

# 100395 Low Power 9-Bit ECL-to-TTL Translator with Registers

## General Description

The 100395 is a 9-bit translator for converting F100K logic levels to FAST® TTL logic levels. A high on the output enable ( $\overline{OE}$ ) holds the TTL outputs in a high impedance state. Two separate clock inputs are available for multiplexing and system level testing.

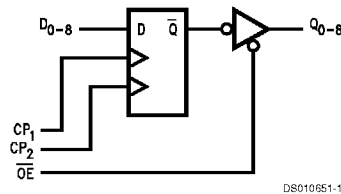
The 100395 is designed with FAST TTL 64 mA outputs for bus driving capability. All inputs have 50 k $\Omega$  pull down resistors. When the inputs are either unconnected or at the same potential, the outputs will go LOW.

## Features

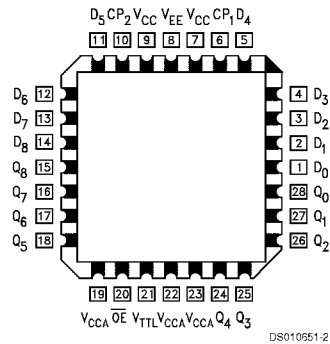
- 64 mA  $I_{OL}$  drive capability
- 2000V ESD protection
- -4.2V to -5.7V operating range
- Registered outputs
- FAST TTL outputs

## Ordering Code:

### Logic Symbol

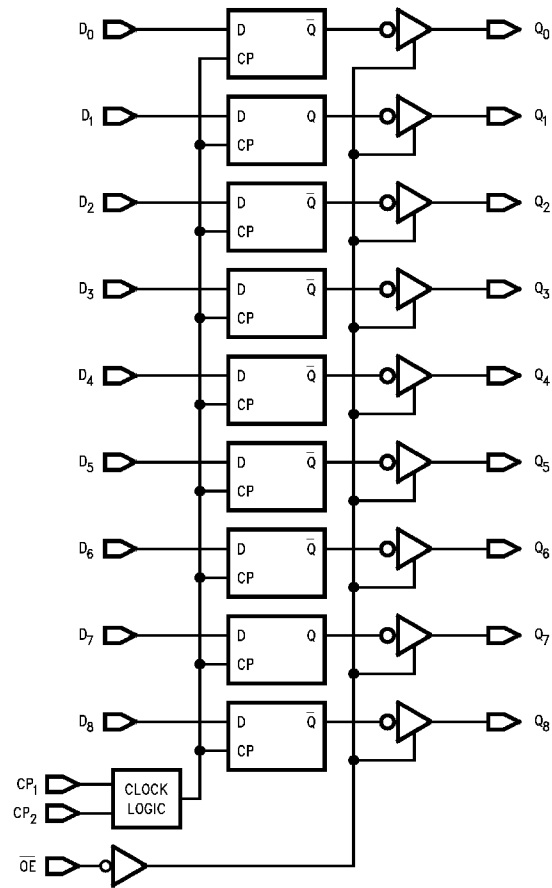


### Connection Diagram



Pin Names	Description
D <sub>0</sub> -D <sub>8</sub>	Data Inputs (ECL)
Q <sub>0</sub> -Q <sub>8</sub>	Data Outputs (TTL)
$\overline{OE}$	Output Enable
CP <sub>1</sub> , CP <sub>2</sub>	Clock Inputs

## Logic Diagram



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## Truth Table

Inputs				Outputs
CP <sub>1</sub>	CP <sub>2</sub>	$\overline{OE}$	D <sub>N</sub>	Q <sub>N</sub>
↗	L	L	L	L
L	↗	L	L	L
↗	L	L	H	H
L	↗	L	H	H
H	X	X	X	NC
X	H	X	X	NC
L	L	X	X	NC
X	X	H	X	Z

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care  
 Z = High Impedance  
 NC = No Change

## Absolute Maximum Ratings (Note 1)

Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
Maximum Junction Temperature ( $T_J$ )	+150°C
Case Temperature under Bias ( $T_C$ )	0°C to +85°C
$V_{EE}$ Pin Potential to Ground Pin	-7.0V to +0.5V
$V_{TTL}$ Pin Potential to Ground Pin	-0.5V to +6.0V
ECL Input Voltage (DC)	$V_{EE}$ to +0.5V
TTL Input Voltage	-0.5V to +7.0V
Output Current (DC Output HIGH)	+130 mA

ESD (Note 2)

≥ 2000V

## Recommended Operating Conditions

Case Temperature ( $T_C$ )	0°C to +85°C
Supply Voltage	
$V_{EE}$	-5.7V to -4.2V
$V_{TTL}$	+4.5V to +5.5V

**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.

## Commercial Version

### DC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = 0^\circ C$  to  $+85^\circ C$  (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
						$I_{OH} = -15\text{ mA}$	$V_{IN} = V_{IH} (\text{Max})$ or $V_{IL} (\text{Min})$
$V_{OH}$	Output HIGH Voltage	2.4			V		
$V_{OL}$	Output LOW Voltage			0.55	V	$I_{OL} = 64\text{ mA}$	
$V_{IH}$	Input HIGH Voltage	-1165		-870	mV	Guaranteed HIGH Signal for All Inputs	
$V_{IL}$	Input LOW Voltage	-1830		-1475	mV	Guaranteed LOW Signal for All Inputs	
$I_{IL}$	Input LOW Current	0.5			$\mu A$	$V_{IN} = V_{IL} (\text{Min})$	
$I_{IH}$	Input HIGH Current			240	$\mu A$	$V_{IN} = V_{IH} (\text{Max})$	
$I_{OZL}$	3-STATE Current Output High			-50	$\mu A$	$V_{OUT} = +0.4V$	
$I_{OZH}$	3-STATE Current Output Low			+50	$\mu A$	$V_{OUT} = +2.7V$	
$I_{CEX}$	Output High Leakage Current			250	$\mu A$	$V_{OUT} = V_{CC}$	
$I_{OS}$	Output Short-Circuit Current	-100		-225	mA		
$I_{EE}$	$V_{EE}$ Power Supply Current	-67		-29	mA	Inputs Open	
$I_{CCH}$	$V_{TTL}$ Power Supply Current High			29	mA		
$I_{CCL}$	$V_{TTL}$ Power Supply Current Low			65	mA		
$I_{CCZ}$	$V_{TTL}$ Power Supply Current 3-STATE			49	mA		

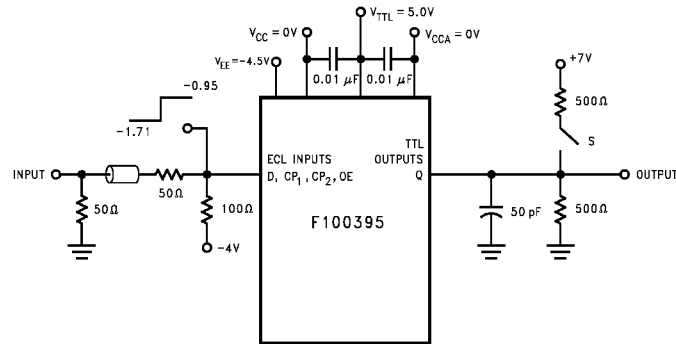
**Note 3:** The specified limits represent the "worst case" value for the parameter. Since these values normally occur at the temperature extremes, additional noise immunity and guardbanding can be achieved by decreasing the allowable system operating ranges. Conditions for testing shown in the tables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

### PCC, AC Electrical Characteristics

$V_{EE} = -4.2V$  to  $-5.7V$ ,  $V_{CC} = GND$ ,  $V_{TTL} = +4.5V$  to  $+5.5V$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
$t_{PLH}$	Propagation Delay	2.30	5.00	2.30	5.00	2.30	5.00	ns	Figures 1, 2
$t_{PHL}$	Clock to Output	3.00	5.60	3.00	5.60	3.40	6.40		
$t_{PZL}$	Output Enable Time	3.20	7.60	3.20	7.60	3.20	7.60	ns	Figures 1, 3
$t_{PZH}$	$\overline{OE} \downarrow$ to $Q_N$	2.40	5.60	2.40	5.60	2.40	5.60		
$t_{PLZ}$	Output Disable Time	3.20	7.60	3.20	7.60	3.20	7.60	ns	Figures 1, 3
$t_{PHZ}$	$\overline{OE} \uparrow$ to $Q_N$	2.40	5.60	2.40	5.60	2.40	5.60		
$t_H$	Data to CP $\overline{EN}$	1.5		1.5		1.5		ns	Figures 1, 2
	Hold Time	1.5		1.5		1.5			
$t_S$	Data to CP $\overline{EN}$	0.5		0.5		0.5		ns	Figures 1, 2
	Setup Time	0.5		0.5		0.5			
$t_{pw(H)}$	Clock Pulse Width	2.0		2.0		2.0		ns	Figures 1, 2

## Test Circuit



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### Notes:

$V_{CC} = 0V$ ,  $V_{CCA} = 0V$ ,  $V_{EE} = -4.5V$ ,  $V_{TTL} = +5V$ .

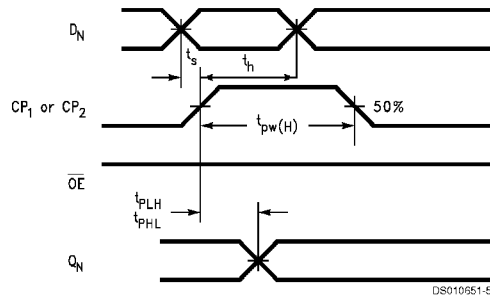
All unused outputs are loaded with  $500\Omega$  to GND. Decoupling capacitors are necessary in the test and end application environment. When  $V_{CC}$  and  $V_{CCA}$  are common to a single power plane, typically 0.0V, decouple  $V_{TTL}$  to that plane with one  $0.01\mu F$  capacitor.

FIGURE 1. AC Test Circuit

## Switch Positions for Parameter Testing

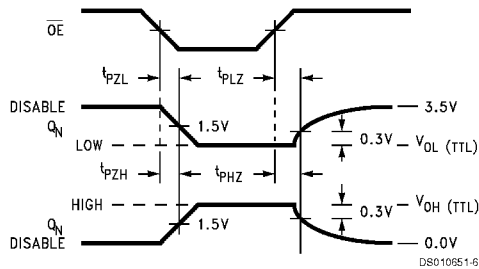
Parameter	S-Position
$t_{PLH}$ , $t_{PHL}$	Open
$t_{PHZ}$ , $t_{PZH}$	Open
$t_{PLZ}$ , $t_{PZL}$	Closed

## Switching Waveforms



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FIGURE 2. Propagation Delay and Transition Times

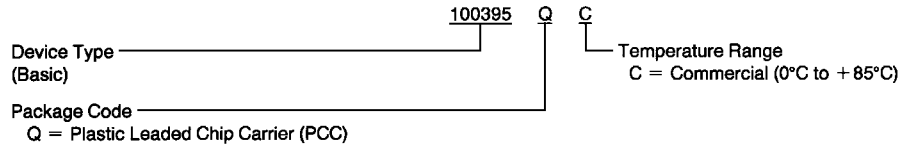


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FIGURE 3. Enable and Disable Waveforms,  $\overline{OE}$  to  $Q_N$

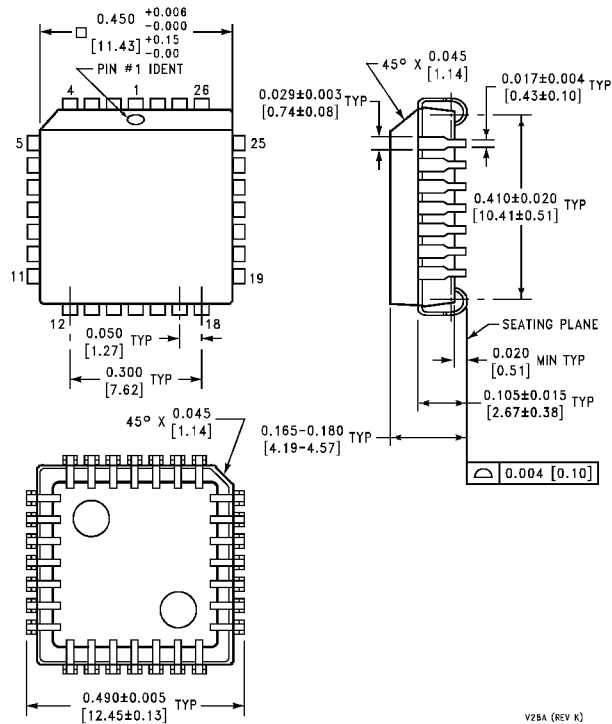
## Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



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## Physical Dimensions inches (millimeters) unless otherwise noted



V28A (REV K)

**28-Lead Plastic Chip Carrier (Q)  
Package Number V28A**

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