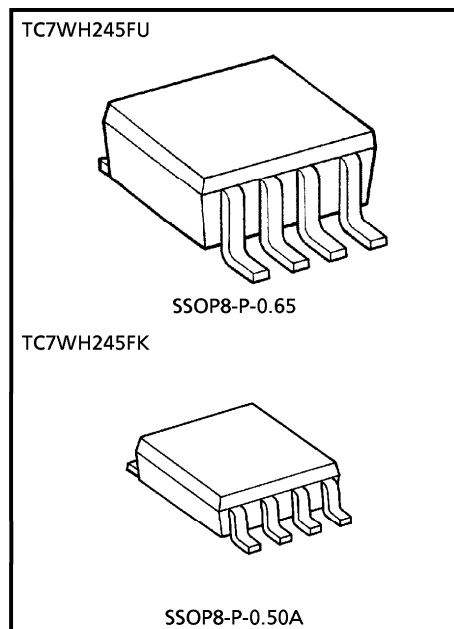
It is intended for two-way asynchronous communication between data busses. The direction of data transmission is determined by the level of the DIR input.

The enable input (\bar{G}) can be used to disable the device so that the busses are effectively isolated.

All inputs are equipped with protection circuits against static discharge.

FEATURES

- High Speed $t_{pd} = 4.0ns$ (Typ.) at $V_{CC} = 5V$
- Low Power Dissipation $I_{CC} = 4\mu A$ (Max.) at $T_a = 25^\circ C$
- High Noise Immunity $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min.)
- Balanced Propagation Delays $t_{pLH} = t_{pHL}$
- Wide Operating Voltage Range $V_{CC} (opr) = 2 \sim 5.5V$
- Low Noise $V_{OLP} = 0.8V$ (Max.)

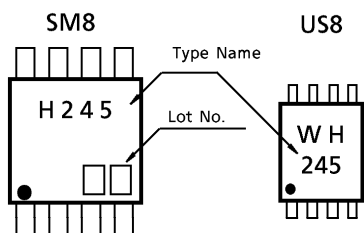


Weight
 SSOP8-P-0.65 : 0.02g (Typ.)
 SSOP8-P-0.50A : 0.01g (Typ.)

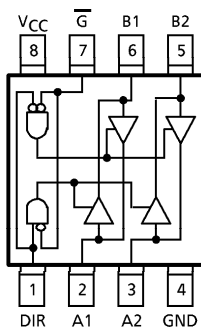
APPLICATION NOTES

- 1) Do not apply a signal to any bus terminal when it is in the output mode. Damage may result.
- 2) All floating (high impedance) bus terminals must have their input levels fixed by means of pull up or pull down resistors or bus terminator IC's such as the TOSHIBA TC40117BP.
- 3) A parasitic diode is formed between the bus and V_{CC} terminals. Therefore bus terminal can not be used to interface 5V to 3V systems directly.

MARKING



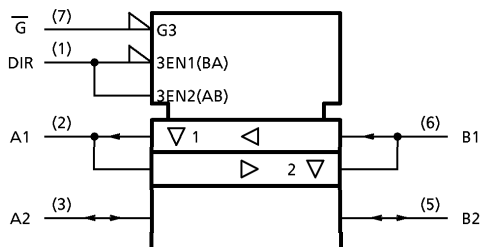
PIN ASSIGNMENT (TOP VIEW)



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V _{CC}	- 0.5~7.0	V
DC Input Voltage	V _{IN}	- 0.5~7.0	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}	± 50	mA
Power Dissipation	P _D	300 (SM8)	mW
		200 (US8)	
Storage Temperature	T _{stg}	- 65~150	°C
Lead Temperature (10 s)	T _L	260	°C

LOGIC DIAGRAM



TRUTH TABLE

INPUTS		FUNCTION		OUTPUT
\overline{G}	DIR	A BUS	B BUS	
L	L	OUTPUT	INPUT	A = B
L	H	INPUT	OUTPUT	B = A
H	x	High impedance		Z

x : Don't care
Z : High impedance

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	2.0~5.5	V
Input Voltage	V _{IN}	0~5.5	V
Output Voltage	V _{OUT}	0~V _{CC}	V
Operating Temperature	T _{opr}	- 40~85	°C
Input Rise and Fall Time	dt / dv	0~100 (V _{CC} = 3.3 ± 0.3V)	ns / V
		0~20 (V _{CC} = 5 ± 0.5V)	

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V _{IH}	—	2.0	1.50	—	—	1.50	—	V	
			3.0~5.5	V _{CC} × 0.7	—	—	V _{CC} × 0.7	—		
Low-Level Input Voltage	V _{IL}	—	2.0	—	—	0.50	—	0.50	V	
			3.0~5.5	—	—	V _{CC} × 0.3	—	V _{CC} × 0.3		
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 μA	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
			I _{OH} = -4mA	4.5	4.4	4.5	—	4.4	—	
				3.0	2.58	—	—	2.48	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 μA	2.0	—	0.0	0.1	—	0.1	V
				3.0	—	0.0	0.1	—	0.1	
			I _{OL} = 4mA	4.5	—	0.0	0.1	—	0.1	
				3.0	—	—	0.36	—	0.44	
3-State Output Off-State Current	I _{OZ}	V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND	5.5	—	—	±0.25	—	±2.5	μA	
										Input Leakage Current
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	2.0	—	20.0	μA	

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3ns$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT		
			VCC (V)	CL (pF)	MIN.	TYP.	MAX.		MIN.	MAX.
Propagation Delay Time	t_{pLH} t_{pHL}		3.3 ± 0.3	15	—	5.8	8.4	1.0	10.0	ns
				50	—	8.3	11.9	1.0	13.5	
			5.0 ± 0.5	15	—	4.0	5.5	1.0	6.5	
				50	—	5.5	7.5	1.0	8.5	
3-State Output Enable Time	t_{pZL} t_{pZH}	$R_L = 1k\Omega$	3.3 ± 0.3	15	—	8.5	13.2	1.0	15.5	ns
				50	—	11.0	16.7	1.0	19.0	
			5.0 ± 0.5	15	—	5.8	8.5	1.0	10.0	
				50	—	7.3	10.6	1.0	12.0	
3-State Output Disable Time	t_{pLZ} t_{pHZ}	$R_L = 1k\Omega$	3.3 ± 0.3	50	—	11.5	15.8	1.0	18.0	ns
			5.0 ± 0.5	50	—	7.0	9.7	1.0	11.0	
Output to Output Skew	t_{osLH} t_{osHL}	(Note 1)	3.3 ± 0.3	50	—	—	1.5	—	1.5	ns
			5.0 ± 0.5	50	—	—	1.0	—	1.0	
Input Capacitance	C_{IN}	DIR, \bar{G}	—			4	10	—	10	pF
Bus Input Capacitance	$C_{I/O}$	An, Bn	—			8	—	—	—	pF
Power Dissipation Capacitance	C_{pD}	(Note 2)	—			21	—	—	—	pF

(Note 1) : Parameter guaranteed by design. $t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$

(Note 2) : C_{pD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

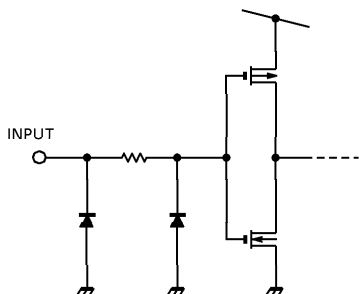
Average operating current can be obtained by the equation :

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

NOISE CHARACTERISTICS (Ta = 25°C, Input $t_r = t_f = 3ns$)

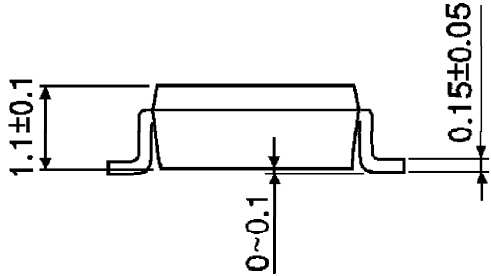
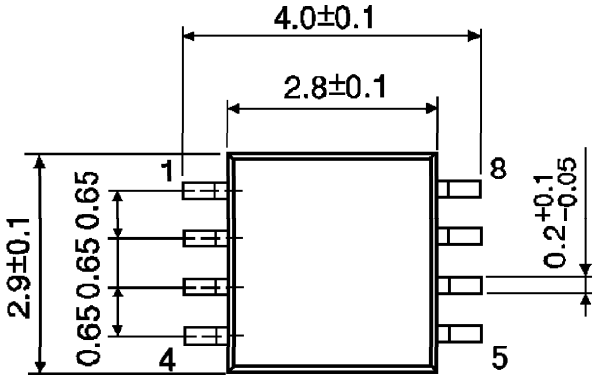
CHARACTERISTIC	SYMBOL	TEST CONDITION	VCC (V)	TYP.	IMIT	UNIT
			5.0			
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}	$C_L = 50pF$	5.0	0.5	0.8	V
Quiet Output Minimum Dynamic V_{OL}	V_{OLV}	$C_L = 50pF$	5.0	-0.5	-0.8	V
Minimum High Level Dynamic Input Voltage	V_{IHD}	$C_L = 50pF$	5.0	—	3.5	V
Maximum Low Level Dynamic Input Voltage	V_{ILD}	$C_L = 50pF$	5.0	—	1.5	V

INPUT EQUIVALENT CIRCUIT



PACKAGE DIMENSIONS
SSOP8-P-0.65

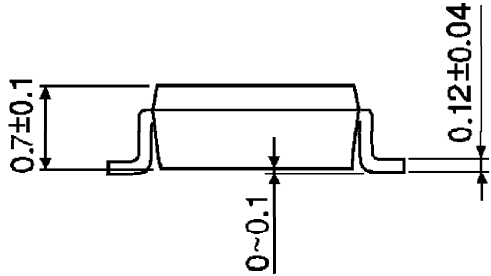
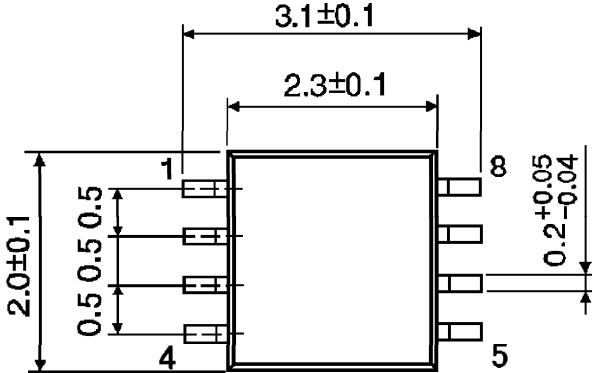
Unit : mm



Weight : 0.02g (Typ.)

PACKAGE DIMENSIONS
SSOP8-P-0.50A

Unit : mm



Weight : 0.01g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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