National Semiconductor

August 1998

100313
Low Power Quad Driver

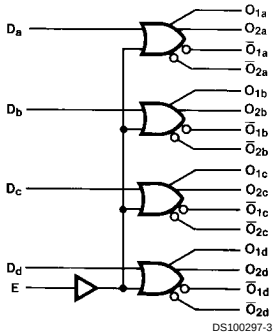
General Description

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

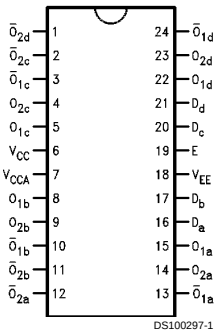


DS100297-3

Pin Names	Description
D_a–D_d	Data Inputs
E	Enable Input
O_{na}–O_{nd}	Data Outputs
$\overline{O}_{na}$–$\overline{O}_{nd}$	Complementary Data Outputs

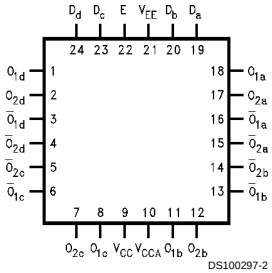
Connection Diagrams

24-Pin DIP



DS100297-1

24-Pin Flatpak



DS100297-2

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

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		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			
		−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			
			−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		350	µA	0˚C to +125˚C	V_{EE} = −5.7V V_{IN} = $V_{IH\ (Max)}$		(Notes 3, 4, 5)
	Enable		240					
	Data		500	µA	−55˚C			
	Enable		340					
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°C		T_C = +25°C		T_C = +125°C		Units	Conditions	Notes
		Min	Max	Min	Max	Min	Max			
t_{PLH} t_{PHL}	Propagation Delay Data to Output	0.30	2.00	0.30	1.80	0.30	2.30	ns		(Notes 7, 8, 10, 11)
t_{PLH} t_{PHL}	Propagation Delay Enable to Output	0.50	2.40	0.60	2.30	0.60	2.70	ns	*Figures 1, 2*	
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.30	2.00	0.30	1.90	0.30	2.00	ns		(Note 10)

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.

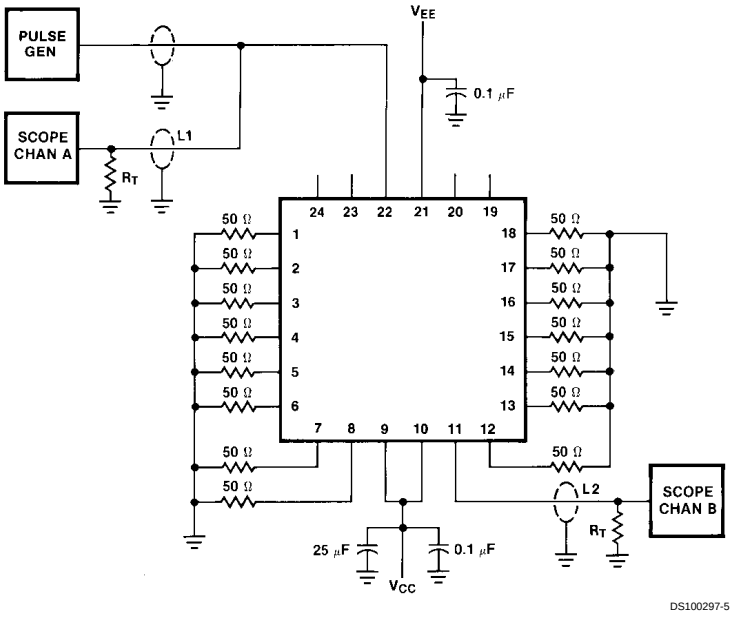
Note 8: Screen tested 100% on each device at +25°C, Subgroup A9.

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 150 ps with multiple outputs switching.

Test Circuitry



Notes:
V_{CC}, V_{CCA} = +2V, V_{EE} = −2.5V.
L1 and L2 = equal length 50Ω impedance lines.
R_T = 50Ω 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.
Pin numbers shown are for flatpak; for DIP see logic symbol.

FIGURE 1. AC Test Circuit

Switching Waveforms

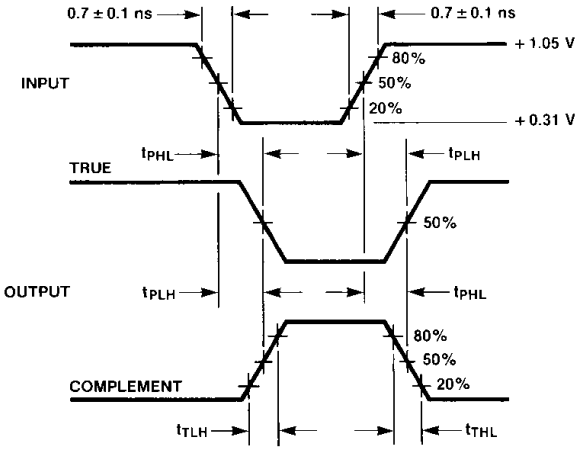
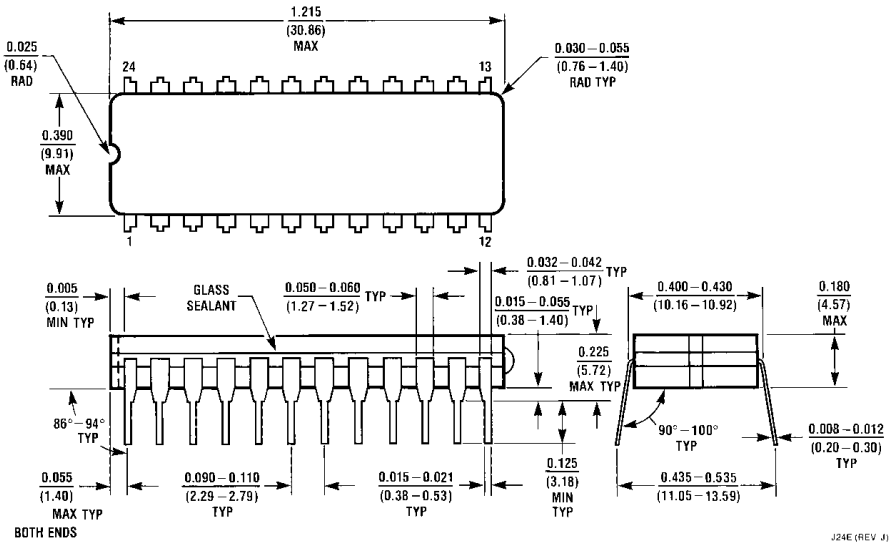
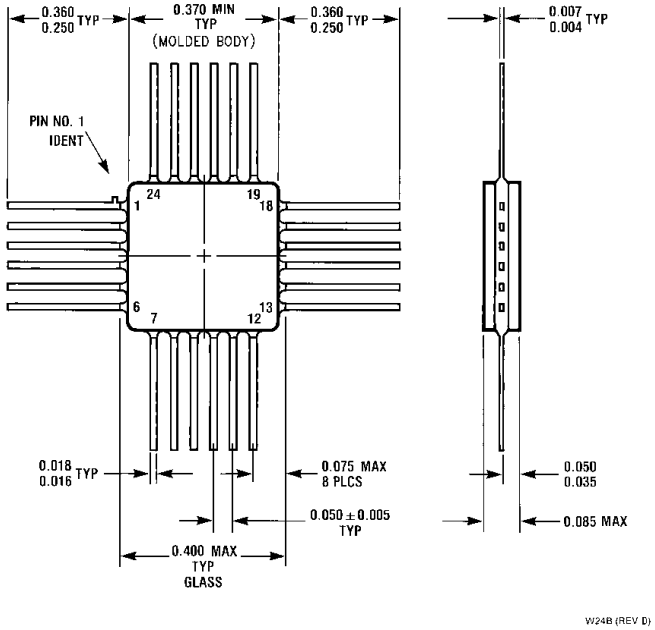


FIGURE 2. Propagation Delay and Transition Times

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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Datasheet

Title	Size (in Kbytes)	Date	View Online	Download	Receive via Email
100313 Low Power Quad Driver	119 Kbytes	4-Sep-98	View Online	Download	Receive via Email

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 Pricing		Std Pack Size	
	Type	# pins		SPICE	IBIS		Quantity	$US each		
5962-9673201QXA	Cerdip	24	Full production	N/A	N/A	.	50+	$24.2000	tube of 15	[lc 100 9(
5962-9673201QYA	Cerquad	24	Full production	N/A	N/A	.	50+	$27.0000	tube of 14	[lo; (F
100313FM-MLS	Cerquad	24	Full production	N/A	N/A	.	50+	$260.0000	tube of 14	[lo;

[Information as of 4-May-2000]