FAIRCHILD SEMICONDUCTOR™

February 1990
Revised August 2000

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 kΩ pull-down resistors.

Features

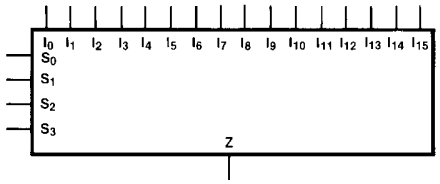
- 35% power reduction of the 100164
- 2000V ESD protection
- Pin/function compatible with 100164
- Voltage compensated operating range = –4.2V to –5.7V
- Available to industrial grade temperature range

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°C to +85°C)

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

Logic Symbol

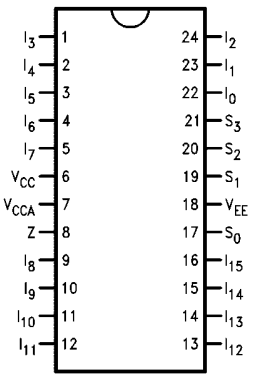


Pin Descriptions

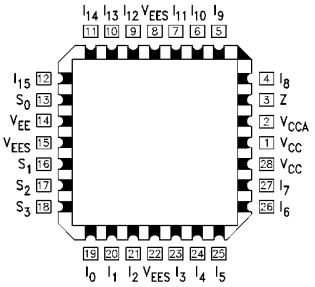
Pin Names	Description
I_0–I_{15}	Data Inputs
S_0–S_3	Select Inputs
Z	Data Output

Connection Diagrams

24-Pin DIP



28-Pin PLCC

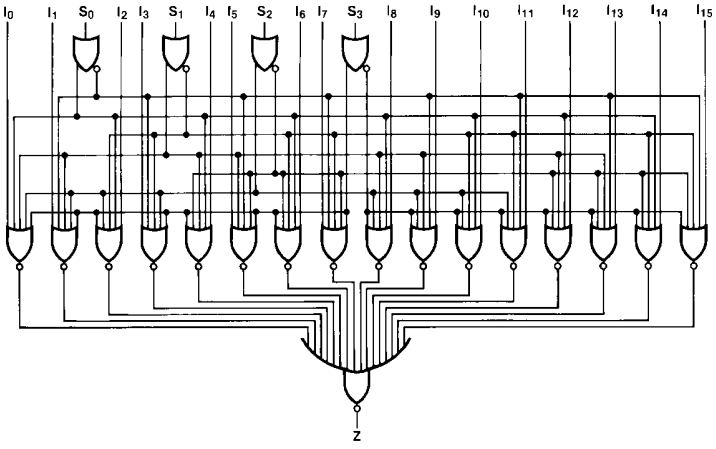


Truth Table

Select Inputs				Output
S_0	S_1	S_2	S_3	Z
L	L	L	L	I_0
H	L	L	L	I_1
L	H	L	L	I_2
H	H	L	L	I_3
L	L	H	L	I_4
H	L	H	L	I_5
L	H	H	L	I_6
H	H	H	L	I_7
L	L	L	H	I_8
H	L	L	H	I_9
L	H	L	H	I_{10}
H	H	L	H	I_{11}
L	L	H	H	I_{12}
H	L	H	H	I_{13}
L	H	H	H	I_{14}
H	H	H	H	I_{15}

H = HIGH Voltage Level
L = LOW Voltage Level

Logic Diagram



Absolute Maximum Ratings(Note 1)

Storage Temperature (T_{STG})	−65°C to +150°C
Maximum Junction Temperature (T_J)	+150°C
Pin Potential to Ground Pin (V_{EE})	−7.0V to +0.5V
Input Voltage (DC)	V_{EE} to +0.5V
Output Current	
(DC Output HIGH)	−50 mA
ESD (Note 2)	≥ 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 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°C to +85°C

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
V_{OH}	Output HIGH Voltage	−1025	−955	−870	mV	V_{IN} = V_{IH} (Max)	Loading with
V_{OL}	Output LOW Voltage	−1830	−1705	−1620	mV	or V_{IL} (Min)	50Ω to −2.0V
V_{OHC}	Output HIGH Voltage	−1035			mV	V_{IN} = V_{IH} (Min)	Loading with
V_{OLC}	Output LOW Voltage			−1610	mV	or V_{IL} (Max)	50Ω to −2.0V
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			µA	V_{IN} = V_{IL} (Min)	
I_{IH}	Input HIGH Current			300	µA	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°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay I_0–I_{15} to Output	0.90	2.00	0.90	2.00	0.90	2.10	ns	Figures 1, 2
t_{PLH} t_{PHL}	Propagation Delay S_0, S_1 to Output	1.40	2.80	1.40	2.80	1.50	2.90	ns	
t_{PLH} t_{PHL}	Propagation Delay S_2, S_3 to Output	1.00	2.20	1.00	2.20	1.10	2.40	ns	
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.35	1.20	0.35	1.20	0.35	1.20	ns	

Commercial Version (Continued)

PLCC AC Electrical Characteristics

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

Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°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	

Industrial Version

PLCC DC Electrical Characteristics (Note 4)

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND, T_C = −40°C to +85°C

Symbol	Parameter	T_C = −40°C		T_C = 0°C to +85°C		Units	Conditions	
		Min	Max	Min	Max			
V_{OH}	Output HIGH Voltage	−1085	−870	−1025	−870	mV	V_{IN} = V_{IH} (Max)	Loading with
V_{OL}	Output LOW Voltage	−1830	−1575	−1830	−1620	mV	or V_{IL} (Min)	50Ω to −2.0V
V_{OHC}	Output HIGH Voltage	−1095		−1035		mV	V_{IN} = V_{IH} (Min)	Loading with
V_{OLC}	Output LOW Voltage		−1565		−1610	mV	or V_{IL} (Max)	50Ω to −2.0V
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		µA	V_{IN} = V_{IL} (Min)	
I_{IH}	Input HIGH Current		325		325	µA	V_{IN} = V_{IH} (Max)	
I_{EE}	Power Supply Current	−89	−45	−89	−45	mA	Inputs OPEN	

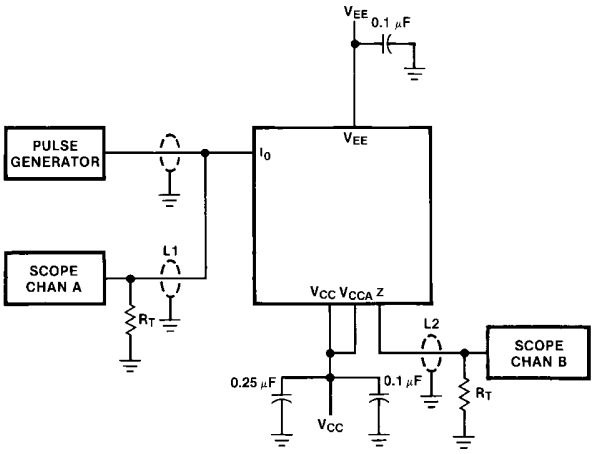
Note 4: The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are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

PLCC AC Electrical Characteristics

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

Symbol	Parameter	T_C = −40°C		T_C = +25°C		T_C = +85°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 = 50Ω 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 ≤ 3 pF

FIGURE 1. AC Test Circuit

Switching Waveforms

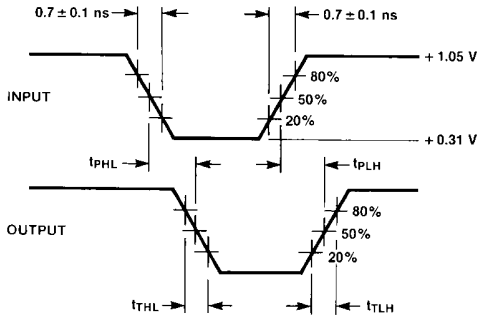
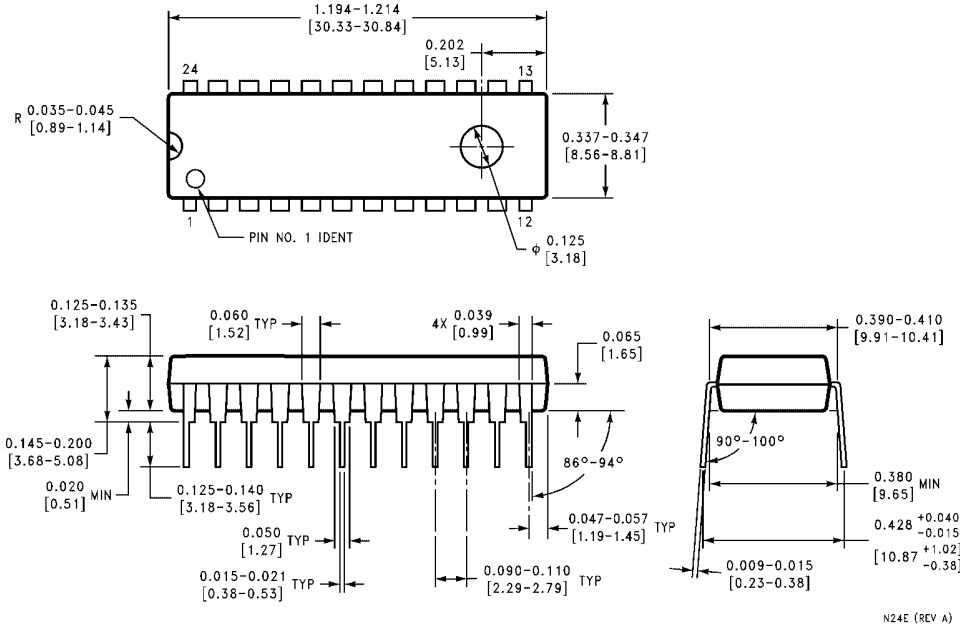


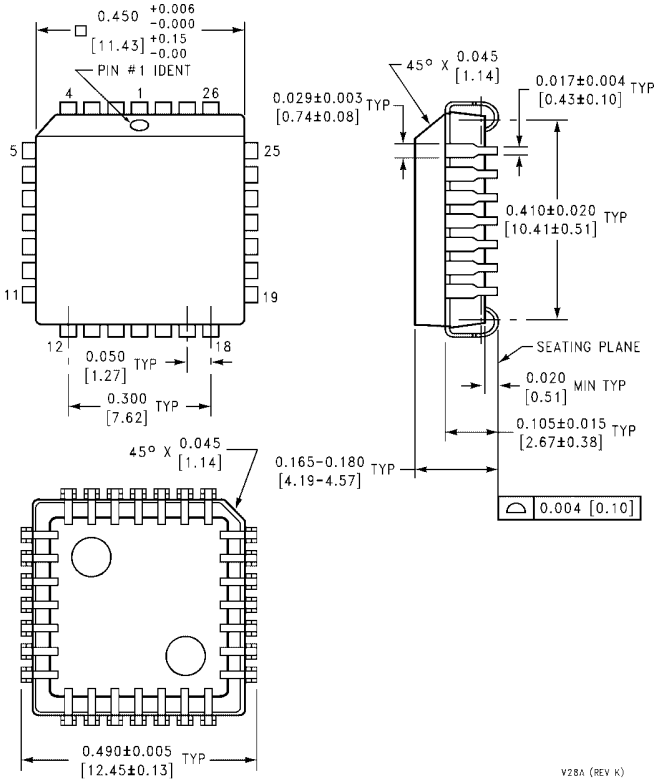
FIGURE 2. Propagation Delay and Transition Times

Physical Dimensions inches (millimeters) unless otherwise noted



24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.400 Wide
Package Number N24E

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



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