

**FAIRCHILD**  
SEMICONDUCTOR™

May 1991  
Revised November 1999

# 100319 Low Power Hex Line Driver with Cut-Off

## General Description

The 100319 is a Hex Line Driver with output cut-off capability. The 100319 has single ended ECL inputs and differential ECL outputs, designed to drive a differential, doubly terminated 50Ω transmission line (25Ω equivalent impedance) in an ECL backplane. A LOW on the Output Enable (OE) will set both the true and complementary outputs, to a high impedance or cut-off state. The cut-off state is designed to be more negative than a normal ECL LOW state.

## Features

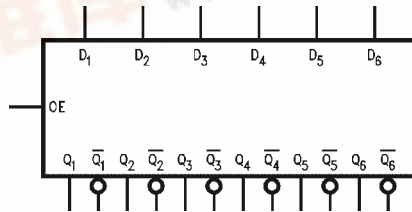
- Differential outputs
- Output cut-off capability
- Drives a 25Ω ECL load
- 2000V ESD protection
- Voltage compensated range = -4.2V to -5.7V
- Available to industrial grade temperature range

## Ordering Code:

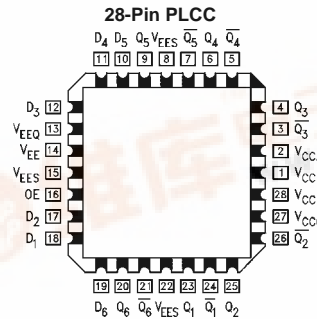
Order Number	Package Number	Package Description
100319QC	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square
100319QI	V28A	28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square Industrial Temperature Range (-40°C to +85°C)

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

## Logic Symbol



## Connection Diagram



## Pin Descriptions

Pin Names	Description
D <sub>n</sub>	Data Inputs
Q <sub>n</sub>	Data Outputs
$\bar{Q}_n$	Complementary Data Outputs
OE	Output Enable

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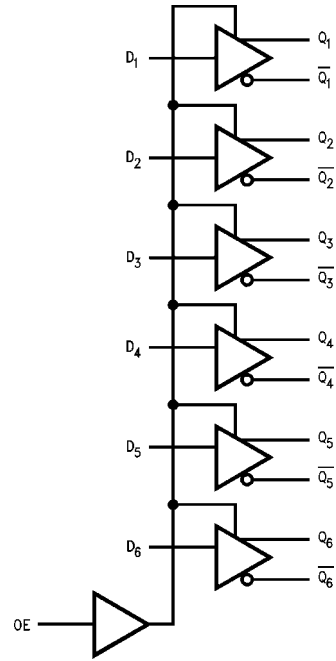
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**Truth Table**

Inputs		Outputs	
D <sub>n</sub>	OE	Q <sub>n</sub>	$\overline{Q}_n$
L	H	L	H
H	H	H	L
X	L	Cut-Off	Cut-Off

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care  
 Cut-off = Lower-than-LOW State

**Logic Diagram**



### Absolute Maximum Ratings (Note 1)

Storage Temperature (T <sub>STG</sub> )	-65°C to +150°C
Maximum Junction Temperature (T <sub>J</sub> )	+150°C
Pin Potential to Ground Pin (V <sub>EE</sub> )	-7.0V to +0.5V
Input Voltage (DC)	V <sub>EE</sub> to +0.5V
Output Current (DC Output HIGH)	-100 mA
ESD (Note 2)	≥2000V

### Recommended Operating Conditions

Case Temperature (T <sub>C</sub> )	Commercial	0°C to +85°C
	Industrial	-40°C to +85°C
Supply Voltage (V <sub>EE</sub> )		-5.7V to -4.2V

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:** ESD testing conforms to MIL-STD-883, Method 3015.

### Commercial Version

### DC Electrical Characteristics (Note 3)

V<sub>EE</sub> = -4.2V to -5.7V, V<sub>CC</sub> = V<sub>CCA</sub> = GND, T<sub>C</sub> = 0°C to +85°C

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V <sub>OH</sub>	Output HIGH Voltage	-1025	-955	-870	mV	V <sub>IN</sub> = V <sub>IH(Max)</sub> Loading with 25Ω to -2.0V
V <sub>OL</sub>	Output LOW Voltage	-1830	-1705	-1620	mV	or V <sub>IL(Min)</sub>
V <sub>OHC</sub>	Output HIGH Voltage	-1035			mV	V <sub>IN</sub> = V <sub>IH(Min)</sub> Loading with 25Ω to -2.0V
V <sub>OLC</sub>	Output LOW Voltage			-1610	mV	or V <sub>IL(Max)</sub>
V <sub>OLZ</sub>	Cut-Off LOW Voltage			-1950	mV	V <sub>IN</sub> = V <sub>IH(Min)</sub> or V <sub>IL(Max)</sub> OE = LOW
V <sub>IH</sub>	Input HIGH Voltage	-1110		-870	mV	Guaranteed HIGH Signal for All Inputs
V <sub>IL</sub>	Input LOW Voltage	-1830		-1530	mV	Guaranteed LOW Signal for All Inputs
I <sub>IL</sub>	Input LOW Current			100	μA	V <sub>IN</sub> = V <sub>IL(Min)</sub>
I <sub>IH</sub>	Input HIGH Current			360	μA	V <sub>IN</sub> = V <sub>IH(Max)</sub>
I <sub>EE</sub>	Power Supply Current, Normal	-119		-30	mA	
I <sub>EEZ</sub>	Power Supply Current, Cut-Off	-219		-75	mA	Inputs Open, OE = LOW

**Note 3:** The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

### AC Electrical Characteristics

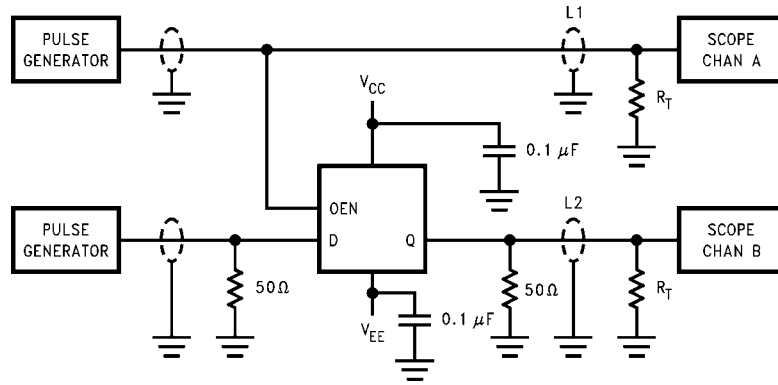
V<sub>EE</sub> = -4.2V to -5.7V, V<sub>CC</sub> = V<sub>CCA</sub> = GND

Symbol	Parameter	T <sub>C</sub> = 0°C		T <sub>C</sub> = +25°C		T <sub>C</sub> = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay Data to Output	0.65	2.10	0.65	2.10	0.65	2.10	ns	Figures 1, 2
t <sub>PZH</sub>	Propagation Delay OE to Output	1.8	4.1	1.8	4.1	1.8	4.1	ns	
t <sub>PHZ</sub>	Propagation Delay OE to Output	1.2	2.9	1.2	2.9	1.2	2.9	ns	
t <sub>TLH</sub>	Transition Time 20% to 80%, 80% to 20%	0.45	1.30	0.45	1.30	0.45	1.30	ns	

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Industrial Version									
DC Electrical Characteristics (Note 4)									
$V_{EE} = -4.2V$ to $-5.7V$ , $V_{CC} = V_{CCA} = GND$									
Symbol	Parameter	$T_C = -40^\circ C$		$T_C = 0^\circ C$ to $+85^\circ C$		Units	Conditions		
		Min	Max	Min	Max				
$V_{OH}$	Output HIGH Voltage	-1085	-870	-1025	-870	mV	$V_{IN} = V_{IH(Max)}$	Loading with $25\Omega$ to $-2.0V$	
$V_{OL}$	Output LOW Voltage	-1830	-1575	-1830	-1620	mV	or $V_{IL(Min)}$		
$V_{OHC}$	Output HIGH Voltage	-1095		-1035		mV	$V_{IN} = V_{IH(Min)}$	Loading with $25\Omega$ to $-2.0V$	
$V_{OLC}$	Output LOW Voltage		-1565		-1610	mV	or $V_{IL(Max)}$		
$V_{IH}$	Input HIGH Voltage	-1115	-870	-1110	-870	mV	Guaranteed HIGH Signal for All Inputs		
$V_{OLZ}$	Cut-Off LOW Voltage		-1900		-1950	mV	$V_{IN} = V_{IH(Min)}$ or $V_{IL(Max)}$	OE = LOW	
$V_{IL}$	Input LOW Voltage	-1830	-1535	-1830	-1530	mV	Guaranteed LOW Signal for All Inputs		
$I_{IL}$	Input LOW Current		130		100	$\mu A$	$V_{IN} = V_{IL(Min)}$		
$I_{IH}$	Input HIGH Current		360		360	$\mu A$	$V_{IN} = V_{IH(Max)}$		
$I_{EE}$	Power Supply Current, Normal	-119	-30	-119	-30	mA			
$I_{EEZ}$	Power Supply Current, Cut-Off	-219	-75	-219	-75	mA	Inputs Open OE = LOW		
<p><b>Note 4:</b> The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.</p>									
AC Electrical Characteristics									
$V_{EE} = -4.2V$ to $-5.7V$ , $V_{CC} = V_{CCA} = GND$									
Symbol	Parameter	$T_C = -40^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
$t_{PLH}$	Propagation Delay	0.65	2.10	0.65	2.10	0.65	2.10	ns	Figure 1 Figure 2
$t_{PHL}$	Data to Output								
$t_{PZH}$	Propagation Delay	1.8	4.1	1.8	4.1	1.8	4.1	ns	
$t_{PHZ}$	OE to Output	1.2	2.9	1.2	2.9	1.2	2.9	ns	
$t_{TLH}$	Transition Time	0.45	1.30	0.45	1.30	0.45	1.30	ns	
$t_{THL}$	20% to 80%, 80% to 20%								

**Test Circuitry**

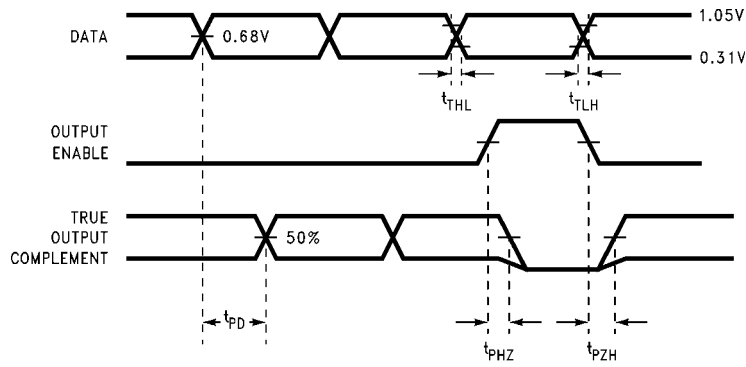


**Notes:**

- $V_{CC}, V_{CCA} = +2V, V_{EE} = -2.5V$
- 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 25Ω to GND
- $C_L$  = Fixture and stray capacitance  $\leq 3$  pF

**FIGURE 1. AC Test Circuit**

**Switching Waveforms**



**Note:** The output AC measurement point for cut-off propagation delay testing = the 50% voltage point between active  $V_{OL}$  and  $V_{OH}$ .

**FIGURE 2. Propagation Delay, Cut-Off and Transition Times**

