

August 1998

100302 Low Power Quint 2-Input OR/NOR Gate

General Description

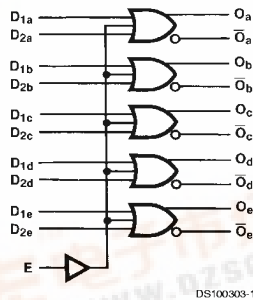
The 100302 is a monolithic quint 2-input OR/NOR gate with common enable. All inputs have 50 k Ω pull-down resistors and all outputs are buffered.

- 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
$\overline{O}_a$ – $\overline{O}_e$	Complementary Data Outputs

Truth Table

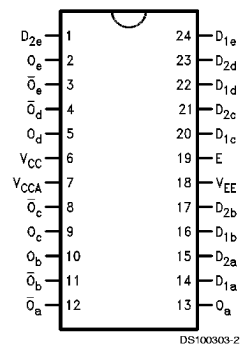
D_{1x}	D_{2x}	E	O_x	$\overline{O}_x$
L	L	L	L	H
L	L	H	H	L
L	H	L	H	L
L	H	H	H	L
H	L	L	H	L
H	L	H	H	L
H	H	L	H	L
H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level

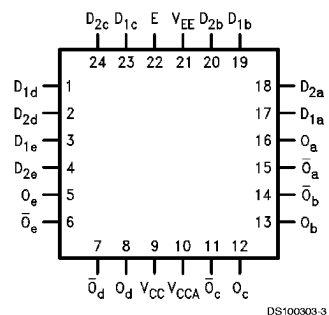
100302 Low Power Quint 2-Input OR/NOR Gate

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 $+150^{\circ}\text{C}$

Maximum Junction Temperature (T_J)

Ceramic $+175^{\circ}\text{C}$

V_{EE} Pin Potential to

Ground Pin -7.0V to $+0.5\text{V}$

Input Voltage (DC) V_{EE} to $+0.5\text{V}$

Output Current (DC Output HIGH) -50 mA

ESD (Note 2)

$\geq 2000\text{V}$

Recommended Operating Conditions

Case Temperature (T_C)

Military

-55°C to $+125^{\circ}\text{C}$

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

$V_{EE} = -4.2\text{V}$ to -5.7V , $V_{CC} = V_{CCA} = \text{GND}$, $T_C = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ (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		(Notes 3, 4, 5)
			340	μA	-55°C	V _{IN} = V _{IL} (Min)		
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 , $+25^{\circ}\text{C}$, and $+125^{\circ}\text{C}$, Subgroups 1, 2, 3, 7, and 8.

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

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

AC Electrical Characteristics

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

Symbol	Parameter	$T_C = -55^{\circ}\text{C}$		$T_C = +25^{\circ}\text{C}$		$T_C = +125^{\circ}\text{C}$		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							ns		
t_{PLH}	Propagation Delay	0.60	2.60	0.80	2.30	0.80	2.80	ns		
t_{PHL}	Enable to Output							ns		
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%							ns		

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)

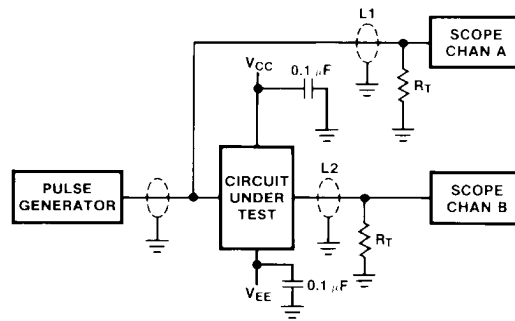
Note 8: Screen tested 100% on each device at +25°C temperature only, Subgroup A9.

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

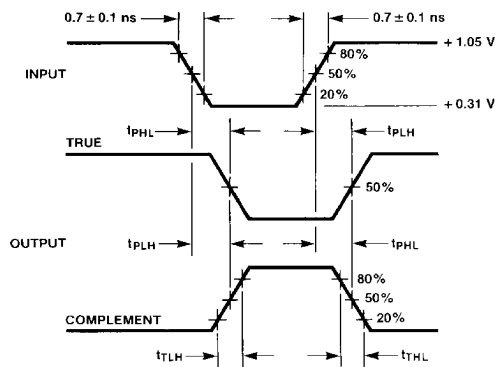
Decoupling 0.1 μF from GND to V_{CC} and V_{EE}

All unused outputs are loaded with 50Ω to GND

C_L = Fixture and stray capacitance ≤ 3 pF

FIGURE 1. AC Test Circuit

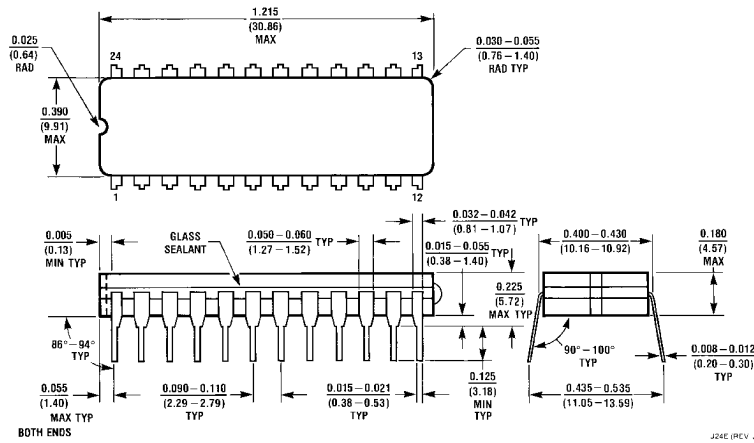
Switching Waveforms



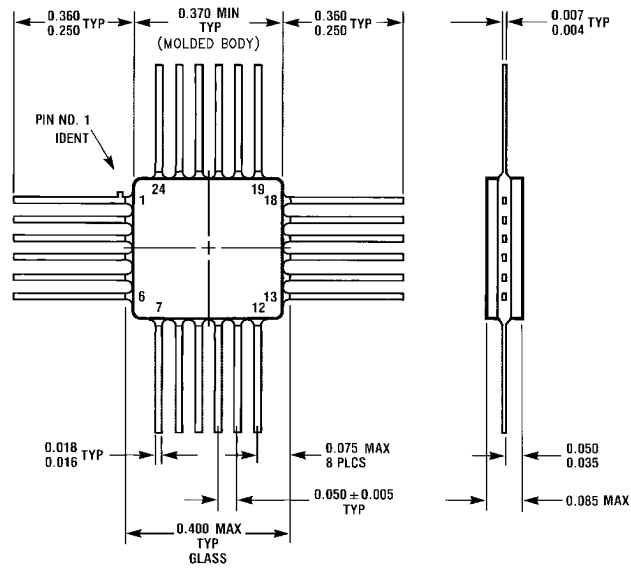
DS100303-6

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