

**FAIRCHILD**  
SEMICONDUCTOR™

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# 100364 Low Power 16-Input Multiplexer

## General Description

The 100364 is a 16-input multiplexer. Data paths are controlled by four Select lines ( $S_0$ – $S_3$ ). Their decoding is shown in the Truth Table. Output data polarity is the same as the selected input data. All inputs have 50 k $\Omega$  pull-down resistors.

## Features

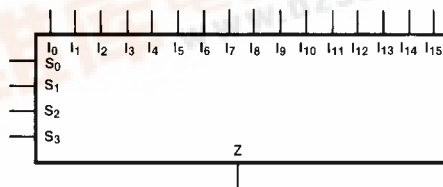
- 35% power reduction of the 100164
- 2000V ESD protection
- Pin/function compatible with 100164
- Voltage compensated operating range =  $-4.2V$  to  $-5.7V$
- Available to industrial grade temperature range

## Ordering Code:

Order Number	Package Number	Package Description
100364PC	N24E	24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.400 Wide
100364QC	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square
100364QI	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square Industrial Temperature Range ( $-40^{\circ}C$ to $+85^{\circ}C$ )

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

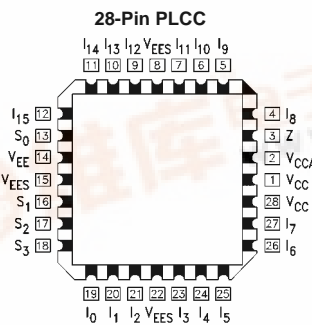
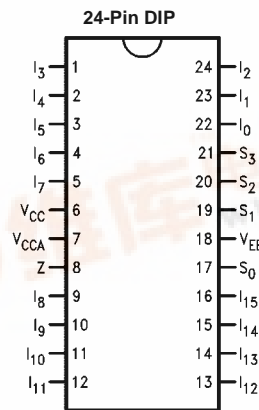
## Logic Symbol



## Pin Descriptions

Pin Names	Description
$I_0$ – $I_{15}$	Data Inputs
$S_0$ – $S_3$	Select Inputs
Z	Data Output

## Connection Diagrams



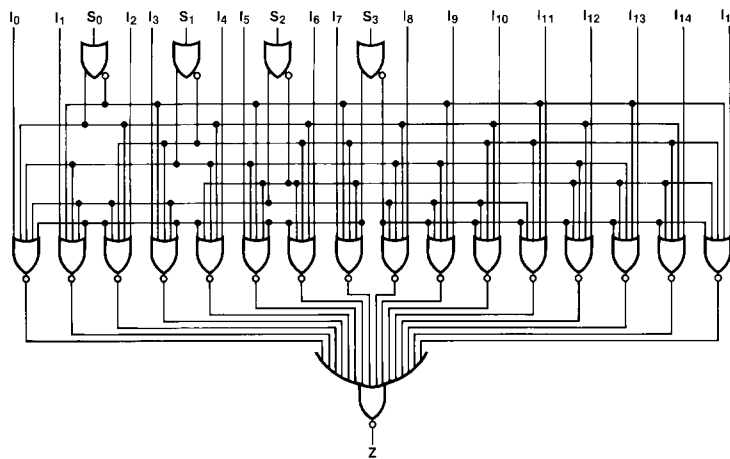
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**Truth Table**

Select Inputs				Output
S <sub>0</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Z
L	L	L	L	I <sub>0</sub>
H	L	L	L	I <sub>1</sub>
L	H	L	L	I <sub>2</sub>
H	H	L	L	I <sub>3</sub>
L	L	H	L	I <sub>4</sub>
H	L	H	L	I <sub>5</sub>
L	H	H	L	I <sub>6</sub>
H	H	H	L	I <sub>7</sub>
L	L	L	H	I <sub>8</sub>
H	L	L	H	I <sub>9</sub>
L	H	L	H	I <sub>10</sub>
H	H	L	H	I <sub>11</sub>
L	L	H	H	I <sub>12</sub>
H	L	H	H	I <sub>13</sub>
L	H	H	H	I <sub>14</sub>
H	H	H	H	I <sub>15</sub>

H = HIGH Voltage Level  
L = LOW Voltage Level

**Logic Diagram**



Absolute Maximum Ratings (Note 1)		Recommended Operating Conditions	
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C	Case Temperature ( $T_C$ )	Commercial
Maximum Junction Temperature ( $T_J$ )	+150°C	Industrial	0°C to +85°C
Pin Potential to Ground Pin ( $V_{EE}$ )	-7.0V to +0.5V	Supply Voltage ( $V_{EE}$ )	-40°C to +85°C
Input Voltage (DC)	$V_{EE}$ to +0.5V		-5.7V to -4.2V
Output Current (DC Output HIGH)	-50 mA		
ESD (Note 2)	$\geq 2000V$		

**Note 1:** 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 Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:** ESD testing conforms to MIL-STD-883, Method 3015.

### Commercial Version

### DC Electrical Characteristics (Note 3)

$V_{EE} = -4.2V$  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) Loading with $50\Omega$ to $-2.0V$
$V_{OL}$	Output LOW Voltage	-1830	-1705	-1620	mV	or $V_{IL}$ (Min)
$V_{OHC}$	Output HIGH Voltage	-1035			mV	$V_{IN} = V_{IH}$ (Min) Loading with $50\Omega$ to $-2.0V$
$V_{OLC}$	Output LOW Voltage			-1610	mV	or $V_{IL}$ (Max)
$V_{IH}$	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	0.5			$\mu A$	$V_{IN} = V_{IL}$ (Min)
$I_{IH}$	Input HIGH Current			300	$\mu A$	$V_{IN} = V_{IH}$ (Max)
$I_{EE}$	Power Supply Current	-89		-45	mA	Inputs OPEN

**Note 3:** 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 operate under "worst case" conditions.

### DIP AC Electrical Characteristics

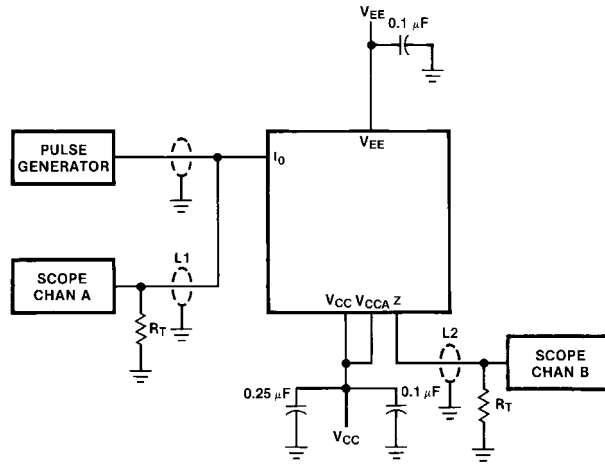
$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$

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	0.90	2.00	0.90	2.00	0.90	2.10	ns	Figures 1, 2
$t_{PHL}$	$I_0$ - $I_5$ to Output								
$t_{PLH}$	Propagation Delay	1.40	2.80	1.40	2.80	1.50	2.90		
$t_{PHL}$	$S_0, S_1$ to Output								
$t_{PLH}$	Propagation Delay	1.00	2.20	1.00	2.20	1.10	2.40		
$t_{PHL}$	$S_2, S_3$ to Output								
$t_{TLH}$	Transition Time	0.35	1.20	0.35	1.20	0.35	1.20		
$t_{THL}$	20% to 80%, 80% to 20%								

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<b>Commercial Version</b> (Continued)									
<b>PLCC AC Electrical Characteristics</b>									
$V_{EE} = -4.2V$ 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 $I_0$ - $I_{15}$ to Output	0.90	1.80	0.90	1.80	0.90	1.90	ns	Figures 1, 2
$t_{PLH}$ $t_{PHL}$	Propagation Delay $S_0, S_1$ to Output	1.40	2.60	1.40	2.60	1.50	2.70	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay $S_2, S_3$ to Output	1.00	2.00	1.00	2.00	1.10	2.20	ns	
$t_{TLH}$ $t_{THL}$	Transition Time 20% to 80%, 80% to 20%	0.35	1.10	0.35	1.10	0.35	1.10	ns	
<b>Industrial Version</b>									
<b>PLCC DC Electrical Characteristics</b> (Note 4)									
$V_{EE} = -4.2V$ 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)		
$V_{OL}$	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)		
$V_{OLC}$	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	0.5		0.5		$\mu A$	$V_{IN} = V_{IL}$ (Min)		
$I_{IH}$	Input HIGH Current		325		325	$\mu A$	$V_{IN} = V_{IH}$ (Max)		
$I_{EE}$	Power Supply Current	-89	-45	-89	-45	mA	Inputs OPEN		
<p><b>Note 4:</b> 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.</p>									
<b>PLCC AC Electrical Characteristics</b>									
$V_{EE} = -4.2V$ 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		
$t_{PLH}$ $t_{PHL}$	Propagation Delay $I_0$ - $I_{15}$ to Output	0.90	1.80	0.90	1.80	0.90	1.90	ns	Figures 1, 2
$t_{PLH}$ $t_{PHL}$	Propagation Delay $S_0, S_1$ to Output	1.20	2.60	1.40	2.60	1.50	2.70	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay $S_2, S_3$ to Output	0.80	2.10	1.00	2.00	1.10	2.20	ns	
$t_{TLH}$ $t_{THL}$	Transition Time 20% to 80%, 80% to 20%	0.20	1.20	0.35	1.10	0.35	1.10	ns	

**Test Circuit**



**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  $\mu F$  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**

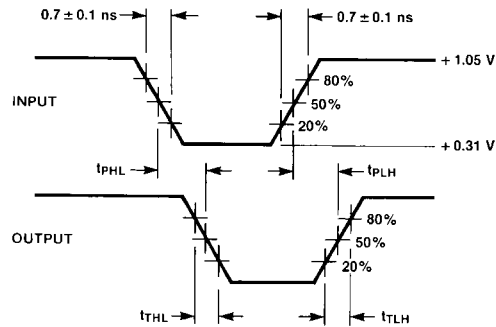
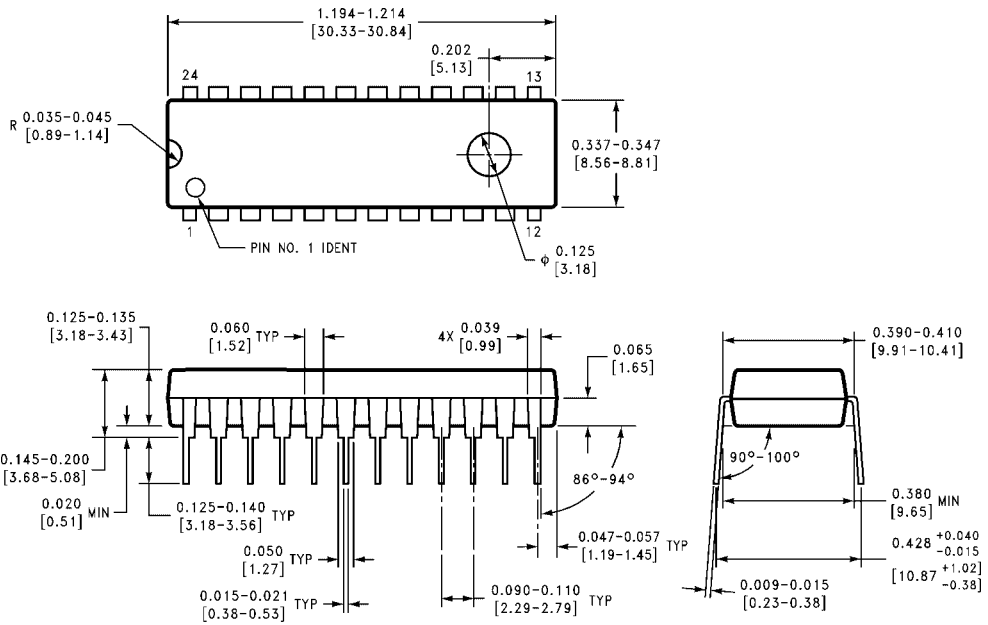


FIGURE 2. Propagation Delay and Transition Times

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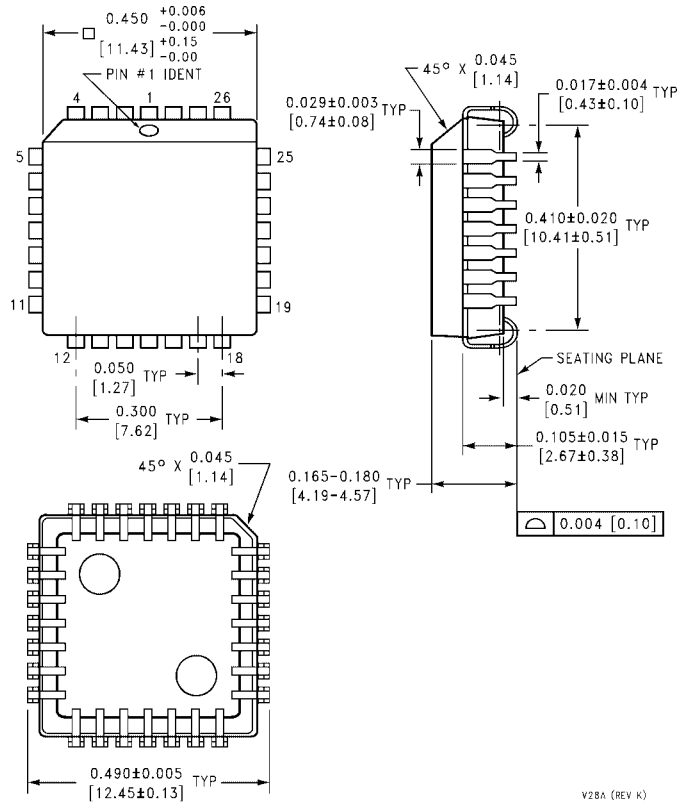
**Physical Dimensions** inches (millimeters) unless otherwise noted



**24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 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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