

## 100371

### Low Power Triple 4-Input Multiplexer with Enable

#### General Description

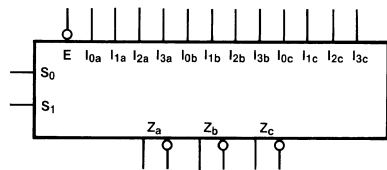
The 100371 contains three 4-input multiplexers which share a common decoder (inputs  $S_0$  and  $S_1$ ). Output buffer gates provide true and complement outputs. A HIGH on the Enable input ( $\bar{E}$ ) forces all true outputs LOW (see Truth Table). All inputs have 50 k $\Omega$  pull-down resistors.

- 2000V ESD protection
- Pin/function compatible with 100171
- Voltage compensated operating range = -4.2V to -5.7V
- Available to MIL-STD-883

#### Features

- 35% power reduction of the 100171

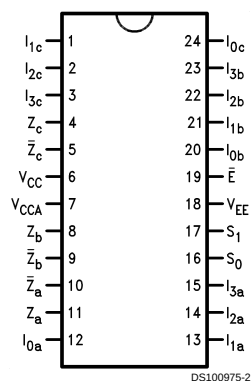
#### Logic Symbol



| Pin Names             | Description                |
|-----------------------|----------------------------|
| $I_{0x}-I_{3x}$       | Data Inputs                |
| $S_0, S_1$            | Select Inputs              |
| $\bar{E}$             | Enable Input (Active LOW)  |
| $Z_a-Z_c$             | Data Outputs               |
| $\bar{Z}_a-\bar{Z}_c$ | Complementary Data Outputs |

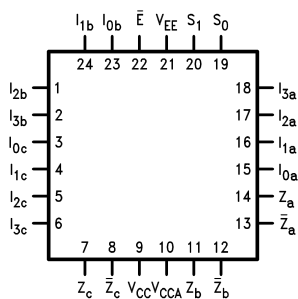
## Connection Diagrams

24-Pin DIP



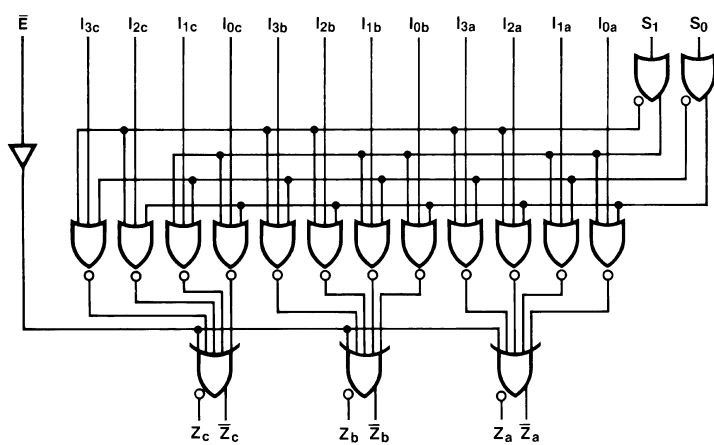
DS100975-2

24-Pin Quad Cerpak



DS100975-3

## Logic Diagram



DS100975-5

## Truth Table

| Inputs    |       |       | Outputs  |
|-----------|-------|-------|----------|
| $\bar{E}$ | $S_0$ | $S_1$ | $Z_n$    |
| L         | L     | L     | $I_{0x}$ |
| L         | H     | L     | $I_{1x}$ |
| L         | L     | H     | $I_{2x}$ |
| L         | H     | H     | $I_{3x}$ |
| H         | X     | X     | L        |

H = HIGH Voltage Level

L = LOW Voltage Level

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.

|                                        |                   |
|----------------------------------------|-------------------|
| 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            |

## 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 <sub>C</sub>  | Conditions                                                          |                              | Notes              |
|------------------|---------------------------------------------------------------------------------|-------|------------|-------|-----------------|---------------------------------------------------------------------|------------------------------|--------------------|
| V <sub>OH</sub>  | Output HIGH Voltage                                                             | -1025 | -870       | mV    | 0°C to +125°C   | V <sub>IN</sub> = V (Max)<br>or V <sub>IL</sub> (Min)               | Loading with<br>50Ω to -2.0V | (Notes 3, 4, 5)    |
|                  |                                                                                 | -1085 | -870       | mV    | -55°C           |                                                                     |                              |                    |
| V <sub>OL</sub>  | Output LOW Voltage                                                              | -1830 | -1620      | mV    | 0°C to +125°C   |                                                                     |                              |                    |
|                  |                                                                                 | -1830 | -1555      | mV    | -55°C           |                                                                     |                              |                    |
| V <sub>OHC</sub> | Output HIGH Voltage                                                             | -1035 |            | mV    | 0°C to +125°C   | V <sub>IN</sub> = V <sub>IH</sub> (Min)<br>or V <sub>IL</sub> (Max) | Loading with<br>50Ω to -2.0V | (Notes 3, 4, 5)    |
|                  |                                                                                 | -1085 |            | mV    | -55°C           |                                                                     |                              |                    |
| V <sub>OLC</sub> | Output LOW Voltage                                                              |       | -1610      | mV    | 0°C to +125°C   |                                                                     |                              |                    |
|                  |                                                                                 |       | -1555      | mV    | -55°C           |                                                                     |                              |                    |
| V <sub>IH</sub>  | Input HIGH Voltage                                                              | -1165 | -870       | mV    | -55°C to +125°C | Guaranteed HIGH Signal for All Inputs                               |                              | (Notes 3, 4, 5, 6) |
| V <sub>IL</sub>  | Input LOW Voltage                                                               | -1830 | -1475      | mV    | -55°C to +125°C | Guaranteed LOW Signal for All Inputs                                |                              | (Notes 3, 4, 5, 6) |
| I <sub>IL</sub>  | Input LOW Current                                                               | 0.50  |            | μA    | -55°C to +125°C | V <sub>EE</sub> = -4.2V<br>V <sub>IN</sub> = V <sub>IL</sub> (Min)  |                              | (Notes 3, 4, 5)    |
| I <sub>IH</sub>  | Input HIGH Current                                                              |       |            |       |                 | V <sub>EE</sub> = -5.7V<br>V <sub>IN</sub> = V <sub>IH</sub> (Max)  |                              | (Notes 3, 4, 5)    |
|                  | I <sub>OX</sub> -I <sub>3X</sub><br>S <sub>0</sub> , S <sub>1</sub> , $\bar{E}$ |       | 340<br>300 | μA    | 0°C to +125°C   |                                                                     |                              |                    |
|                  | I <sub>OX</sub> -I <sub>3X</sub><br>S <sub>0</sub> , S <sub>1</sub> , $\bar{E}$ |       | 490<br>450 | μA    | -55°C           |                                                                     |                              |                    |
| I <sub>EE</sub>  | Power Supply Current                                                            | -80   | -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 1, 2, 3, 7, and 8.

**Note 6:** Guaranteed by applying specified input condition and testing  $V_{OH}/V_{OL}$ .

## 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 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         | 0.10                | 1.90 | 0.20                | 1.70 | 0.20                 | 2.00 | ns    | Figures 1, 2 | (Notes 7, 8, 9, 11) |
| $t_{PHL}$ | $I_{0x}-I_{3x}$ to Output |                     |      |                     |      |                      |      |       |              |                     |
| $t_{PLH}$ | Propagation Delay         | 0.40                | 2.70 | 0.60                | 2.40 | 0.50                 | 2.90 | ns    |              |                     |
| $t_{PHL}$ | $S_0, S_1$ to Output      |                     |      |                     |      |                      |      |       |              |                     |
| $t_{PLH}$ | Propagation Delay         | 0.50                | 2.70 | 0.60                | 2.40 | 0.50                 | 2.90 | ns    |              | (Note 10)           |
| $t_{PHL}$ | $\bar{E}$ to Output       |                     |      |                     |      |                      |      |       |              |                     |
| $t_{TLH}$ | Transition Time           | 0.20                | 1.60 | 0.30                | 1.50 | 0.20                 | 1.60 | ns    |              |                     |
| $t_{THL}$ | 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.

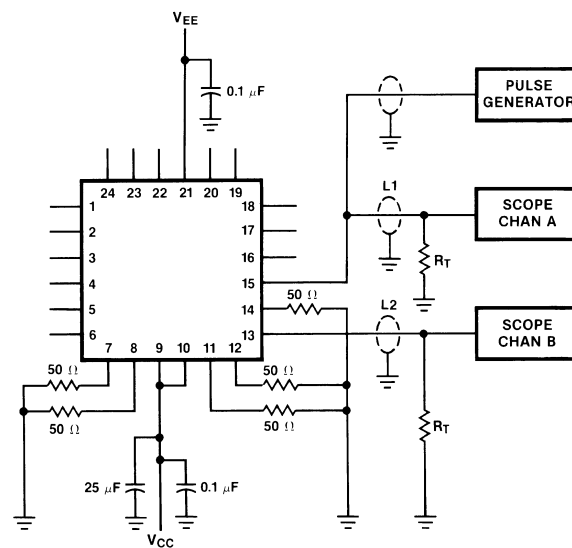
**Note 8:** Screen tested 100% on each device at  $+25^\circ C$  temperature only, Subgroup A9.

**Note 9:** Sample tested (Method 5005, Table I) on each mfg. 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).

**Note 11:** The propagation delay specified is for single output switching. Delays may vary up to 300 ps with multiple outputs switching.

## Test Circuitry



DS100975-6

### 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

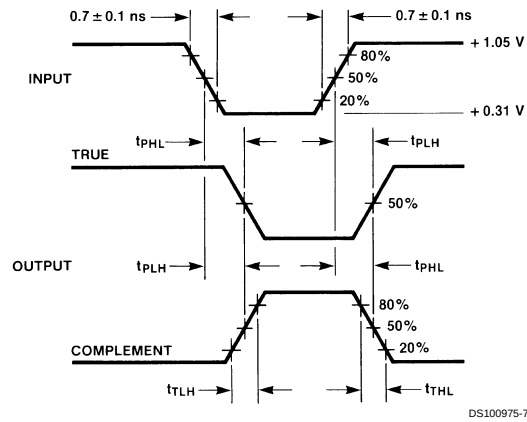
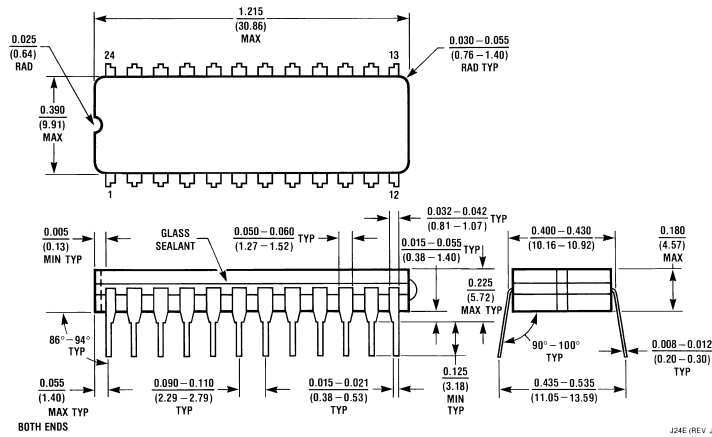
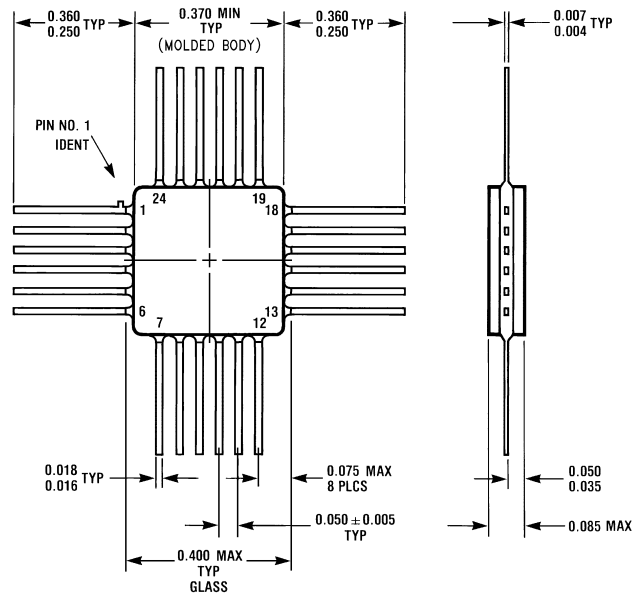


FIGURE 2. Propagation Delay and Transition Times

## Physical Dimensions inches (millimeters) unless otherwise noted



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



**24-Lead Ceramic Flatpak (F)**  
**Package Number W24B**

#### LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



**National Semiconductor Corporation**  
Americas  
Tel: 1-800-272-9959  
Fax: 1-800-737-7018  
Email: support@nsc.com

www.national.com

**National Semiconductor Europe**

Fax: +49 (0) 1 80-530 85 86  
Email: europe.support@nsc.com  
Deutsch Tel: +49 (0) 1 80-530 85 85  
English Tel: +49 (0) 1 80-532 78 32  
Français Tel: +49 (0) 1 80-532 93 58  
Italiano Tel: +49 (0) 1 80-534 16 80

**National Semiconductor Asia Pacific Customer Response Group**

Tel: 65-2544466  
Fax: 65-2504466  
Email: sea.support@nsc.com

**National Semiconductor Japan Ltd.**

Tel: 81-3-5620-6175  
Fax: 81-3-5620-6179



|                                                                                                                                                                                                               |                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|  <a href="#">National Semiconductor Corporation Home</a>                                                                     | <a href="#">Design</a> · <a href="#">Purchasing</a> · <a href="#">Quality</a> · <a href="#">Company</a> · <a href="#">Jobs</a> |
|                                                                                                                                                                                                               |                                               |
|  <a href="#">Products</a> > <a href="#">Military/Aerospace</a> > <a href="#">Logic</a> > <a href="#">ECL</a> > <b>100371</b> |                                                                                                                                |



## 100371 Low Power Triple 4-Input Multiplexer with Enable

### Contents

- [General Description](#)
- [Features](#)
- [Datasheet](#)
- [Package Availability, Models, Samples & Pricing](#)

---

## General Description

The 100371 contains three 4-input multiplexers which share a common decoder (inputs  $S_0$  and  $S_1$ ). Output buffer gates provide true and complement outputs. A HIGH on the Enable input ( $E\#$ ) forces all true outputs LOW (see Truth Table). All inputs have 50 k Ohm pull-down resistors.

---

## Features

- 35% power reduction of the 100171
  - 2000V ESD protection
  - Pin/function compatible with 100171
  - Voltage compensated operating range = -4.2V to -5.7V
  - Available to MIL-STD-883
- 

## Datasheet

| Title                                                   | Size<br>(in<br>Kbytes) | Date      |  View<br>Online |  Download |  Receive<br>via Email |
|---------------------------------------------------------|------------------------|-----------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 100371 Low Power Triple 4-Input Multiplexer with Enable | 123 Kbytes             | 23-Sep-98 | <a href="#">View Online</a>                                                                       | <a href="#">Download</a>                                                                     | <a href="#">Receive via Email</a>                                                                        |
| 100371 Mil-Aero Datasheet MN100371-X                    | 106 Kbytes             |           | <a href="#">View Online</a>                                                                       | <a href="#">Download</a>                                                                     | <a href="#">Receive via Email</a>                                                                        |

Please use [Adobe Acrobat](#) to view PDF file(s).

If you have trouble printing, see [Printing Problems](#).

## Package Availability, Models, Samples & Pricing

| Part Number  | Package |        | Status          | Models |      | Samples & Electronic Orders                                                                                 | Budgetary Price |         |
|--------------|---------|--------|-----------------|--------|------|-------------------------------------------------------------------------------------------------------------|-----------------|---------|
|              | Type    | # pins |                 | SPICE  | IBIS |                                                                                                             | Quantity        | \$US ea |
| 100371DMQB   | Cerdip  | 24     | Full production | N/A    | N/A  |  <a href="#">Order</a> | 50+             | \$38.8  |
| 100371FMQB   | Cerpack | 24     | Full production | N/A    | N/A  |  <a href="#">Order</a> | 50+             | \$41.2  |
| 100371DM-MLS | Cerdip  | 24     | Full production | N/A    | N/A  | .                                                                                                           | 50+             | \$280.  |
| 100371FM-MLS | Cerpack | 24     | Full production | N/A    | N/A  | .                                                                                                           | 50+             | \$280.  |
| 100371 MD8   | die     |        | Full production | N/A    | N/A  | .                                                                                                           |                 |         |
| 100371 MW8   | wafer   |        | Full production | N/A    | N/A  | .                                                                                                           |                 |         |

[Information as of 7-Mar-2001]

**Quick Search**[\*\*Parametric  
Search\*\*](#)[\*\*System  
Diagrams\*\*](#)[\*\*Product  
Tree\*\*](#)[\*\*Home\*\*](#)

[About Languages](#) . [Website Guide](#) . [About "Cookies"](#) . National is [QS 9000 Certified](#)  
[Site Terms & Conditions of Use](#) . Copyright 2001 © National Semiconductor Corporation  
[Privacy/Security Statement](#) . ☐ [Preferences](#) . [\*\*Feedback\*\*](#)