

# HEX PARALLEL D REGISTER WITH ENABLE

- 8-BIT HIGH SPEED PARALLEL REGISTER
- POSITIVE EDGE-TRIGGERED D-TYPE FLIP-FLOPS
- FULLY BUFFERED COMMON CLOCK AND ENABLE INPUTS
- INPUT CLAMP DIODES LIMIT HIGH SPEED TERMINATION EFFECTS
- FULLY TTL AND CMOS COMPATIBLE

## DESCRIPTION

The T74LS378 is an 8-Bit Register with a buffered common enable. This device is similar to the T74LS174, but with common Enable rather than common Master Reset.

## PIN NAMES

$\bar{E}$	ENABLE (active LOW) INPUT
D <sub>0</sub> -D <sub>5</sub>	DATA INPUTS
CP	CLOCK (active HIGH going edge) INPUT
Q <sub>0</sub> -Q <sub>5</sub>	TRUE OUTPUTS

**B1**  
(Plastic Package)

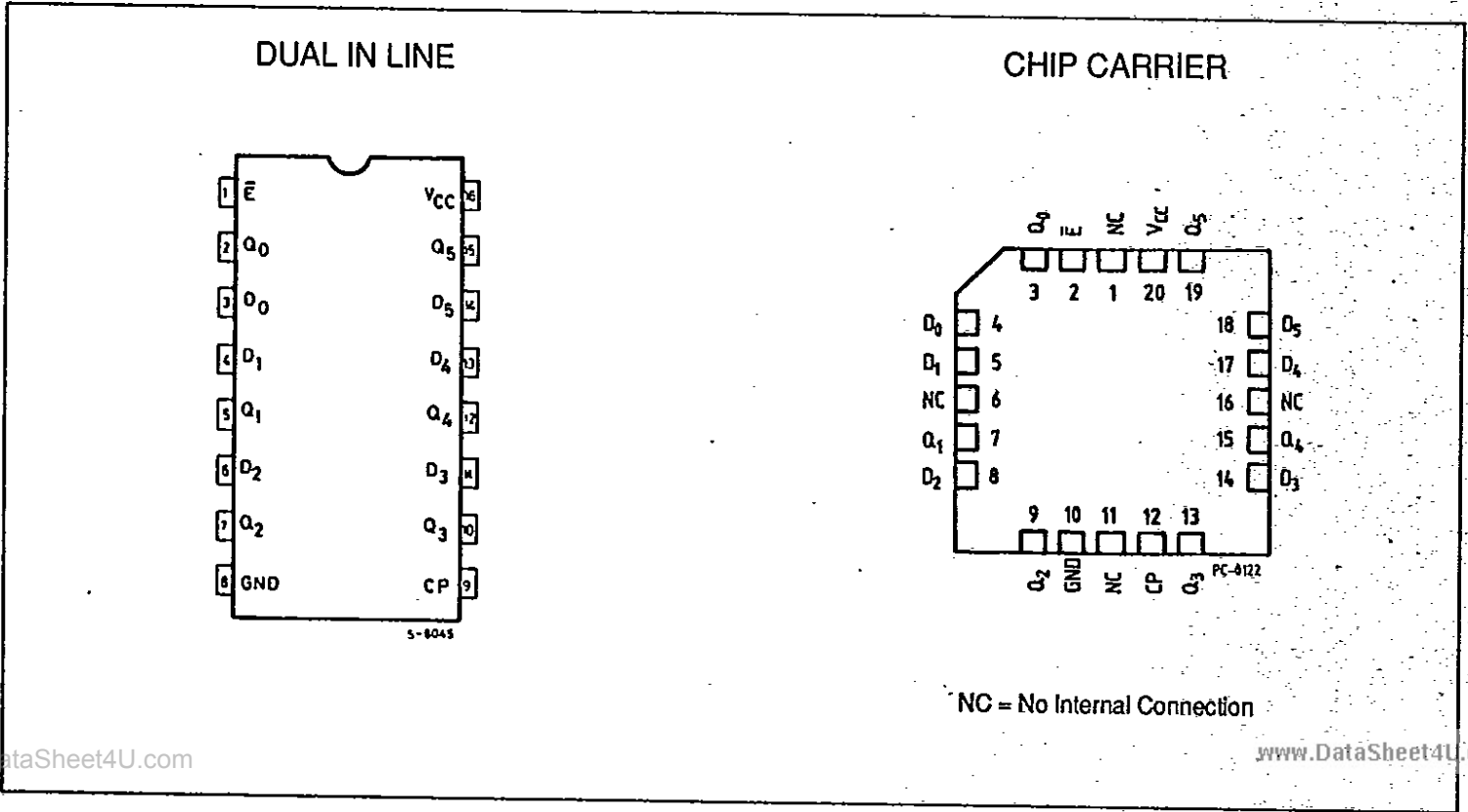
**D1**  
(Ceramic Package)

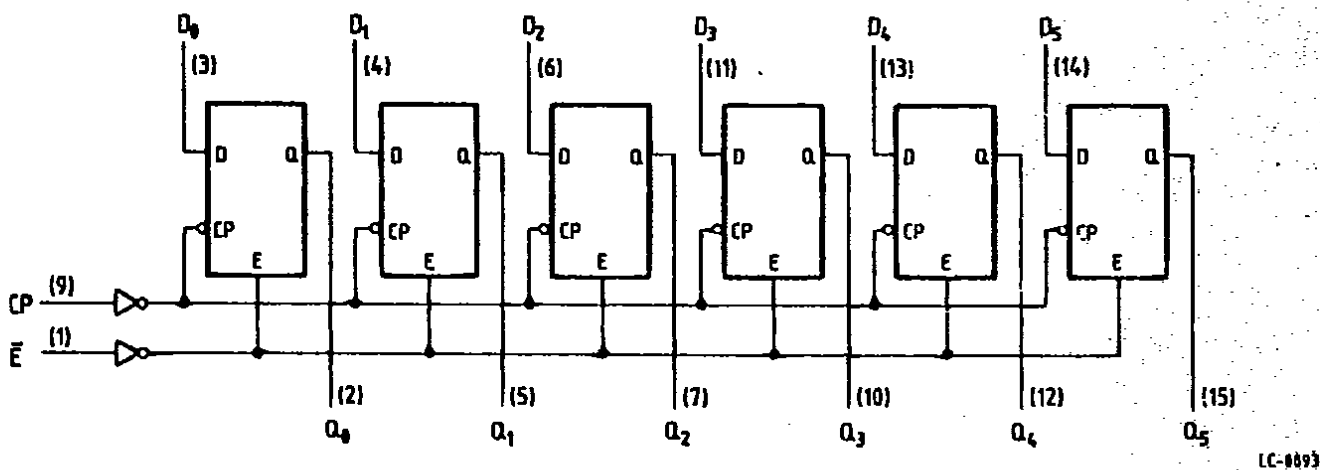
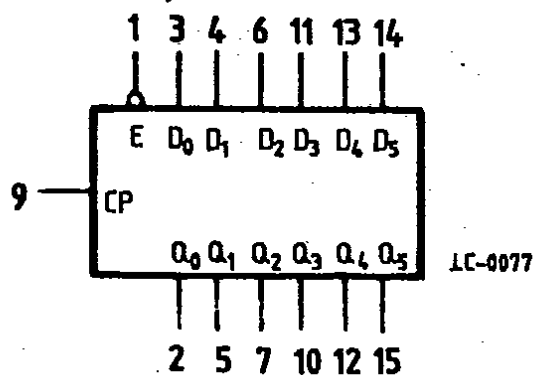
**M1**  
(Micro Package)

**C1**  
(Plastic Chip Carrier)

**ORDER CODES :**  
 T74LS378 D1      T74LS378 C1  
 T74LS378 B1      T74LS378 M1

## PIN CONNECTION (top view)





$V_{CC}$  = Pin 16  
 GND = Pin 8  
 () = Pin numbers

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## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	- 0.5 to 7	V
$V_I$	Input Voltage, Applied to Input	- 0.5 to 15	V
$V_O$	Output Voltage, Applied to Output	- 0.5 to 10	V
$I_I$	Input Current, into Inputs	- 30 to 5	mA
$I_O$	Output Current, into Outputs	50	mA

Stresses in excess of those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions in excess of those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## GUARANTEED OPERATING RANGE

Part Numbers	Supply Voltage			Temperature
	Min.	Typ.	Max.	
T74LS378XX	4.75 V	5.0 V	5.25 V	0 °C to + 70 °C

XX = package type.

# FUNCTIONAL DESCRIPTION

The LS378 consists of eight edge-triggered D flip-flops with individual D inputs and Q outputs. The Clock (CP) and Enable ( $\bar{E}$ ) input are common to all flip-flops.

When  $\bar{E}$  input is LOW, new data is entered into the register on the LOW-to-HIGH transition of CP input. When the  $\bar{E}$  input is HIGH the register will retain the present data independent of the CP input.

## TRUTH TABLE

$\bar{E}$	CP	$D_n$	$Q_n$
H		X	No charge
L		H	H
L		L	L

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Don't Care

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Symbol	Parameter	Limits			Test Condition (note 1)	Unit	
		Min.	Typ. (*)	Max.			
$V_{IH}$	Input HIGH Voltage	2.0			Guaranteed Input HIGH Threshold Voltage for All Inputs	V	
$V_{IL}$	Input LOW Voltage			0.8	Guaranteed Input LOW Threshold Voltage for All Inputs	V	
$V_{CD}$	Input Clamp Diode Voltage		- 0.65	- 1.5	$V_{CC} = \text{MIN}$ , $I_{IN} = -18 \text{ mA}$	V	
$V_{OH}$	Output HIGH Voltage	2.7	3.4		$V_{CC} = \text{MIN}$ , $I_{OH} = -400 \mu\text{A}$ $V_{IN} = V_{IH}$ or $V_{IL}$ per Truth Table	V	
$V_{OL}$	Output LOW Voltage		0.25	0.4	$I_{OL} = 4.0 \text{ mA}$	$V_{CC} = \text{MIN}$ , $V_{IN} = V_{IH}$ or $V_{IL}$ per Truth Table	V
			0.35	0.5	$I_{OL} = 8.0 \text{ mA}$		V
$I_{IH}$	Input HIGH Current			20 0.1	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7 \text{ V}$ $V_{CC} = \text{MAX}$ , $V_{IN} = 7.0 \text{ V}$	$\mu\text{A}$ mA	
$I_{IL}$	Input LOW Current			- 0.4	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.4 \text{ V}$	mA	
$I_{OS}$	Output Short Circuit Current (note 2)	- 20		- 100	$V_{CC} = \text{MAX}$ , $V_{OUT} = 0 \text{ V}$	mA	
$I_{CC}$	Power Supply Current		16	27	$V_{CC} = \text{MAX}$	mA	

Notes : 1. Conditions for testing, not shown in the table, are chosen to guarantee operation under "worst case" conditions.  
2. Not more than one output should be shorted at a time.  
(\*) Typical values are at  $V_{CC} = 5.0 \text{ V}$ ,  $T_A = 25 \text{ }^\circ\text{C}$ .

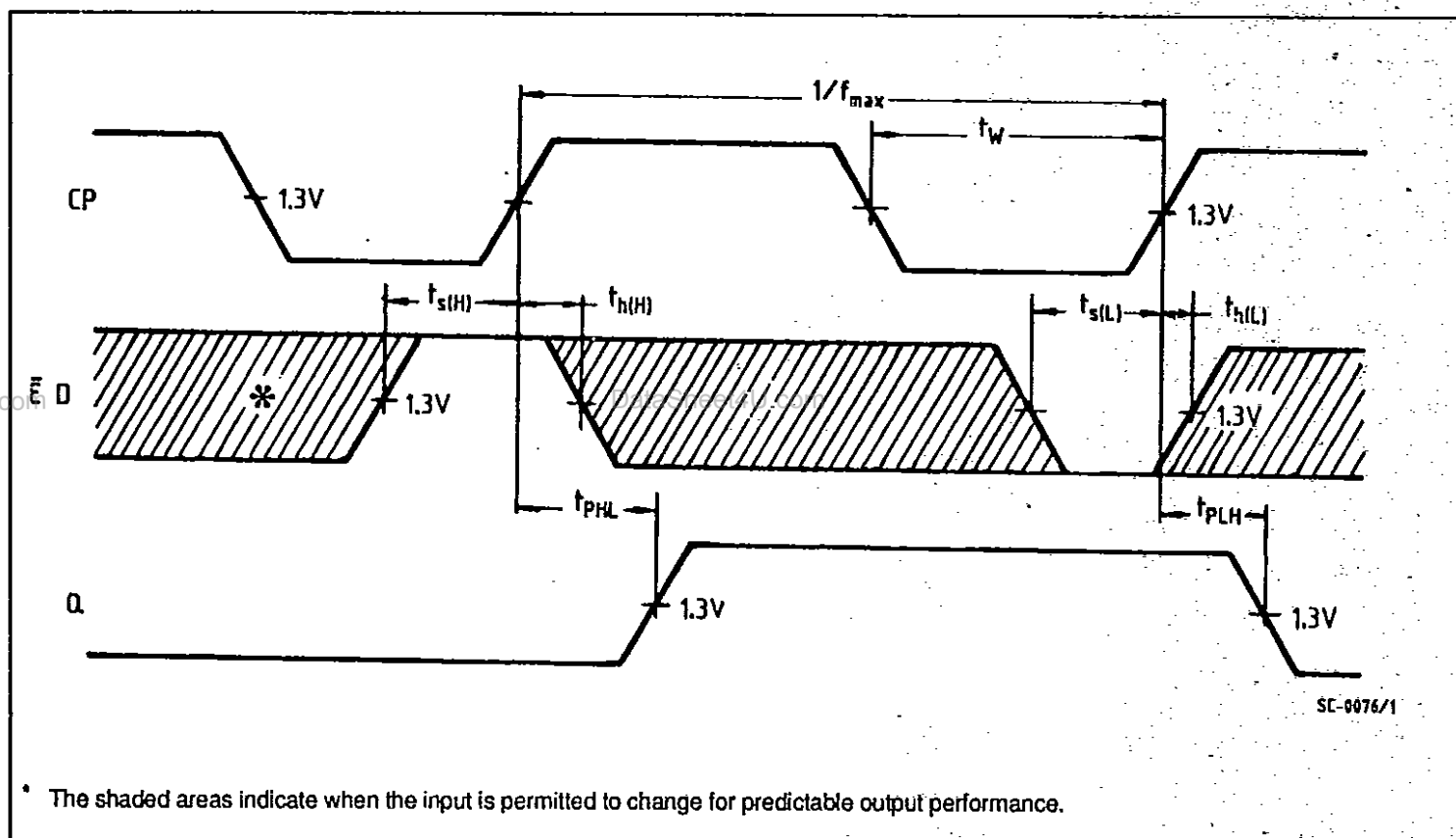
## AC CHARACTERISTICS : $T_A = 25 \text{ }^\circ\text{C}$

Symbol	Parameter	Limits			Test Conditions	Unit
		Min.	Typ.	Max.		
$f_{MAX}$	Minimum Input Clock Frequency	30	40		Fig. 1	MHz
$t_{PLH}$	CP to Q Output		17	27	Fig. 1	ns
$t_{PHL}$	CP to Q Output		18	27	Fig. 1	ns

Symbol	Parameter	Limits			Test Conditions	Unit
		Min.	Typ.	Max.		
$t_s$	Set-up Time, Data to Clock (HIGH or LOW)	20			Fig. 1	V <sub>CC</sub> = 5.0 V
$t_h$	Hold Time, Data to Clock (HIGH or LOW)	5			Fig. 1	
$t_s$	Set-up Time, Enable to Clock (HIGH or LOW)	30			Fig. 1	
$t_h$	Hold Time, Enable to Clock (HIGH or LOW)	5			Fig. 1	
$t_{wCP}$	Minimum Clock Pulse Width	20				

### AC WAVEFORMS

Figure 1 : Clock to Output Delays, Clock Pulse Width, Frequency, Set-up and Hold Times Data, Enable to Clock.



### DEFINITION OF TERMS :

**SET-UP TIME ( $t_s$ )-** is defined as the minimum time required for the correct logic level to be present at the logic input prior to the clock transition from LOW to HIGH in order to be recognized and transferred to the outputs.

**HOLD-TIME ( $t_h$ )-** is defined as the minimum time following the clock transition from LOW to HIGH that the logic level must be maintained at the input in order to ensure continued recognition. A negative HOLD TIME indicates that the correct logic level may be released prior to the clock transition from LOW to HIGH and still be recognized.