

# 100313 Low Power Quad Driver

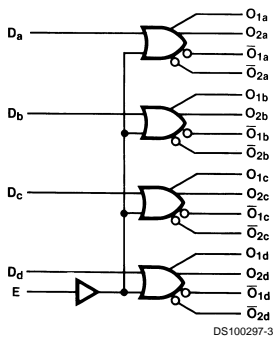
## General Description

The 100313 is a monolithic quad driver with two OR and two NOR outputs and common enable. The common input is buffered to minimize input loading. If the D inputs are not used the Enable can be used to drive sixteen 50Ω lines. All inputs have 50 kΩ pull-down resistors and all outputs are buffered.

## Features

- 50% power reduction of the 100113
- 2000V ESD protection
- Pin/function compatible with 100113 and 100112
- Voltage compensated operating range = -4.2V to -5.7V
- Standard Microcircuit Drawing (SMD) 5962-9673201

## Logic Symbol

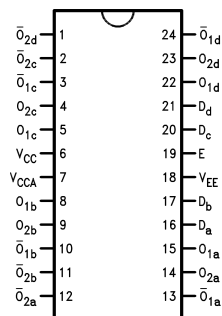


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Pin Names	Description
D <sub>a</sub> -D <sub>d</sub>	Data Inputs
E	Enable Input
O <sub>na</sub> -O <sub>nd</sub>	Data Outputs
$\bar{O}_{na}$ - $\bar{O}_{nd}$	Complementary Data Outputs

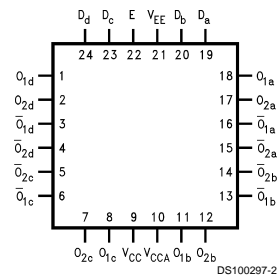
## Connection Diagrams

24-Pin DIP



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24-Pin Flatpak



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## 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	$T_C$	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	$V_{IN} = V_{IH (Min)}$ 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	Data Enable	350	μA	0°C to +125°C	$V_{EE} = -5.7V$ $V_{IN} = V_{IH (Max)}$		(Notes 3, 4, 5)
			240	μA	-55°C			
		Data Enable	500	μA	-55°C			
			340	μA	-55°C			
$I_{EE}$	Power Supply Current	-65	-20	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  $V_{OH}/V_{OL}$ .

## 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	0.30	2.00	0.30	1.80	0.30	2.30	ns	Figures 1, 2	(Notes 7, 8, 10, 11)
$t_{PHL}$	Data to Output									
$t_{PLH}$	Propagation Delay	0.50	2.40	0.60	2.30	0.60	2.70	ns		
$t_{PHL}$	Enable to Output									
$t_{TLH}$	Transition Time	0.30	2.00	0.30	1.90	0.30	2.00	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  $-55^\circ C$ ), then testing immediately after power-up. This provides "cold start" specs which can be considered a worst case condition at cold temperatures.

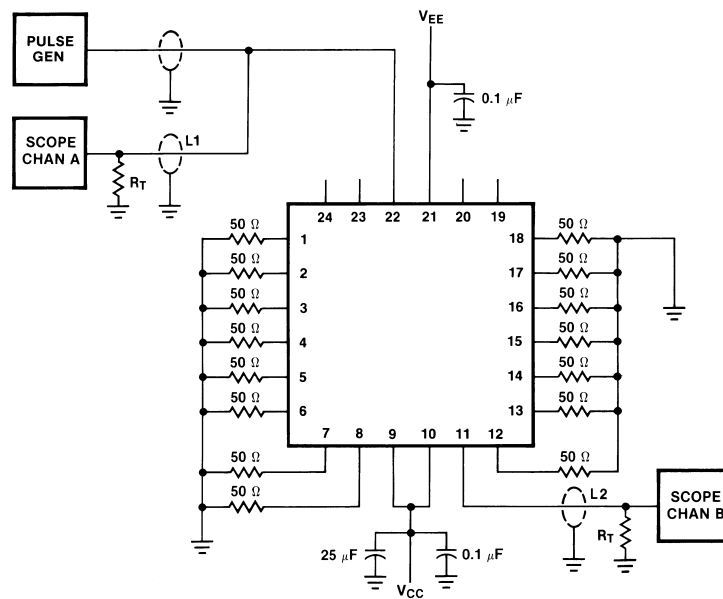
**Note 8:** Screen tested 100% on each device at  $+25^\circ C$ , Subgroup A9.

**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).

**Note 11:** The propagation delay specified is for single output switching. Delays may vary up to 150 ps with multiple outputs switching.

### Test Circuitry



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#### 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  $V_{EE}$ .

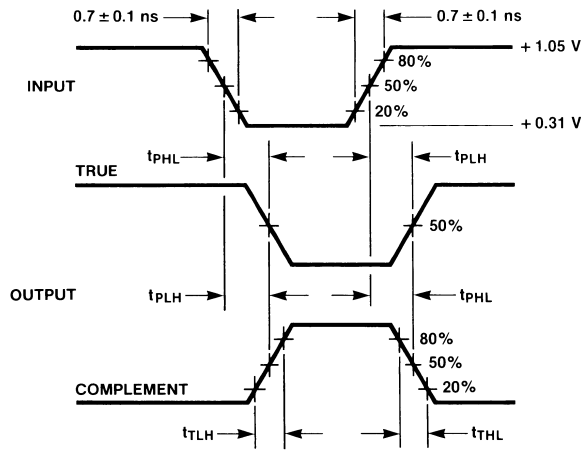
All unused outputs are loaded with 50Ω to GND.

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

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

FIGURE 1. AC Test Circuit

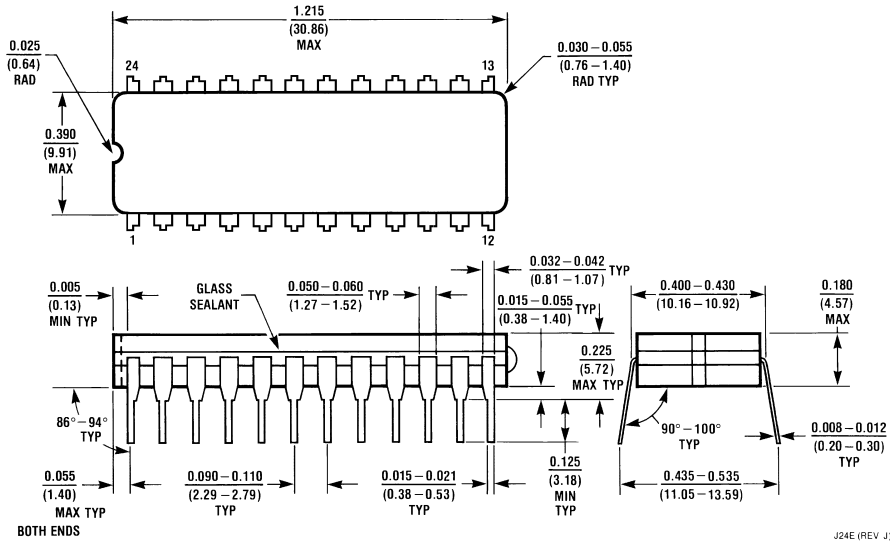
### Switching Waveforms



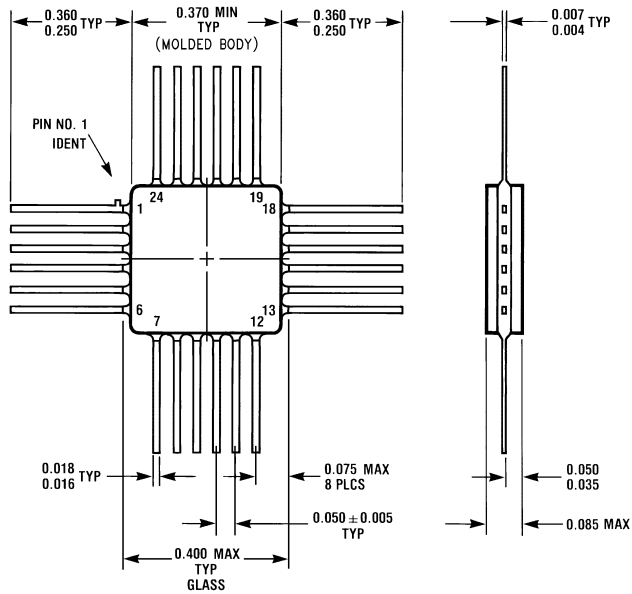
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FIGURE 2. Propagation Delay and Transition Times

**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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