

# 100363 Low Power Dual 8-Input Multiplexer

## General Description

The 100363 is a dual 8-input multiplexer. The Data Select ( $S_n$ ) inputs determine which bit ( $A_n$  and  $B_n$ ) will be presented at the outputs ( $Z_a$  and  $Z_b$ , respectively). The same bit (0–7) will be selected for both the  $Z_a$  and  $Z_b$  output. All inputs have 50 k $\Omega$  pulldown resistors.

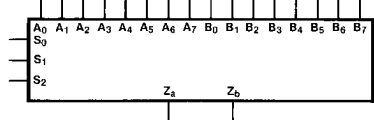
- 2000V ESD protection
- Pin/function compatible with 100163
- Voltage compensated operating range = -4.2V to -5.7V
- Available to MIL-STD-883
- Available to industrial grade temperature range

## Features

- 50% power reduction of the 100163

## Ordering Code:

## Logic Symbol

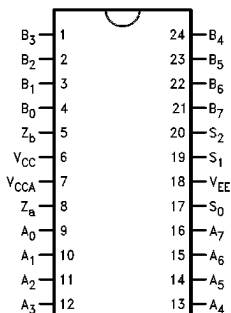


DS010612-1

Pin Names	Description
$S_0$ – $S_2$	Data Select Inputs
$A_0$ – $A_7$	A Data Inputs
$B_0$ – $B_7$	B Data Inputs
$Z_a$ , $Z_b$	Data Outputs

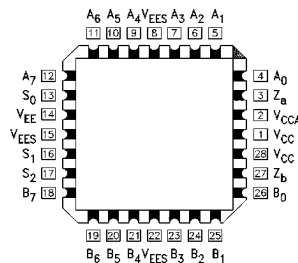
## Connection Diagrams

24-Pin DIP



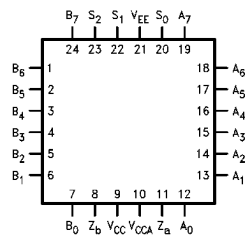
DS010612-2

28-Pin PCC



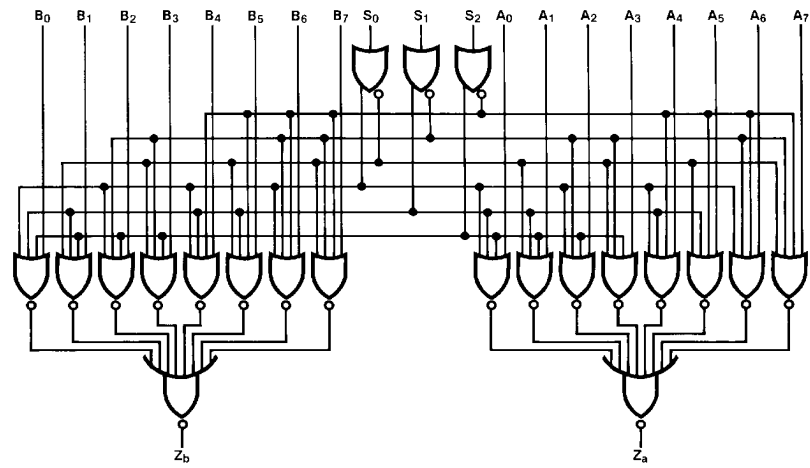
DS010612-4

24-Pin Quad Cerpak



DS010612-3

## Logic Diagram



DS010612-5

## Truth Table

Inputs											Outputs	
Select			Data								Z <sub>a</sub>	Z <sub>b</sub>
S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	A <sub>7</sub> B <sub>7</sub>	A <sub>6</sub> B <sub>6</sub>	A <sub>5</sub> B <sub>5</sub>	A <sub>4</sub> B <sub>4</sub>	A <sub>3</sub> B <sub>3</sub>	A <sub>2</sub> B <sub>2</sub>	A <sub>1</sub> B <sub>1</sub>	A <sub>0</sub> B <sub>0</sub>		
L	L	L								L	L	
L	L	L								H	H	
L	L	H							L		L	
L	L	H							H		H	
L	H	L						L			L	
L	H	L						H			H	
L	H	H					L				L	
L	H	H					H				H	
H	L	L				L					L	
H	L	L				H					H	
H	L	H			L						L	
H	L	H			H						H	
H	H	L		L							L	
H	H	L		H							H	
H	H	H	L								L	
H	H	H	H								H	

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

## Absolute Maximum Ratings (Note 1)

Above which the useful life may be impaired

Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
Maximum Junction Temperature ( $T_J$ )	
Ceramic	+175°C
Plastic	+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 2)	≥2000V

## Recommended Operating Conditions

Case Temperature ( $T_C$ )	
Commercial	0°C to +85°C
Industrial	-40°C to +85°C
Military	-55°C to +125°C
Supply Voltage ( $V_{EE}$ )	-5.7V to -4.2V

**Note 1:** Absolute maximum ratings are those values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

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

## Commercial Version DC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = 0^\circ C$  to  $+85^\circ C$  (Note 3)

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 $S_n$ $A_n, B_n$			265	μA	$V_{IN} = V_{IH}$ (Max)	
				340			
$I_{EE}$	Power Supply Current	-80		-40	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 operation 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	0.70	1.65	0.80	1.70	0.80	1.80	ns	Figure 1 and Figure 2
$t_{PHL}$	$A_0-A_7, B_0-B_7$ to Output								
$t_{PLH}$	Propagation Delay	1.30	2.60	1.40	2.70	1.40	2.70	ns	
$t_{PHL}$	$S_0-S_2$ to Output								
$t_{TLH}$	Transition Time	0.45	1.30	0.45	1.30	0.45	1.30	ns	
$t_{THL}$	20% to 80%, 80% to 20%								

## PCC and Cerpak 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	0.70	1.65	0.80	1.70	0.80	1.80	ns	Figure 1 and Figure 2
$t_{PHL}$	$A_0-A_7, B_0-B_7$ to Output								
$t_{PLH}$	Propagation Delay	1.30	2.60	1.40	2.70	1.40	2.70	ns	
$t_{PHL}$	$S_0-S_2$ to Output								
$t_{TLH}$	Transition Time	0.45	1.30	0.45	1.30	0.45	1.30	ns	
$t_{THL}$	20% to 80%, 80% to 20%								

## Industrial Version DC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = -40^{\circ}C$  to  $+85^{\circ}C$  (Note 4)

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) or $V_{IL}$ (min)	Loading with $50\Omega$ to $-2.0V$
$V_{OL}$	Output LOW Voltage	-1830	-1575	-1830	-1620	mV		
$V_{OHC}$	Output HIGH Voltage	-1095		-1035		mV	$V_{IN} = V_{IH}$ (min) or $V_{IL}$ (max)	Loading with $50\Omega$ to $-2.0V$
$V_{OLC}$	Output LOW Voltage		-1565		-1610	mV		
$V_{IH}$	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					$\mu A$	$V_{IN} = V_{IH}$ (Max)	
	$S_n$		265		265			
	$A_n, B_n$		380		340			
$I_{EE}$	Power Supply Current	-80	-35	-80	-40	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.

## 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	0.60	1.65	0.80	1.70	0.80	1.80	ns	Figure 1 and Figure 2
$t_{PHL}$	$A_0-A_7, B_0-B_7$ to Output								
$t_{PLH}$	Propagation Delay	1.20	2.60	1.40	2.70	1.40	2.70	ns	
$t_{PHL}$	$S_0-S_2$ to Output								
$t_{TLH}$	Transition Time	0.30	1.90	0.45	1.30	0.45	1.30	ns	
$t_{THL}$	20% to 80%, 80% to 20%								

## Military Version DC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = -55^\circ C$  to  $+125^\circ C$

Symbol	Parameter	Min	Max	Units	$T_C$	Conditions	Note	
$V_{OH}$	Output HIGH Voltage	-1025	-870	mV	$0^\circ C$ to $+125^\circ C$	$V_{IN} = V_{IH}$ (Max) or $V_{IL}$ (Min)	Loading with $50\Omega$ to $-2.0V$	(Notes 5, 6, 7)
		-1085	-870	mV	$-55^\circ C$			
$V_{OL}$	Output LOW Voltage	-1830	-1620	mV	$0^\circ C$ to $+125^\circ C$	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with $50\Omega$ to $-2.0V$	(Notes 5, 6, 7)
		-1830	-1555	mV	$-55^\circ C$			
$V_{OHC}$	Output HIGH Voltage	-1035		mV	$0^\circ C$ to $+125^\circ C$	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with $50\Omega$ to $-2.0V$	(Notes 5, 6, 7)
		-1085		mV	$-55^\circ C$			
$V_{OLC}$	Output LOW Voltage		-1610	mV	$0^\circ C$ to $+125^\circ C$	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with $50\Omega$ to $-2.0V$	(Notes 5, 6, 7)
			-1555	mV	$-55^\circ C$			
$V_{IH}$	Input HIGH Voltage	-1165	-870	mV	$-55^\circ C$ to $+125^\circ C$	Guaranteed HIGH Signal for All Inputs	(Notes 5, 6, 7, 8)	
$V_{IL}$	Input LOW Voltage	-1830	-1475	mV	$-55^\circ C$ to $+125^\circ C$	Guaranteed LOW Signal for All Inputs	(Notes 5, 6, 7, 8)	
$I_{IL}$	Input LOW Current	0.50		$\mu A$	$-55^\circ C$ to $+125^\circ C$	$V_{EE} = -4.2V$ $V_{IN} = V_{IL}$ (Min)	(Notes 5, 6, 7)	
$I_{IH}$	Input HIGH Current	$S_n$ $A_n, B_n$	265	$\mu A$	$0^\circ C$ to $+125^\circ C$	$V_{EE} = -5.7V$ $V_{IN} = V_{IH}$ (Max)	(Notes 5, 6, 7)	
			340	$\mu A$	$-55^\circ C$			
		$S_n$ $A_n, B_n$	385	$\mu A$	$-55^\circ C$			
			490	$\mu A$	$-55^\circ C$			
$I_{EE}$	Power Supply Current	-87	-30	mA	$-55^\circ C$ to $+125^\circ C$	Inputs Open	(Notes 5, 6, 7)	

**Note 5:** F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals  $-55^\circ C$ ), then testing immediately without allowing for the junction temperature to stabilize due to heat dissipation after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

**Note 6:** Screen tested 100% on each device at  $-55^\circ C$ ,  $+25^\circ C$ , and  $+125^\circ C$ , Subgroups 1, 2, 3, 7, and 8.

**Note 7:** Sample tested (Method 5005, Table I) on each manufactured lot at  $-55^\circ C$ ,  $+25^\circ C$ , and  $+125^\circ C$ , Subgroups A1, 2, 3, 7, and 8.

**Note 8:** Guaranteed by applying specified input condition and testing  $V_{OH}/V_{OL}$ .

## AC Electrical Characteristics

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

Symbol	Parameter	$T_C = -55^\circ C$		$T_C = +25^\circ C$		$T_C = +125^\circ C$		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
$t_{PLH}$	Propagation Delay	0.50	2.40	0.60	2.30	0.70	3.00	ns	Figure 1 and Figure 2	(Notes 9, 10, 11)
$t_{PHL}$	$A_0-A_7, B_0-B_7$ to Output									
$t_{PLH}$	Propagation Delay	0.80	3.00	0.90	2.80	0.80	3.40	ns		
$t_{PHL}$	$S_0-S_2$ to Output									
$t_{TLH}$	Transition Time	0.30	1.90	0.40	1.80	0.30	2.10	ns		(Note 12)
$t_{THL}$	20% to 80%, 80% to 20%									

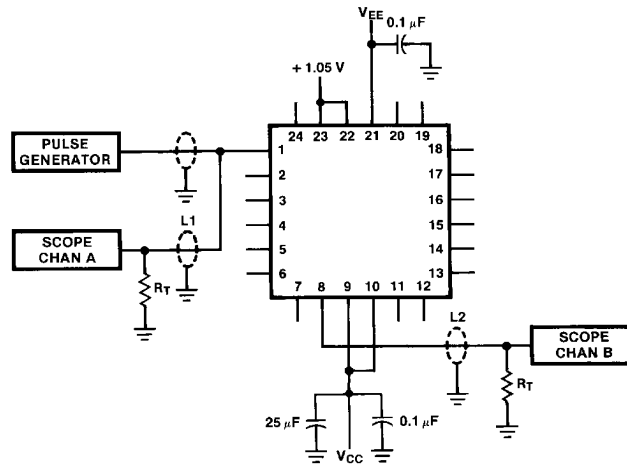
**Note 9:** F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals  $-55^\circ C$ ), then testing immediately after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

**Note 10:** Screen tested 100% on each device at  $+25^\circ C$  temperature only, Subgroup A9.

**Note 11:** Sample tested (Method 5005, Table I) on each manufactured lot at  $+25^\circ C$ , Subgroup A9, and at  $+125^\circ C$  and  $-55^\circ C$ , temperatures, Subgroups A10 and A11.

**Note 12:** Not tested at  $+25^\circ C$ ,  $+125^\circ C$ , and  $-55^\circ C$  temperature (design characterization data).

## Test Circuitry



DS010612-6

### Notes:

$V_{CC}, V_{CCA} = +2V, V_{EE} = -2.5V$

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  $V_{EE}$

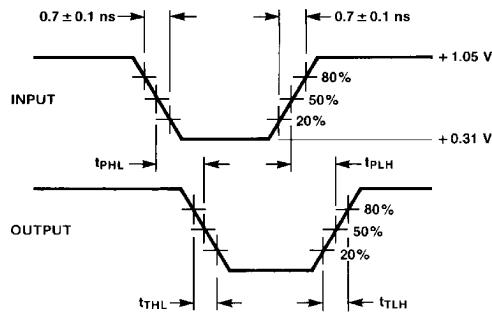
All unused outputs are loaded with 50Ω to GND

$C_L$  = Fixture and stray capacitance  $\leq 3$  pF

Pin numbers shown are for flatpak; for DIP see logic symbol

FIGURE 1. AC Test Circuit

## Switching Waveforms

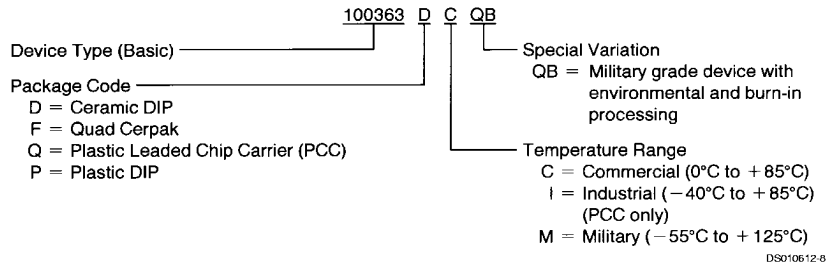


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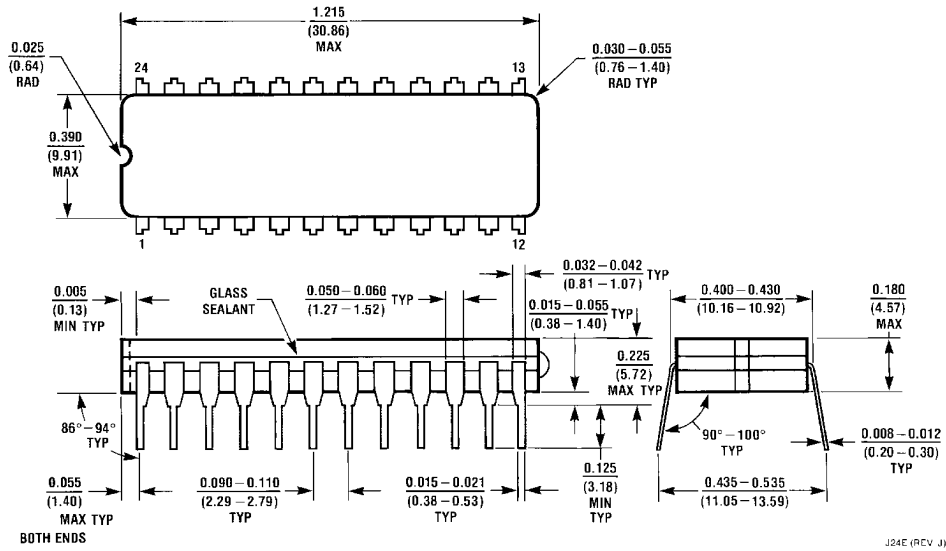
FIGURE 2. Propagation Delay and Transition Times

## Ordering Information

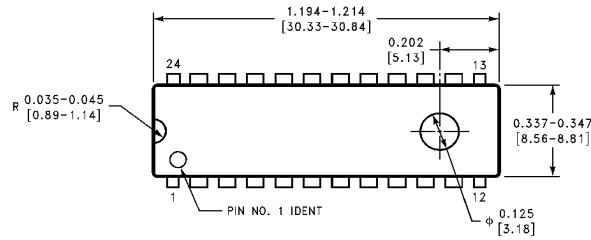
The device number is used to form part of a simplified purchasing code where a package type and temperature range are defined as follows:



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



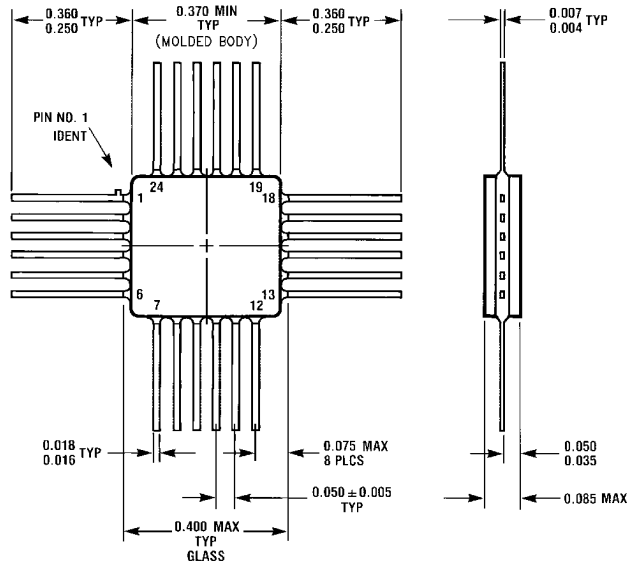
**24-Pin Ceramic Dual-In-Line Package (D)**  
Package Number J24E



**24-Lead Plastic Dual-In-Line Package (P)**  
Package Number N24E



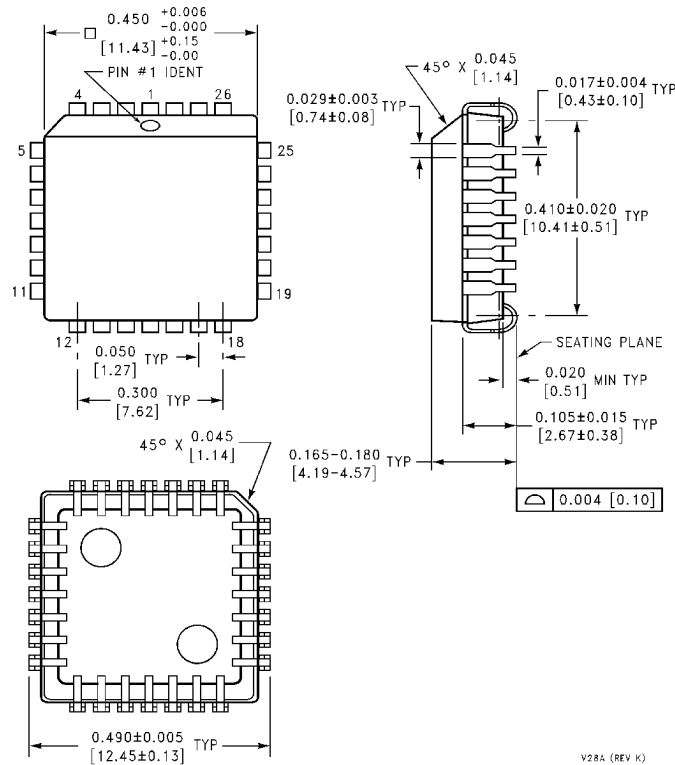
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



W24B (REV D)

**24-Pin Quad Cerpak (F)  
Package Number W24B**

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



**28-Pin Plastic Leaded Chip Carrier (Q)  
Package Number V28A**

V28A (REV K)

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