

# 100363

## Low Power Dual 8-Input Multiplexer

### General Description

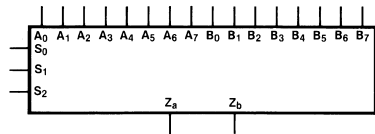
The 100363 is a dual 8-input multiplexer. The Data Select ( $S_n$ ) inputs determine which bit ( $A_n$  and  $B_n$ ) will be presented at the outputs ( $Z_a$  and  $Z_b$ , respectively). The same bit (0–7) will be selected for both the  $Z_a$  and  $Z_b$  output. All inputs have 50 k $\Omega$  pulldown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

- 2000V ESD protection
- Pin/function compatible with 100163
- Voltage compensated operating range =  $-4.2V$  to  $-5.7V$
- Standard Microcircuit Drawing (SMD) 5962-9165501

### Features

- 50% power reduction of the 100163

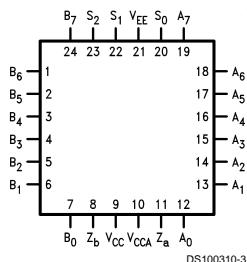
### Logic Symbol



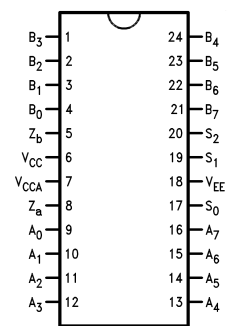
DS100310-1

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

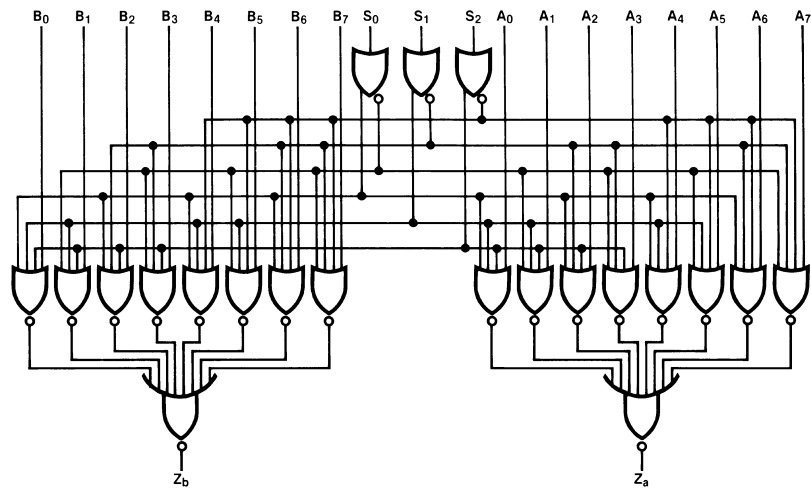
**24-Pin Quad Cerpak**


DS100310-3

**24-Pin DIP**


DS100310-2

# Logic Diagram



DS100310-5

## 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)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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
$V_{EE}$ 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 ( $T_C$ )	
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.

## Military Version DC Electrical Characteristics

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

Symbol	Parameter	Min	Max	Units	$T_C$	Conditions	Note	
$V_{OH}$	Output HIGH Voltage	-1025	-870	mV	0°C to +125°C	$V_{IN} = V_{IH}$ (Max) or $V_{IL}$ (Min)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
		-1085	-870	mV	-55°C			
$V_{OL}$	Output LOW Voltage	-1830	-1620	mV	0°C to +125°C	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
		-1830	-1555	mV	-55°C			
$V_{OHC}$	Output HIGH Voltage	-1035		mV	0°C to +125°C	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
		-1085		mV	-55°C			
$V_{OLC}$	Output LOW Voltage		-1610	mV	0°C to +125°C	$V_{IN} = V_{IH}$ (Min) or $V_{IL}$ (Max)	Loading with 50Ω to -2.0V	(Notes 3, 4, 5)
			-1555	mV	-55°C			
$V_{IH}$	Input HIGH Voltage	-1165	-870	mV	-55°C to +125°C	Guaranteed HIGH Signal for All Inputs	(Notes 3, 4, 5, 6)	
$V_{IL}$	Input LOW Voltage	-1830	-1475	mV	-55°C to +125°C	Guaranteed LOW Signal for All Inputs	(Notes 3, 4, 5, 6)	
$I_{IL}$	Input LOW Current	0.50		μA	-55°C to +125°C	$V_{EE} = -4.2V$ $V_{IN} = V_{IL}$ (Min)	(Notes 3, 4, 5)	
$I_{IH}$	Input HIGH Current	$S_n$	265	μA	0°C to +125°C	$V_{EE} = -5.7V$ $V_{IN} = V_{IH}$ (Max)	(Notes 3, 4, 5)	
			$A_n, B_n$	340	μA			-55°C
		$S_n$	385	μA	-55°C			
			$A_n, B_n$	490	μA			-55°C
$I_{EE}$	Power Supply Current	-87	-30	mA	-55°C to +125°C	Inputs Open	(Notes 3, 4, 5)	

**Note 3:** F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals -55°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 4:** Screen tested 100% on each device at -55°C, +25°C, and +125°C, Subgroups 1, 2, 3, 7, and 8.

**Note 5:** Sample tested (Method 5005, Table I) on each manufactured lot at -55°C, +25°C, and +125°C, Subgroups A1, 2, 3, 7, and 8.

**Note 6:** 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 7, 8, 9)
$t_{PHL}$	$A_0-A_7, B_0-B_7$ to Output									
$t_{PLH}$	Propagation Delay	0.80	3.00	0.90	2.80	0.80	3.40			
$t_{PHL}$	$S_0-S_2$ to Output							ns		(Note 10)
$t_{TLH}$	Transition Time	0.30	1.90	0.30	1.80	0.30	2.10			
$t_{THL}$	20% to 80%, 80% to 20%									

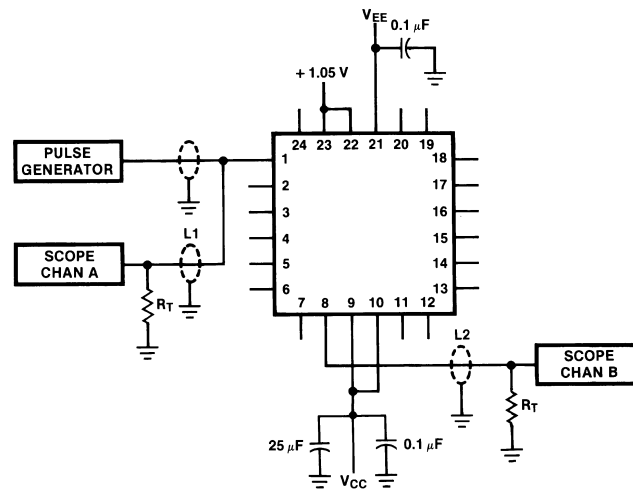
**Note 7:** F100K 300 Series cold temperature testing is performed by temperature soaking (to guarantee junction temperature equals  $-55^\circ C$ ), then testing immediately after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

**Note 8:** Screen tested 100% on each device at  $+25^\circ C$  temperature only, Subgroup A9.

**Note 9:** 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 10:** Not tested at  $+25^\circ C$ ,  $+125^\circ C$ , and  $-55^\circ C$  temperature (design characterization data).

## Test Circuitry



DS100310-6

### 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  $\mu F$  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

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

FIGURE 1. AC Test Circuit

## Switching Waveforms

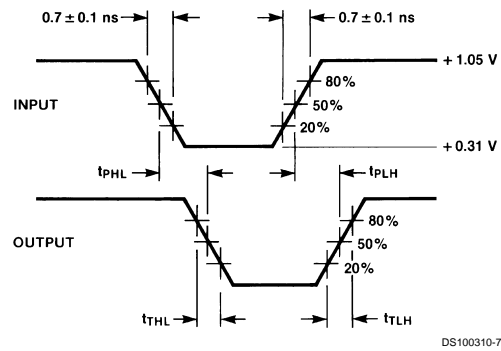
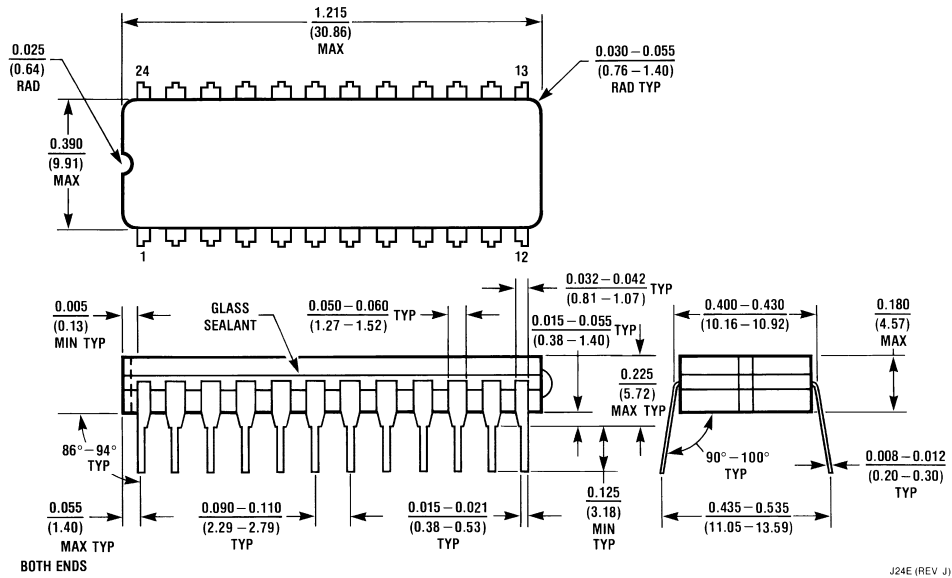
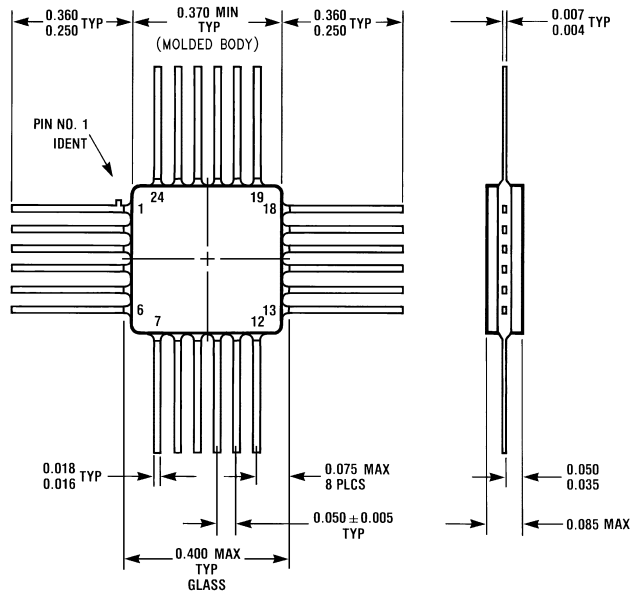


FIGURE 2. Propagation Delay and Transition Times

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



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



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

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