

54AC373 • 54ACT373 Octal Transparent Latch with TRI-STATE® Outputs

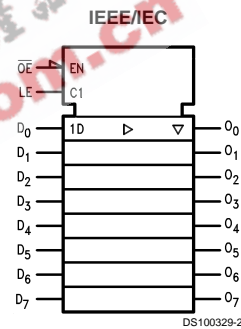
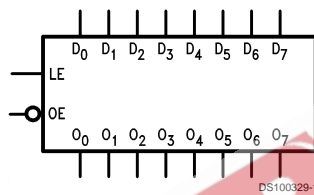
General Description

The 'AC/'ACT373 consists of eight latches with TRI-STATE outputs for bus organized system applications. The flip-flops appear transparent to the data when Latch Enable (LE) is HIGH. When LE is LOW, the data that meets the setup time is latched. Data appears on the bus when the Output Enable (\overline{OE}) is LOW. When \overline{OE} is HIGH, the bus output is in the high impedance state.

Features

- I_{CC} and I_{OZ} reduced by 50%
- Eight latches in a single package
- TRI-STATE outputs for bus interfacing
- Outputs source/sink 24 mA
- 'ACT373 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD)
 - 'AC373: 5962-87555
 - 'ACT373: 5962-87556

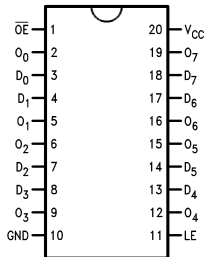
Logic Symbols



Pin Names	Description
D_0 – D_7	Data Inputs
LE	Latch Enable Input
\overline{OE}	Output Enable Input
O_0 – O_7	TRI-STATE Latch Outputs

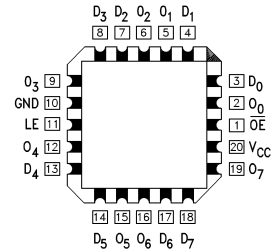
Connection Diagrams

Pin Assignment for DIP and Flatpak



DS100329-3

Pin Assignment for LCC



DS100329-4

Functional Description

The 'AC/ACT373 contains eight D-type latches with TRI-STATE standard outputs. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW, the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The TRI-STATE standard outputs are controlled by the Output Enable (\overline{OE}) input. When \overline{OE} is LOW, the standard outputs are in the 2-state mode. When \overline{OE} is HIGH, the standard outputs are in the high impedance mode but this does not interfere with entering new data into the latches.

Truth Table

Inputs			Outputs
LE	\overline{OE}	D_n	O_n
X	H	X	Z
H	L	L	L
H	L	H	H
L	L	X	O_0

H = HIGH Voltage Level

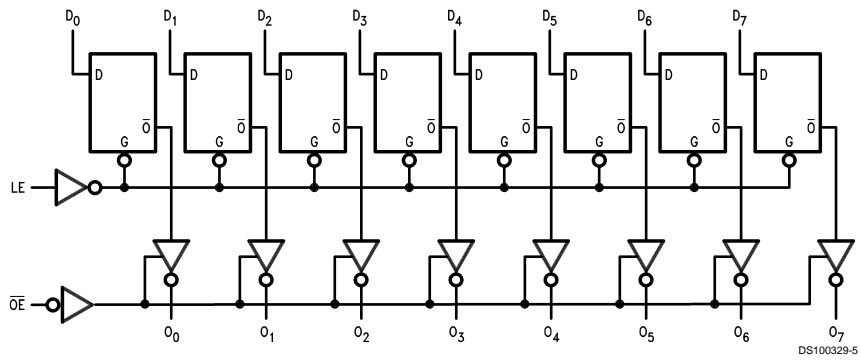
L = LOW Voltage Level

Z = High Impedance

X = Immaterial

O_0 = Previous O_0 before HIGH to Low transition of Latch Enable

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

EEPW 电子产品世界
.com.cn

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source	
or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current	
per Output Pin (I_{CC} or I_{GND})	± 50 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Junction Temperature (T_J)	
CDIP	175°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
'AC	2.0V to 6.0V
'ACT	4.5V to 5.5V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	
54AC/ACT	-55°C to +125°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
'AC Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
'ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT® circuits outside databook specifications.

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V_{CC} (V)	54AC	Units	Conditions
			$T_A =$		
			-55°C to +125°C		
Guaranteed Limits					
V_{IH}	Minimum High Level Input Voltage	3.0	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	3.15		
		5.5	3.85		
V_{IL}	Maximum Low Level Input Voltage	3.0	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	1.35		
		5.5	1.65		
V_{OH}	Minimum High Level Output Voltage	3.0	2.9	V	$I_{OUT} = -50 \mu A$
		4.5	4.4		
		5.5	5.4		
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1	V	$I_{OUT} = 50 \mu A$
		4.5	0.1		
		5.5	0.1		
I_{IN}	Maximum Input Leakage Current	3.0	2.4	V	(Note 2) $V_{IN} = V_{IL}$ or V_{IH}
		4.5	3.7		
		5.5	4.7		
I_{OL}	Maximum Low Level Output Current	3.0	0.50	V	I_{OL}
		4.5	0.50		
		5.5	0.50		
I_{OH}	Maximum High Level Output Current	3.0	0.50	V	I_{OH}
		4.5	0.50		
		5.5	0.50		
I_{CC}	Maximum Input Leakage Current	3.0	± 1.0	μA	$V_I = V_{CC}, GND$
		4.5			
		5.5			

DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V _{CC} (V)	54AC	Units	Conditions
			T _A =		
			Guaranteed Limits		
I _{OZ}	Maximum TRI-STATE Current	5.5	±5.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	(Note 3) Minimum Dynamic Output Current	5.5	50	mA	V _{OLD} = 1.65V Max
I _{OHD}		5.5	-50	mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0	μA	V _{IN} = V _{CC} or GND

Note 2: All outputs loaded, thresholds on input associated with output under test.

Note 3: Maximum test duration 2.0 ms, one output loaded at a time.

Note 4: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.

I_{CC} for 54AC @ 25°C is identical to 74AC @ 25°C.

DC Characteristics for 'ACT Family Devices

Symbol	Parameter	V _{CC} (V)	54ACT	Units	Conditions
			T _A =		
			Guaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	4.5	2.0	V	V _{OUT} = 0.1V or V _{CC} - 0.1V
		5.5	2.0		
V _{IL}	Maximum Low Level Input Voltage	4.5	0.8	V	V _{OUT} = 0.1V or V _{CC} - 0.1V
		5.5	0.8		
V _{OH}	Minimum High Level Output Voltage	4.5	4.4	V	I _{OUT} = -50 μA
		5.5	5.4		
		4.5	3.70		
5.5	4.70				
V _{OL}	Maximum Low Level Output Voltage	4.5	0.1	V	I _{OUT} = 50 μA
		5.5	0.1		
		4.5	0.50		
5.5	0.50				
I _{IN}	Maximum Input Leakage Current	5.5	±1.0	μA	V _I = V _{CC} , GND
I _{OZ}	Maximum TRI-STATE Current	5.5	±5.0	μA	V _I = V _{IL} , V _{IH} V _O = V _{CC} , GND
I _{CCT}	Maximum I _{CC} /Input	5.5	1.6	mA	V _I = V _{CC} - 2.1V
I _{OLD}	(Note 6) Minimum Dynamic Output Current	5.5	50	mA	V _{OLD} = 1.65V Max
I _{OHD}	Output Current	5.5	-50	mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0	μA	V _{IN} = V _{CC} or GND

Note 5: All outputs loaded; thresholds on input associated with output under test.

Note 6: Maximum test duration 2.0 ms, one output loaded at a time.

Note 7: I_{CC} for 54ACT @ 25°C is identical to 74ACT @ 25°C.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) (Note 8)	54AC		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Min	Max	
t _{PLH}	Propagation Delay D _n to O _n	3.3	1.0	16.5	ns
		5.0	1.5	11.5	
t _{PHL}	Propagation Delay D _n to O _n	3.3	1.0	16.0	ns
		5.0	1.5	11.5	
t _{PLH}	Propagation Delay LE to O _n	3.3	1.0	16.5	ns
		5.0	1.5	12.0	
t _{PHL}	Propagation Delay LE to O _n	3.3	1.0	15.0	ns
		5.0	1.5	11.0	
t _{PZH}	Output Enable Time	3.3	1.0	14.0	ns
		5.0	1.5	10.5	
t _{PZL}	Output Enable Time	3.3	1.0	13.5	ns
		5.0	1.5	10.0	
t _{PHZ}	Output Disable Time	3.3	1.0	16.0	ns
		5.0	1.5	13.5	
t _{PLZ}	Output Disable Time	3.3	1.0	13.0	ns
		5.0	1.5	10.5	

Note 8: Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

AC Operating Requirements

Symbol	Parameter	V _{CC} (V) (Note 9)	54AC		Units	Fig. No.
			T _A = -55°C to +125°C C _L = 50 pF			
			Guaranteed Minimum			
t _s	Setup Time, HIGH or LOW D _n to LE	3.3	6.5		ns	
		5.0	5.0			
t _h	Hold Time, HIGH or LOW D _n to LE	3.3	1.0		ns	
		5.0	1.0			
t _w	LE Pulse Width, HIGH	3.3	6.5		ns	
		5.0	5.0			

Note 9: Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) (Note 10)	54ACT		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Min	Max	
t _{PLH}	Propagation Delay D _n to O _n	5.0	1.5	12.5	ns
t _{PHL}	Propagation Delay D _n to O _n	5.0	1.5	12.5	ns
t _{PLH}	Propagation Delay LE to O _n	5.0	1.5	12.5	ns
t _{PHL}	Propagation Delay LE to O _n	5.0	1.5	11.5	ns
t _{PZH}	Output Enable Time	5.0	1.5	11.5	ns
t _{PZL}	Output Enable Time	5.0	1.5	11.0	ns
t _{PHZ}	Output Disable Time	5.0	1.5	14.0	ns
t _{PLZ}	Output Disable Time	5.0	1.5	11.0	ns

Note 10: Voltage Range 5.0 is 5.0V ±0.5V

AC Operating Requirements

Symbol	Parameter	V _{CC} (V) (Note 11)	54ACT		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW D _n to LE	5.0	8.5		ns
t _h	Hold Time, HIGH or LOW D _n to LE	5.0	1.0		ns
t _w	LE Pulse Width, HIGH	5.0	8.5		ns

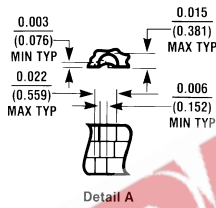
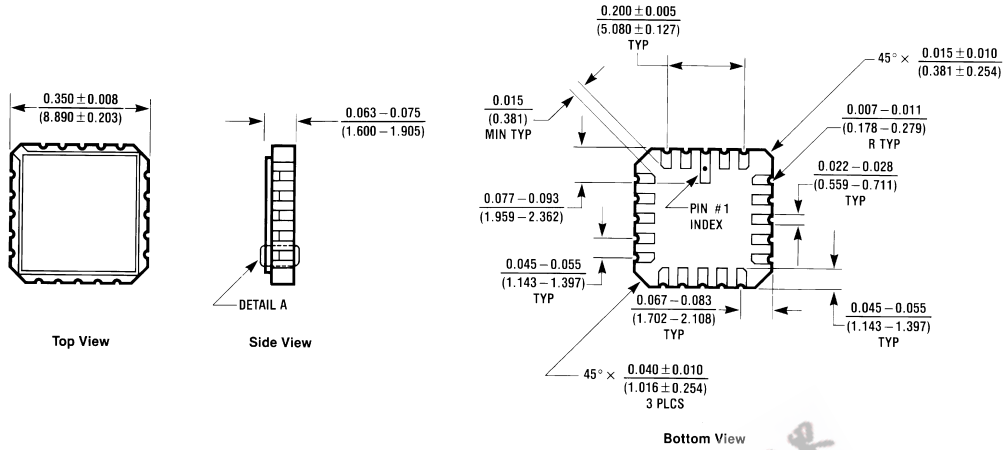
Note 11: Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	40.0	pF	V _{CC} = 5.0V

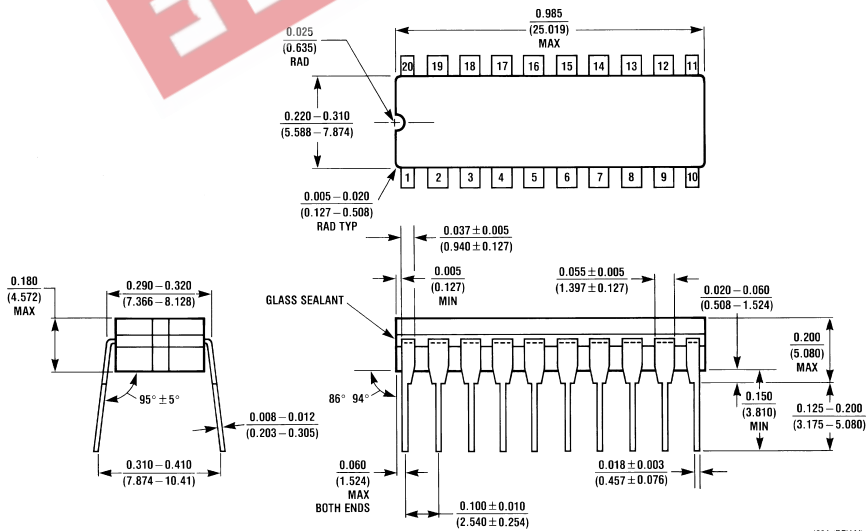
EEPW 电子产品世界
.com.cn

Physical Dimensions inches (millimeters) unless otherwise noted



20 Terminal Ceramic Leadless Chip Carrier (L)
 NS Package Number E20A

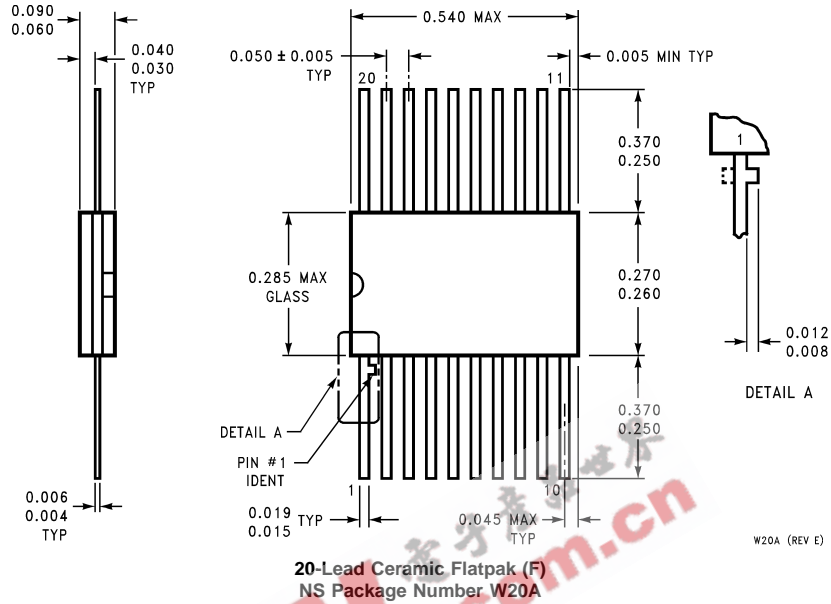
E20A (REV. 0)



20 Lead Ceramic Dual-In-Line Package (D)
 NS Package Number J20A

J20A (REV. M)

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179