

# 100302

## Low Power Quint 2-Input OR/NOR Gate

### General Description

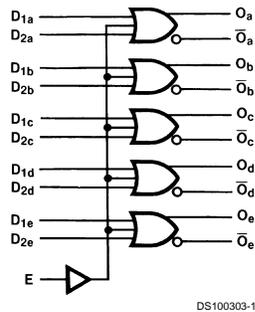
The 100302 is a monolithic quint 2-input OR/NOR gate with common enable. All inputs have 50 kΩ pull-down resistors and all outputs are buffered.

- 2000V ESD protection
- Pin/function compatible with 100102
- Voltage compensated operating range = -4.2V to -5.7V
- Standard Microcircuit Drawing (SMD) 5962-9152802

### Features

- 43% power reduction of the 100102

### Logic Symbol



Pin Names	Description
$D_{1a}-D_{2e}$	Data Inputs
E	Enable Input
$O_a-O_e$	Data Outputs
$\bar{O}_a-\bar{O}_e$	Complementary Data Outputs

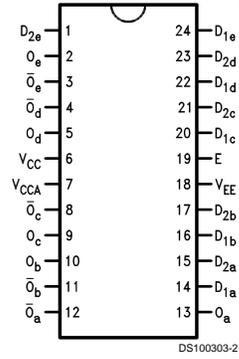
### Truth Table

$D_{1x}$	$D_{2x}$	E	$O_x$	$\bar{O}_x$
L	L	L	L	H
L	L	H	H	L
L	H	L	H	L
L	H	H	H	L
H	L	L	H	L
H	L	H	H	L
H	H	L	H	L
H	H	H	H	L

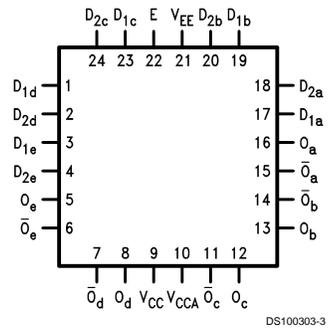
H = HIGH Voltage Level  
L = LOW Voltage Level

## Connection Diagrams

24-Pin DIP



24-Pin Quad Cerpak



## 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  $+125°C$  (Note 5)

Symbol	Parameter	Min	Max	Units	$T_C$	Conditions	Notes	
$V_{OH}$	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	$V_{IN} = V_{IH(Max)}$ or $V_{IL} (Min)$	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	$V_{IN} = V_{IH(Max)}$ or $V_{IL} (Min)$	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	$V_{IN} = V_{IH(Max)}$ or $V_{IL} (Min)$	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	$V_{EE} = -4.2V$ $V_{IN} = V_{IH} (Max)$	(Notes 3, 4, 5)	
$I_{IH}$	Input HIGH Current		240	μA	0°C to +125°C	$V_{EE} = -5.7V$ $V_{IN} = V_{IL} (Min)$	(Notes 3, 4, 5)	
			340	μA	-55°C			
$I_{EE}$	Power Supply Current	-48	-17	mA	-55°C to +125°C	Inputs Open	(Notes 3, 4, 5, 6)	

**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	$T_C = -55°C$		$T_C = +25°C$		$T_C = +125°C$		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
$t_{PLH}$	Propagation Delay	0.30	1.80	0.40	1.50	0.40	1.70	ns	Figures 1, 2	(Notes 7, 8, 9, 10, 11)
$t_{PHL}$	Data to Output									
$t_{PLH}$	Propagation Delay	0.60	2.60	0.80	2.30	0.80	2.80	ns		
$t_{PHL}$	Enable to Output									
$t_{TLH}$	Transition Time	0.30	1.20	0.30	1.20	0.30	1.20	ns		(Note 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°C), then testing immediately after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

## AC Electrical Characteristics (Continued)

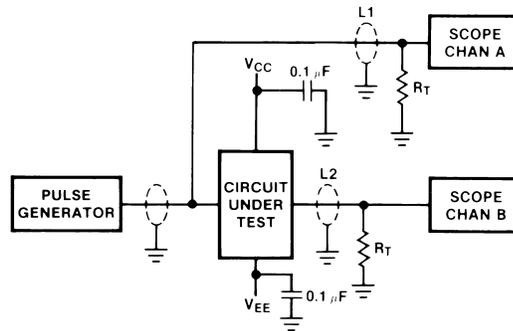
**Note 8:** Screen tested 100% on each device at +25°C temperature only, Subgroup A9.

**Note 9:** Sample tested (Method 5005, Table I) on each manufactured lot at +25°C, Subgroup A9, and at +125°C and -55°C temperatures, Subgroups A10 and A11.

**Note 10:** Not tested at +25°C, +125°C, and -55°C temperature (design characterization data).

**Note 11:** The propagation delay specified is for single output switching. Delays may vary up to 100 ps with multiple outputs switching.

## Test Circuitry



DS100303-5

### 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

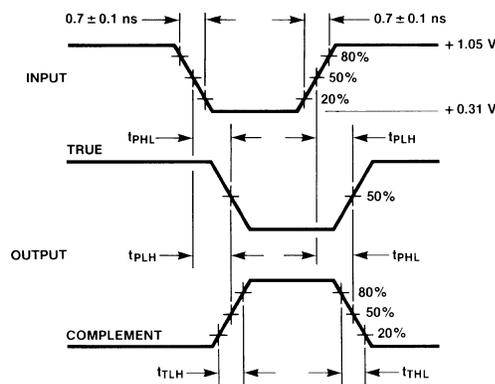
Decoupling 0.1 μF from GND to  $V_{CC}$  and  $V_{EE}$

All unused outputs are loaded with 50Ω to GND

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

FIGURE 1. AC Test Circuit

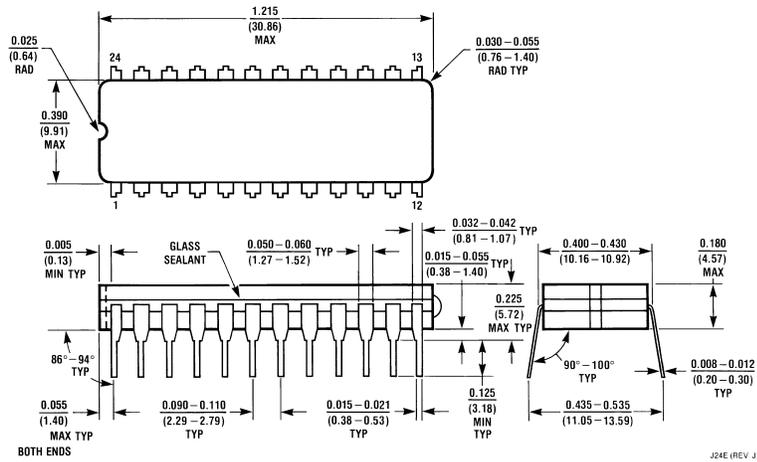
## Switching Waveforms



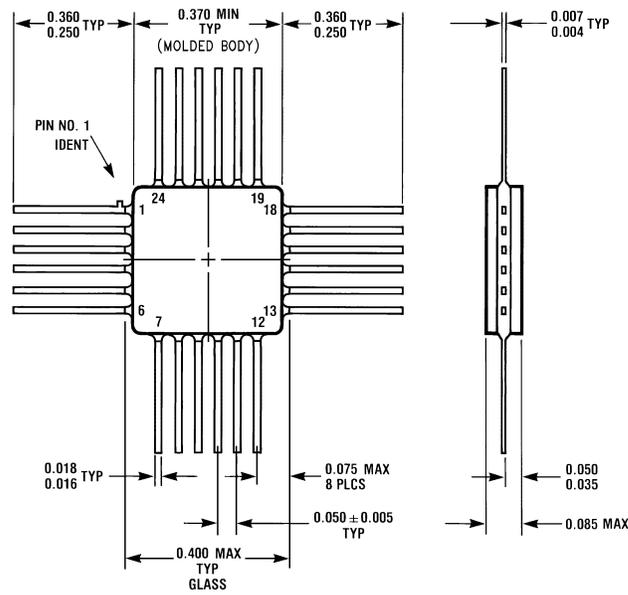
DS100303-6

FIGURE 2. Propagation Delay and Transition Times

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



**24-Lead Ceramic Dual-In-Line Package (0.400" Wide) (D)**  
NS Package Number J24E



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

W24B (REV. D)

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