

# 100343 Low Power 8-Bit Latch

## General Description

The 100343 contains eight D-type latches, individual inputs, ( $D_n$ ), outputs ( $Q_n$ ), a common enable pin ( $\bar{E}$ ), and a latch enable pin ( $\bar{LE}$ ). A Q output follows its D input when both  $\bar{E}$  and  $\bar{LE}$  are LOW. When either  $\bar{E}$  or  $\bar{LE}$  (or both) are HIGH, a latch stores the last valid data present on its D input prior to  $\bar{E}$  or  $\bar{LE}$  going HIGH.

The 100343 outputs are designed to drive a 50Ω termination resistor to -2.0V. All inputs have 50 kΩ pull-down resistors.

## Features

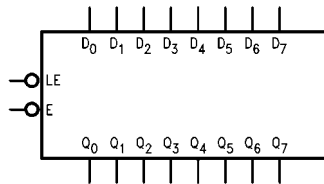
- Low power operation
- 2000V ESD protection
- Voltage compensated operating range = -4.2V to -5.7V
- Available to industrial grade temperature range

## Ordering Code:

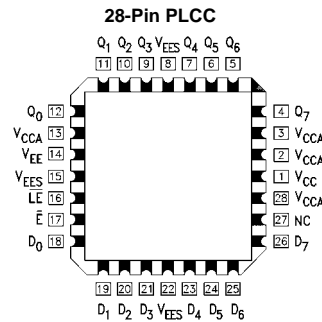
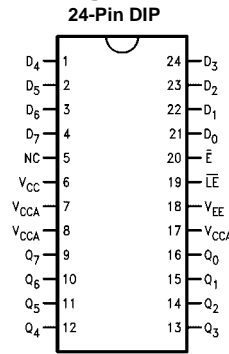
Order Number	Package Number	Package Description
100343PC	N24E	24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-011, 0.400 Wide
100343QC	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square
100343QI	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square Industrial Temperature Range (-40°C to +85°C)

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

## Logic Symbol



## Connection Diagrams



## Pin Descriptions

Pin Names	Description
$D_0$ - $D_7$	Data Inputs
$\bar{E}$	Enable Input
$\bar{LE}$	Latch Enable Input
$Q_0$ - $Q_7$	Data Outputs
NC	No Connect

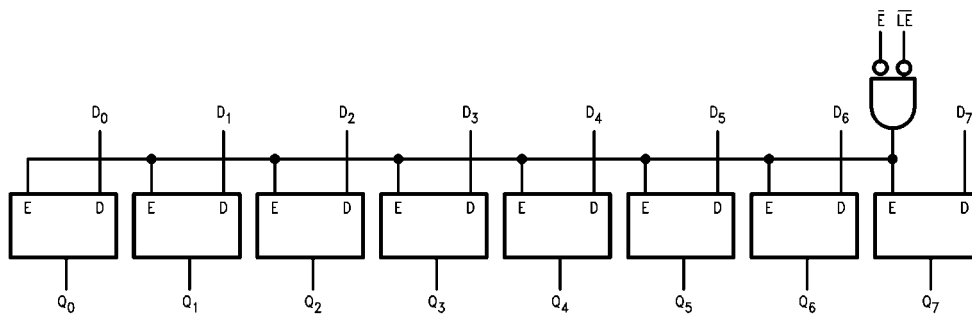
## Truth Table

Inputs			Outputs
$D_n$	$\bar{E}$	$\bar{LE}$	$Q_n$
L	L	L	L
H	L	L	H
X	H	X	Latched (Note 1)
X	X	H	Latched (Note 1)

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Don't Care

**Note 1:** Retains data present before either  $\bar{LE}$  or  $\bar{E}$  went HIGH

## Logic Diagram



**Absolute Maximum Ratings**(Note 2)

Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
Maximum Junction Temperature ( $T_J$ )	+150°C
$V_{EE}$ Pin Potential to Ground Pin	-7.0V to +0.5V
Input Voltage (DC)	$V_{EE}$ to +0.5V
Output Current (DC Output HIGH)	-50 mA
ESD (Note 3)	≥2000V

**Recommended Operating Conditions**

Case Temperature ( $T_C$ )	Commercial	0°C to +85°C
	Industrial	-40°C to +85°C
Supply Voltage ( $V_{EE}$ )		-5.7V to -4.2V

**Note 2:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 3:** ESD testing conforms to MIL-STD-883, Method 3015.

**Commercial Version****DC Electrical Characteristics** (Note 4)

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = 0^\circ C$  to  $+85^\circ C$

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
$V_{OH}$	Output HIGH Voltage	-1025	-955	-870	mV	$V_{IN} = V_{IH}$ (Max) or $V_{IL}$ (Min)	Loading with 50Ω to -2.0V
$V_{OL}$	Output LOW Voltage	-1830	-1705	-1620	mV		
$V_{OHC}$	Output HIGH Voltage	-1035			mV	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with 50Ω to -2.0V
$V_{OLC}$	Output LOW Voltage			-1610	mV		
$V_{IH}$	Input HIGH Voltage	-1165		-870	mV	Guaranteed HIGH Signal for All Inputs	
$V_{IL}$	Input LOW Voltage	-1830		-1475	mV	Guaranteed LOW Signal for All Inputs	
$I_{IL}$	Input LOW Current	0.50			μA	$V_{IN} = V_{IL}$ (Min)	
$I_{IH}$	Input HIGH Current			240	μA	$V_{IN} = V_{IH}$ (Max)	
$I_{EE}$	Power Supply Current	-95 -97		-55 -55	mA	Inputs Open $V_{EE} = -4.2V$ to $-4.8V$ $V_{EE} = -4.2V$ to $-5.7V$	

**Note 4:** The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

**AC Electrical Characteristics**

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
$t_{PLH}$	Propagation Delay $D_n$ to Output	0.80	2.00	0.80	2.00	0.80	2.20	ns	Figures 1, 2, 3 (Note 5)
$t_{PHL}$	Propagation Delay $\overline{LE}$ , $\overline{E}$ to Output	1.40	2.90	1.40	2.90	1.60	3.10	ns	Figures 1, 2, 3 (Note 5)
$t_{TLH}$	Transition Time 20% to 80%, 80% to 20%	0.45	2.00	0.45	2.00	0.45	2.00	ns	Figures 1, 3
$t_S$	Setup Time $D_0$ - $D_7$	1.0		1.0		1.1		ns	Figures 1, 4
$t_H$	Hold Time $D_0$ - $D_7$	0.1		0.1		0.1		ns	Figures 1, 4
$t_{PW(H)}$	Pulse Width HIGH $\overline{LE}$ , $\overline{E}$	2.00		2.00		2.00		ns	Figures 1, 4

**Note 5:** The propagation delay specified is for single output switching. Delays may vary up to 300 ps with multiple outputs switching.

## Commercial Version (Continued) PLCC AC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
$t_{PLH}$ $t_{PHL}$	Propagation Delay $D_n$ to Output	0.80	1.80	0.80	1.80	0.80	2.00	ns	Figures 1, 2, 3 (Note 6)
$t_{PLH}$ $t_{PHL}$	Propagation Delay LE, E to Output	1.40	2.70	1.40	2.70	1.60	2.90	ns	Figures 1, 2, 3 (Note 6)
$t_{TLH}$ $t_{THL}$	Transition Time 20% to 80%, 80% to 20%	0.45	1.90	0.45	1.90	0.45	1.90	ns	Figures 1, 3
$t_S$	Setup Time $D_0-D_7$	0.90		0.90		1.00		ns	Figures 1, 4
$t_H$	Hold Time $D_0-D_7$	0.0		0.0		0.0		ns	Figures 1, 4
$t_{PW(H)}$	Pulse Width HIGH $\overline{LE}, \overline{E}$	2.00		2.00		2.00		ns	Figures 1, 4
$t_{OSHL}$	Maximum Skew Common Edge Output-to-Output Variation Data to Output Path		340		340		340	ps	PLCC Only (Note 7)
$t_{OSLH}$	Maximum Skew Common Edge Output-to-Output Variation Data to Output Path		440		440		440	ps	PLCC Only (Note 7)
$t_{OST}$	Maximum Skew Opposite Edge Output-to-Output Variation Data to Output Path		480		480		480	ps	PLCC Only (Note 7)
$t_{PS}$	Maximum Skew Pin (Signal) Transition Variation Data to Output Path		300		300		300	ps	PLCC Only (Note 7)

**Note 6:** The propagation delay specified is for single output switching. Delays may vary up to 300 ps with multiple outputs switching.

**Note 7:** Output-to-Output Skew is defined as the absolute value of the difference between the actual propagation delay for any outputs within the same packaged device. The specifications apply to any outputs switching in the same direction either HIGH-to-LOW ( $t_{OSHL}$ ), or LOW-to-HIGH ( $t_{OSLH}$ ), or in opposite directions both HL and LH ( $t_{OST}$ ). Parameters  $t_{OST}$  and  $t_{PS}$  guaranteed by design.

## Industrial Version

### PLCC DC Electrical Characteristics (Note 8)

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = -40^\circ C$  to  $+85^\circ C$

Symbol	Parameter	$T_C = -40^\circ C$		$T_C = 0^\circ C$ to $+85^\circ C$		Units	Conditions	
		Min	Max	Min	Max			
$V_{OH}$	Output HIGH Voltage	-1085	-870	-1025	-870	mV	$V_{IN} = V_{IH} (Max)$	Loading with $50\Omega$ to $-2.0V$
$V_{OL}$	Output LOW Voltage	-1830	-1575	-1830	-1620	mV	or $V_{IL} (Min)$	
$V_{OHC}$	Output HIGH Voltage	-1095		-1035		mV	$V_{IN} = V_{IH} (Min)$	Loading with $50\Omega$ to $-2.0V$
$V_{OLC}$	Output LOW Voltage		-1565		-1610	mV	or $V_{IL} (Max)$	
$V_{IH}$	Input HIGH Voltage	-1170	-870	-1165	-870	mV	Guaranteed HIGH Signal for All Inputs	
$V_{IL}$	Input LOW Voltage	-1830	-1480	-1830	-1475	mV	Guaranteed LOW Signal for All Inputs	
$I_{IL}$	Input LOW Current	0.50		0.50		$\mu A$	$V_{IN} = V_{IL} (Min)$	
$I_{IH}$	Input HIGH Current		240		240	$\mu A$	$V_{IN} = V_{IH} (Max)$	
$I_{EE}$	Power Supply Current	-95	-50	-95	-55	mA	Inputs Open $V_{EE} = -4.2V$ to $-4.8V$ $V_{EE} = -4.2V$ to $-5.7V$	

**Note 8:** The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

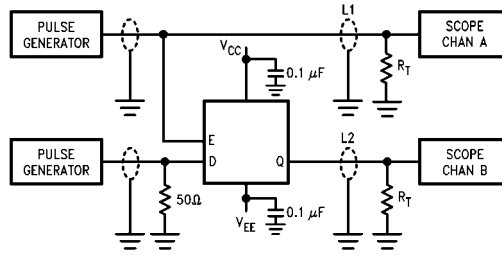
### PLCC AC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = -40^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
$t_{PLH}$	Propagation Delay $D_n$ to Output	0.80	1.80	0.80	1.80	0.80	2.00	ns	Figures 1, 2, 3 (Note 9)
$t_{PHL}$									
$t_{PLH}$	Propagation Delay $\overline{LE}, \overline{E}$ to Output	1.40	2.70	1.40	2.70	1.60	2.90	ns	Figures 1, 2, 3 (Note 9)
$t_{PHL}$									
$t_{TLH}$	Transition Time 20% to 80%, 80% to 20%	0.40	2.50	0.45	1.90	0.45	1.90	ns	Figures 1, 3
$t_{THL}$									
$t_s$	Setup Time $D_0-D_7$	0.60		0.90		1.00		ns	Figures 1, 4
$t_H$	Hold Time $D_0-D_7$	0.8		0.0		0.0		ns	Figures 1, 4
$t_{pw(H)}$	Pulse Width HIGH $\overline{LE}, \overline{E}$	2.40		2.00		2.00		ns	Figures 1 Figure 4

**Note 9:** The propagation delay specified is for single output switching. Delays may vary up to 300 ps with multiple outputs switching.

### Test Circuitry



**Note:**

- $V_{CC}, V_{CCA} = +2V, V_{EE} = -2.5V$
- L1 and L2 = equal length 50Ω impedance lines
- $R_T = 50\Omega$  terminator internal to scope
- Decoupling 0.1 μF from GND to  $V_{CC}$  and  $V_{EE}$
- All unused outputs are loaded with 50Ω to GND
- $C_L$  = Fixture and stray capacitance  $\leq 3$  pF

FIGURE 1. AC Test Circuit

### Switching Waveforms

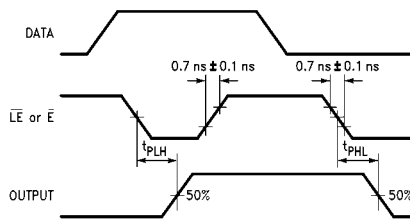


FIGURE 2. Propagation Delays

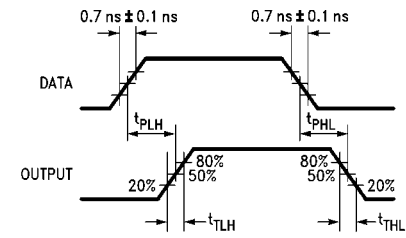


FIGURE 3. Propagation and Transition Times

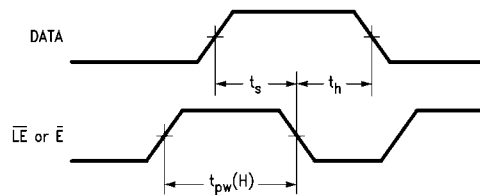
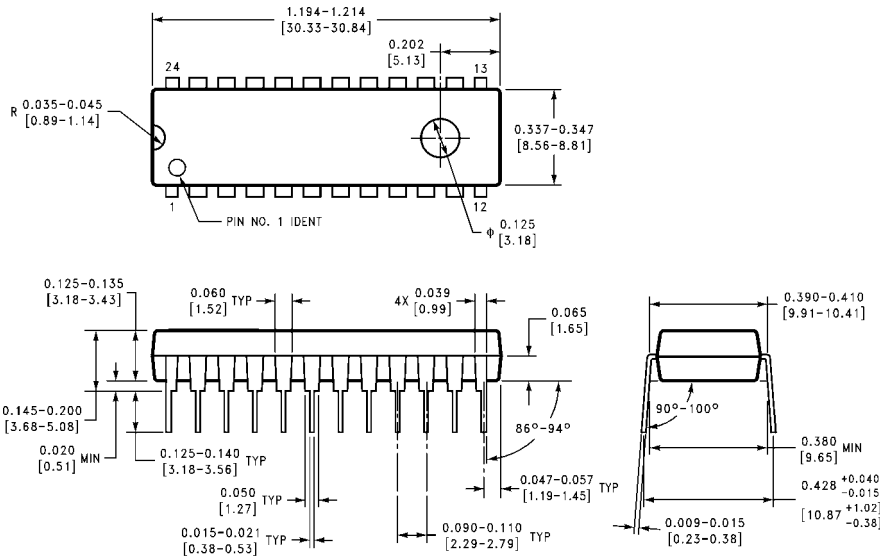


FIGURE 4. Setup, Hold and Pulse Width Times

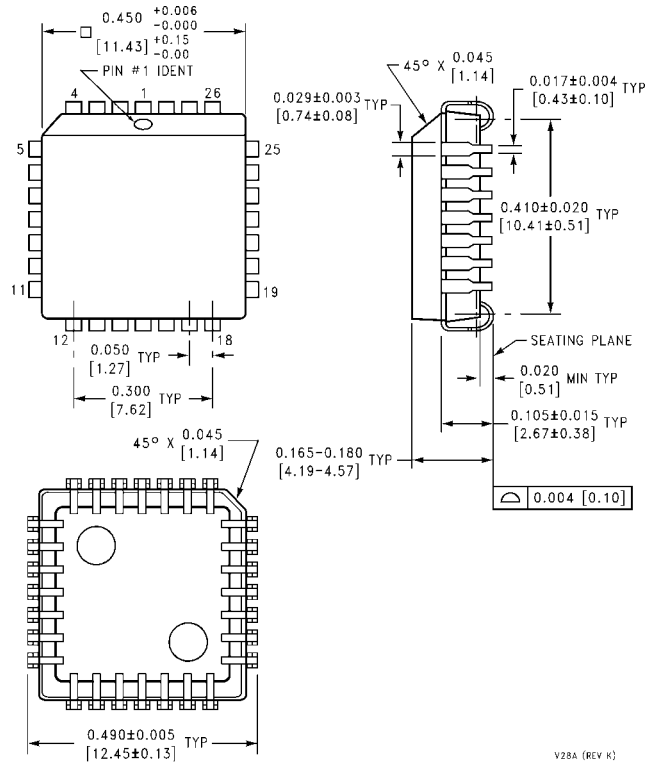
**Physical Dimensions** inches (millimeters) unless otherwise noted



**24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-011, 0.400 Wide  
Package Number N24E**

N24E (REV A)

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square Package Number V28A**

V28A (REV K)

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