CMOS Digital Integrated Circuits Silicon Monolithic

74HC259D

1. Functional Description

- 8-Bit Addressable Latch

2. General

The 74HC259D is a high speed CMOS ADDRESSABLE LATCH fabricated with silicon gate C²MOS technology. It achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

The respective bits are controlled by address inputs A, B, and C. When $\overline{\text{CLEAR}}$ input is held high and enable input $\overline{\text{G}}$ is held low, the data is written into the bit selected by address inputs, the other bit hold their previous conditions.

When both $\overline{\text{CLEAR}}$ and $\overline{\text{G}}$ held high, writing of all bits is inhibited regardless of adress inputs, and their previous condition are held. When $\overline{\text{CLEAR}}$ is held low and $\overline{\text{G}}$ is held high, all bits are resent to low regardless of the other inputs. When both of $\overline{\text{CLEAR}}$ and $\overline{\text{G}}$ held low, all bits which isn't selected by adress inputs are resent to low.

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

3. Features

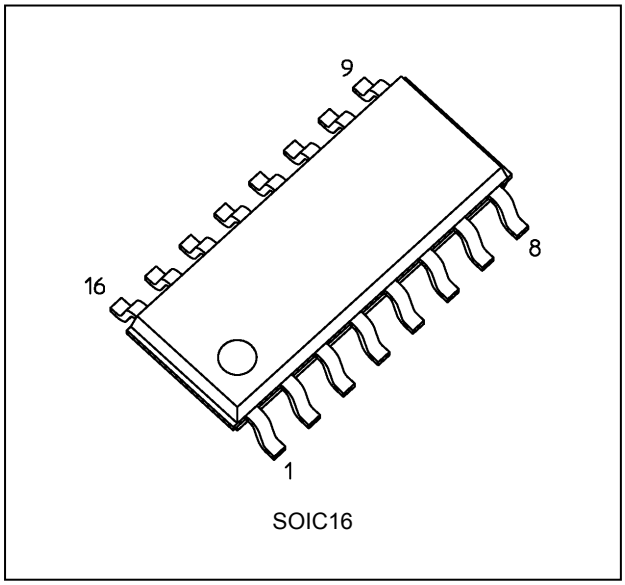
(1) High speed: t_{pd} = 15 ns (typ.) at V_{CC} = 5 V

(2) Low power dissipation: I_{CC} = 4.0 μA (max) at T_a = 25 °C

(3) Balanced propagation delays: $t_{PLH} \approx t_{PHL}$

(4) Wide operating voltage range: $V_{CC(opr)}$ = 2.0 to 6.0 V

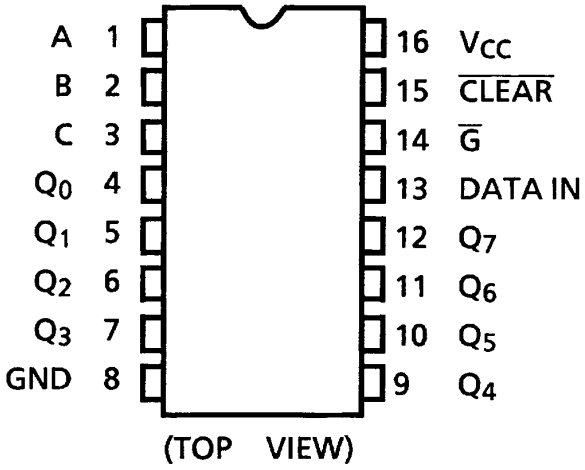
4. Packaging



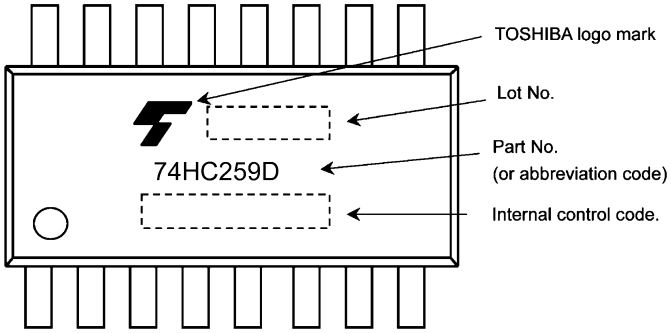
SOIC16

Start of commercial production
2016-05

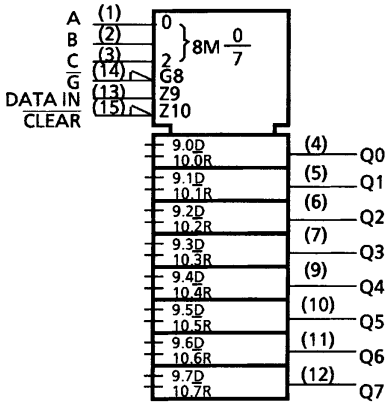
5. Pin Assignment



6. Marking



7. IEC Logic Symbol



8. Truth Table

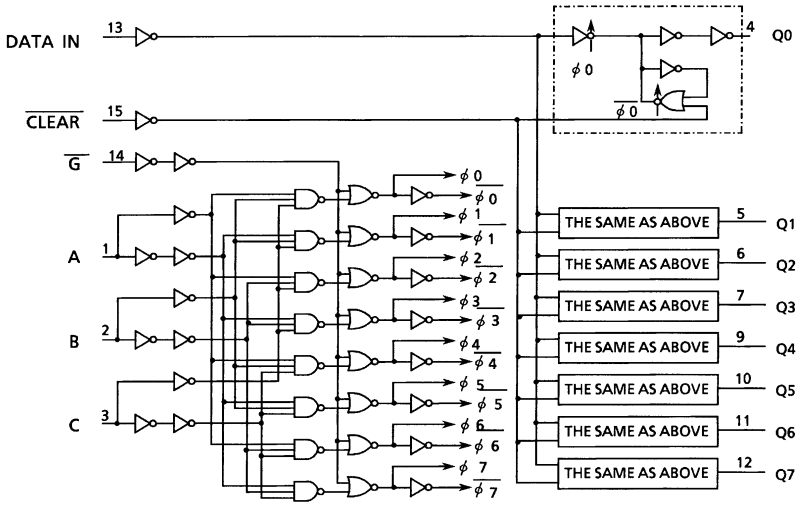
Inputs		Output of Addressed Latch	Each Other Output	Function
$\overline{CLEAR}$	$\overline{G}$			
H	L	D	QiO	Addressable Latch
H	H	QiO	QiO	Memory
L	L	D	L	8-Line Demultriplexer
L	H	L	L	Clear All Bits to “L”

Select Inputs			Latch Addressed
C	B	A	
L	L	L	Q0
L	L	H	Q1
L	H	L	Q2
L	H	H	Q3
H	L	L	Q4
H	L	H	Q5
H	H	L	Q6
H	H	H	Q7

D: The level at the data input

QiO: The level before the indicared steady-state input conditions were established (i = 0, 1, ... 7)

9. System Diagram



10. Absolute Maximum Ratings (Note)

Characteristics	Symbol	Note	Rating	Unit
Supply voltage	V_{CC}		-0.5 to 7.0	V
Input voltage	V_{IN}		-0.5 to V_{CC} + 0.5	V
Output voltage	V_{OUT}		-0.5 to V_{CC} + 0.5	V
Input diode current	I_{IK}		±20	mA
Output diode current	I_{OK}		±20	mA
Output current	I_{OUT}		±25	mA
V_{CC}/ground current	I_{CC}		±50	mA
Power dissipation	P_D	(Note 1)	500	mW
Storage temperature	T_{stg}		-65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: P_D derates linearly with -8 mW/°C above 85 °C

11. Operating Ranges (Note)

Characteristics	Symbol	Test Condition	Rating	Unit
Supply voltage	V_{CC}	—	2.0 to 6.0	V
Input voltage	V_{IN}	—	0 to V_{CC}	V
Output voltage	V_{OUT}	—	0 to V_{CC}	V
Operating temperature	T_{opr}	—	-40 to 125	°C
Input rise and fall times	t_r,t_f	—	0 to 50	μs

Note: The operating ranges are required to ensure the normal operation of the device. Unused inputs must be tied to either V_{CC} or GND.

12. Electrical Characteristics

12.1. DC Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Typ.	Max	Unit
High-level input voltage	V_{IH}	—		2.0	1.50	—	—	V
				4.5	3.15	—	—	
				6.0	4.20	—	—	
Low-level input voltage	V_{IL}	—		2.0	—	—	0.50	V
				4.5	—	—	1.35	
				6.0	—	—	1.80	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20 μA	2.0	1.9	2.0	—	V
				4.5	4.4	4.5	—	
				6.0	5.9	6.0	—	
			I_{OH} = -4 mA	4.5	4.18	4.31	—	
			I_{OH} = -5.2 mA	6.0	5.68	5.80	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	2.0	—	0.0	0.1	V
				4.5	—	0.0	0.1	
				6.0	—	0.0	0.1	
			I_{OL} = 4 mA	4.5	—	0.17	0.26	
			I_{OL} = 5.2 mA	6.0	—	0.18	0.26	
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	4.0	μA

12.2. DC Characteristics (Unless otherwise specified, T_a = -40 to 85 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
High-level input voltage	V_{IH}	—		2.0	1.50	—	V
				4.5	3.15	—	
				6.0	4.20	—	
Low-level input voltage	V_{IL}	—		2.0	—	0.50	V
				4.5	—	1.35	
				6.0	—	1.80	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20 μA	2.0	1.9	—	V
				4.5	4.4	—	
				6.0	5.9	—	
			I_{OH} = -4 mA	4.5	4.13	—	
			I_{OH} = -5.2 mA	6.0	5.63	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	2.0	—	0.1	V
				4.5	—	0.1	
				6.0	—	0.1	
			I_{OL} = 4 mA	4.5	—	0.33	
			I_{OL} = 5.2 mA	6.0	—	0.33	
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	40.0	μA

12.3. DC Characteristics (Unless otherwise specified, T_a = -40 to 125 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
High-level input voltage	V_{IH}	—		2.0	1.50	—	V
				4.5	3.15	—	
				6.0	4.20	—	
Low-level input voltage	V_{IL}	—		2.0	—	0.50	V
				4.5	—	1.35	
				6.0	—	1.30	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20 μA	2.0	1.9	—	V
				4.5	4.4	—	
				6.0	5.9	—	
			I_{OH} = -4 mA	4.5	3.7	—	
			I_{OH} = -5.2 mA	6.0	5.2	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	2.0	—	0.1	V
				4.5	—	0.1	
				6.0	—	0.1	
			I_{OL} = 4 mA	4.5	—	0.4	
			I_{OL} = 5.2 mA	6.0	—	0.4	V
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	160.0	μA

13. Timing Requirements (Unless otherwise specified, T_a = 25 °C, Input: tr = tf = 6 ns)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Limit	Unit
Minimum pulse width ($\overline{G}$)	$t_{w(L)}$	—	2.0	75	ns
			4.5	15	
			6.0	13	
Minimum pulse width ($\overline{CLEAR}$)	$t_{w(L)}$	—	2.0	75	ns
			4.5	15	
			6.0	13	
Minimum setup time (DATA IN)	t_S	—	2.0	50	ns
			4.5	10	
			6.0	9	
Minimum setup time (A, B, C)	t_S	—	2.0	25	ns
			4.5	5	
			6.0	5	
Minimum hold time (DATA IN)	t_h	—	2.0	25	ns
			4.5	5	
			6.0	5	
Minimum hold time (A, B, C)	t_h	—	2.0	0	ns
			4.5	0	
			6.0	0	

13.1. Timing Requirements (Unless otherwise specified, T_a = -40 to 85 °C, Input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Limit	Unit
Minimum pulse width ($\overline{G}$)	$t_{w(L)}$	—	2.0	95	ns
			4.5	19	
			6.0	16	
Minimum pulse width ($\overline{CLEAR}$)	$t_{w(L)}$	—	2.0	95	ns
			4.5	19	
			6.0	16	
Minimum setup time (DATA IN)	t_S	—	2.0	60	ns
			4.5	12	
			6.0	11	
Minimum setup time (A, B, C)	t_S	—	2.0	30	ns
			4.5	6	
			6.0	5	
Minimum hold time (DATA IN)	t_h	—	2.0	30	ns
			4.5	6	
			6.0	5	
Minimum hold time (A, B, C)	t_h	—	2.0	0	ns
			4.5	0	
			6.0	0	

13.2. Timing Requirements (Unless otherwise specified, T_a = -40 to 125 °C, Input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Limit	Unit
Minimum pulse width ($\overline{G}$)	$t_{w(L)}$	—	2.0	115	ns
			4.5	23	
			6.0	20	
Minimum pulse width ($\overline{CLEAR}$)	$t_{w(L)}$	—	2.0	115	ns
			4.5	23	
			6.0	20	
Minimum setup time (DATA IN)	t_S	—	2.0	75	ns
			4.5	15	
			6.0	13	
Minimum setup time (A, B, C)	t_S	—	2.0	40	ns
			4.5	8	
			6.0	7	
Minimum hold time (DATA IN)	t_h	—	2.0	40	ns
			4.5	8	
			6.0	7	
Minimum hold time (A, B, C)	t_h	—	2.0	0	ns
			4.5	0	
			6.0	0	

14. AC Characteristics
(Unless otherwise specified, C_L = 15 pF, V_{CC} = 5 V, T_a = 25 °C, Input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output transition time	t_{TLH},t_{THL}	—	—	4	8	ns
Propagation delay time (DATA IN - Q)	t_{PLH},t_{PHL}	—	—	15	22	ns
Propagation delay time (A, B, C - Q)	t_{PLH},t_{PHL}	—	—	21	32	ns
Propagation delay time ($\overline{G}$ - Q)	t_{PLH},t_{PHL}	—	—	16	28	ns
Propagation delay time ($\overline{CLEAR}$ - Q)	t_{PHL}	—	—	13	23	ns

14.1. AC Characteristics
(Unless otherwise specified, C_L = 50pF, T_a = 25 °C, Input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Note	V_{CC} (V)	Min	Typ.	Max	Unit
Output transition time	t_{TLH},t_{THL}		2.0	—	30	75	ns
			4.5	—	8	15	
			6.0	—	7	13	
Propagation delay time (DATA IN - Q)	t_{PLH},t_{PHL}		2.0	—	56	130	ns
			4.5	—	18	26	
			6.0	—	15	22	
Propagation delay time (A, B, C - Q)	t_{PLH},t_{PHL}		2.0	—	83	185	ns
			4.5	—	25	37	
			6.0	—	21	31	
Propagation delay time ($\overline{G}$ - Q)	t_{PLH},t_{PHL}		2.0	—	67	165	ns
			4.5	—	20	33	
			6.0	—	17	28	
Propagation delay time ($\overline{CLEAR}$ - Q)	t_{PHL}		2.0	—	52	135	ns
			4.5	—	16	27	
			6.0	—	14	23	
Input capacitance	C_{IN}		—	—	3	—	pF
Power dissipation capacitance	C_{PD}	(Note 1)	—	—	8	—	pF

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.

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

14.2. AC Characteristics
(Unless otherwise specified, C_L = 50 pF, T_a = -40 to 85 °C, Input: $t_r = t_f$ = 6 ns)

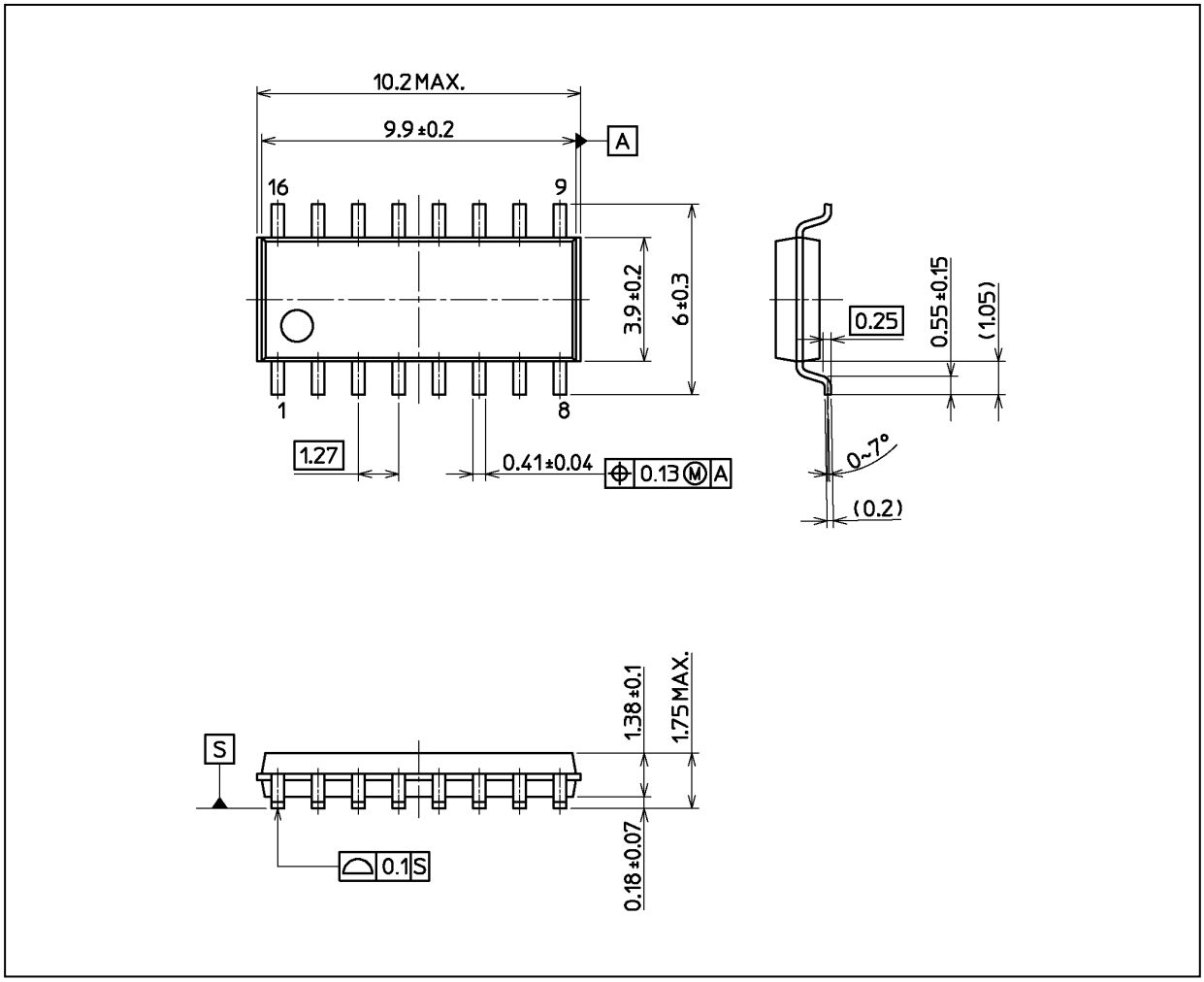
Characteristics	Symbol	V_{CC} (V)	Min	Max	Unit
Output transition time	t_{TLH},t_{THL}	2.0	—	95	ns
		4.5	—	19	
		6.0	—	16	
Propagation delay time (DATA IN - Q)	t_{PLH},t_{PHL}	2.0	—	165	ns
		4.5	—	33	
		6.0	—	28	
Propagation delay time (A, B, C - Q)	t_{PLH},t_{PHL}	2.0	—	230	ns
		4.5	—	46	
		6.0	—	39	
Propagation delay time ($\overline{G}$ - Q)	t_{PLH},t_{PHL}	2.0	—	205	ns
		4.5	—	41	
		6.0	—	35	
Propagation delay time ($\overline{CLEAR}$ - Q)	t_{PHL}	2.0	—	170	ns
		4.5	—	34	
		6.0	—	29	

14.3. AC Characteristics
(Unless otherwise specified, C_L = 50 pF, T_a = -40 to 125 °C, Input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	V_{CC} (V)	Min	Max	Unit
Output transition time	t_{TLH},t_{THL}	2.0	—	115	ns
		4.5	—	23	
		6.0	—	20	
Propagation delay time (DATA IN - Q)	t_{PLH},t_{PHL}	2.0	—	195	ns
		4.5	—	39	
		6.0	—	33	
Propagation delay time (A, B, C - Q)	t_{PLH},t_{PHL}	2.0	—	280	ns
		4.5	—	56	
		6.0	—	48	
Propagation delay time ($\overline{G}$ - Q)	t_{PLH},t_{PHL}	2.0	—	235	ns
		4.5	—	47	
		6.0	—	40	
Propagation delay time ($\overline{CLEAR}$ - Q)	t_{PHL}	2.0	—	205	ns
		4.5	—	41	
		6.0	—	35	

Package Dimensions

Unit: mm



Weight: 0.15 g (typ.)

Package Name(s)
Nickname: SOIC16

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