

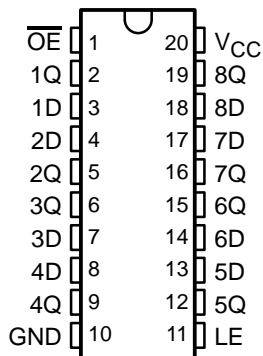
SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS235I – OCTOBER 1995 – REVISED JULY 2003

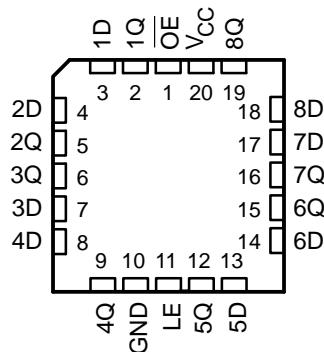
- Operating Range 2-V to 5.5-V V_{CC}
- Latch-Up Performance Exceeds 250 mA Per JESD 17

- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

SN54AHC373 . . . J OR W PACKAGE
SN74AHC373 . . . DB, DGV, DW, N, NS, OR PW PACKAGE
(TOP VIEW)



SN54AHC373 . . . FK PACKAGE
(TOP VIEW)



description/ordering information

The 'AHC373 devices are octal transparent D-type latches designed for 2-V to 5.5-V V_{CC} operation.

When the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is low, the Q outputs are latched at the logic levels of the D inputs.

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube	SN74AHC373N	SN74AHC373N
	SOIC – DW	Tube	SN74AHC373DW	AHC373
		Tape and reel	SN74AHC373DWR	
	SOP – NS	Tape and reel	SN74AHC373NSR	AHC373
	SSOP – DB	Tape and reel	SN74AHC373DBR	HA373
	TSSOP – PW	Tube	SN74AHC373PW	HA373
		Tape and reel	SN74AHC373PWR	
TVSOP – DGV	Tape and reel	SN74AHC373DGV	HA373	
-55°C to 125°C	CDIP – J	Tube	SNJ54AHC373J	SNJ54AHC373J
	CFP – W	Tube	SNJ54AHC373W	SNJ54AHC373W
	LCCC – FK	Tube	SNJ54AHC373FK	SNJ54AHC373FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

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SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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description/ordering information (continued)

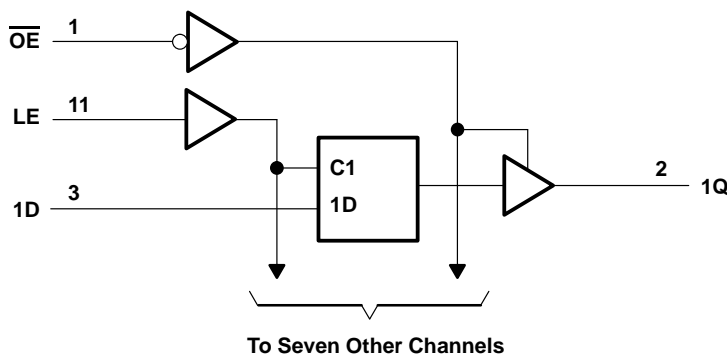
\overline{OE} does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

FUNCTION TABLE
(each latch)

INPUTS			OUTPUT
\overline{OE}	LE	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC}	-0.5 V to 7 V
Input voltage range, V_I (see Note 1)	-0.5 V to 7 V
Output voltage range, V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$)	-20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±25 mA
Continuous current through V_{CC} or GND	±75 mA
Package thermal impedance, θ_{JA} (see Note 2):	
DB package	70°C/W
DGV package	92°C/W
DW package	58°C/W
N package	69°C/W
NS package	60°C/W
PW package	83°C/W
Storage temperature range, T_{stg}	-65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.



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SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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recommended operating conditions (see Note 3)

		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage	2	5.5	2	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V		1.5		V
		V _{CC} = 3 V		2.1		
		V _{CC} = 5.5 V		3.85		
V _{IL}	Low-level input voltage	V _{CC} = 2 V		0.5		V
		V _{CC} = 3 V		0.9		
		V _{CC} = 5.5 V		1.65		
V _I	Input voltage	0	5.5	0	5.5	V
V _O	Output voltage	0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V		-50		μA
		V _{CC} = 3.3 V ± 0.3 V		-4		
		V _{CC} = 5 V ± 0.5 V		-8		
I _{OL}	Low-level output current	V _{CC} = 2 V		50		μA
		V _{CC} = 3.3 V ± 0.3 V		4		
		V _{CC} = 5 V ± 0.5 V		8		
Δt/Δv	Input transition rise or fall rate	V _{CC} = 3.3 V ± 0.3 V		100		ns/V
		V _{CC} = 5 V ± 0.5 V		20		
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHC373		SN74AHC373		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = -50 μA	2 V	1.9			1.9		1.9		V
		3 V	2.9			2.9		2.9		
		4.5 V	4.4			4.4		4.4		
	I _{OH} = -4 mA	3 V	2.58			2.48		2.48		
	I _{OH} = -8 mA	4.5 V	3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	2 V	0.1			0.1		0.1		V
		3 V	0.1			0.1		0.1		
		4.5 V	0.1			0.1		0.1		
	I _{OL} = 4 mA	3 V	0.36			0.5		0.44		
	I _{OL} = 8 mA	4.5 V	0.36			0.5		0.44		
I _I	V _I = 5.5 V or GND	0 V to 5.5 V	±0.1			±1*		±1		μA
I _{OZ}	V _I = V _{IH} or V _{IL} , V _O = V _{CC} or GND	5.5 V	±0.25			±2.5		±2.5		μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V	4			40		40		μA
C _i	V _I = V _{CC} or GND	5 V	4			10		10		pF
C _o	V _O = V _{CC} or GND	5 V	6							pF

* On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.



SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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timing requirements over recommended operating free-air temperature range, $V_{CC} = 3.3 V \pm 0.3 V$ (unless otherwise noted) (see Figure 1)

		$T_A = 25^\circ C$		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, LE high	5		5		5		ns
t_{su}	Setup time, data before LE↓	4		4		4		ns
t_h	Hold time, data after LE↓	1		1		1		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 5 V \pm 0.5 V$ (unless otherwise noted) (see Figure 1)

		$T_A = 25^\circ C$		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, LE high	5		5		5		ns
t_{su}	Setup time, data before LE↓	4		4		4		ns
t_h	Hold time, data after LE↓	1		1		1		ns

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 3.3 V \pm 0.3 V$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ C$			SN54AHC373		SN74AHC373		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	D	Q	$C_L = 15 \text{ pF}$	7.3*	11.4*		1*	13.5*	1	13.5	ns
t_{PHL}				7.3*	11.4*		1*	13.5*	1	13.5	
t_{PLH}	LE	Q	$C_L = 15 \text{ pF}$	7*	11*		1*	13*	1	13	ns
t_{PHL}				7*	11*		1*	13*	1	13	
t_{PZH}	\overline{OE}	Q	$C_L = 15 \text{ pF}$	7.3*	11.4*		1*	13.5*	1	13.5	ns
t_{PZL}				7.3*	11.4*		1*	13.5*	1	13.5	
t_{PHZ}	\overline{OE}	Q	$C_L = 15 \text{ pF}$	7*	10*		1*	12*	1	12	ns
t_{PLZ}				7*	10*		1*	12*	1	12	
t_{PLH}	D	Q	$C_L = 50 \text{ pF}$	9.8	14.9		1	17	1	17	ns
t_{PHL}				9.8	14.9		1	17	1	17	
t_{PLH}	LE	Q	$C_L = 50 \text{ pF}$	9.5	14.5		1	16.5	1	16.5	ns
t_{PHL}				9.5	14.5		1	16.5	1	16.5	
t_{PZH}	\overline{OE}	Q	$C_L = 50 \text{ pF}$	9.8	14.9		1	17	1	17	ns
t_{PZL}				9.8	14.9		1	17	1	17	
t_{PHZ}	\overline{OE}	Q	$C_L = 50 \text{ pF}$	9.5	13.2		1	15	1	15	ns
t_{PLZ}				9.5	13.2		1	15	1	15	
$t_{sk(o)}$			$C_L = 50 \text{ pF}$			1.5**			1.5	ns	

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

** On products compliant to MIL-PRF-38535, this parameter does not apply.



SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54AHC373		SN74AHC373		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	D	Q	$C_L = 15\text{ pF}$	5*	7.2*	1*	8.5*	1	8.5	ns	
t_{PHL}				5*	7.2*	1*	8.5*	1	8.5		
t_{PLH}	LE	Q	$C_L = 15\text{ pF}$	4.9*	7.2*	1*	8.5*	1	8.5	ns	
t_{PHL}				4.9*	7.2*	1*	8.5*	1	8.5		
t_{PZH}	\overline{OE}	Q	$C_L = 15\text{ pF}$	5.5*	8.1*	1*	9.5*	1	9.5	ns	
t_{PZL}				5.5*	8.1*	1*	9.5*	1	9.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 15\text{ pF}$	5*	7.2*	1*	8.5*	1	8.5	ns	
t_{PLZ}				5*	7.2*	1*	8.5*	1	8.5		
t_{PLH}	D	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	1	10.5	ns	
t_{PHL}				6.5	9.2	1	10.5	1	10.5		
t_{PLH}	LE	Q	$C_L = 50\text{ pF}$	6.4	9.2	1	10.5	1	10.5	ns	
t_{PHL}				6.4	9.2	1	10.5	1	10.5		
t_{PZH}	\overline{OE}	Q	$C_L = 50\text{ pF}$	7	10.1	1	11.5	1	11.5	ns	
t_{PZL}				7	10.1	1	11.5	1	11.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	1	10.5	ns	
t_{PLZ}				6.5	9.2	1	10.5	1	10.5		
$t_{sk(o)}$			$C_L = 50\text{ pF}$		1**				1	ns	

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

** On products compliant to MIL-PRF-38535, this parameter does not apply.

noise characteristics, $V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Note 4)

PARAMETER		SN74AHC373		UNIT
		MIN	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}	0.8		V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}	-0.8		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}	4.1		V
$V_{IH(D)}$	High-level dynamic input voltage	3.5		V
$V_{IL(D)}$	Low-level dynamic input voltage	1.5		V

NOTE 4: Characteristics are for surface-mount packages only.

operating characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

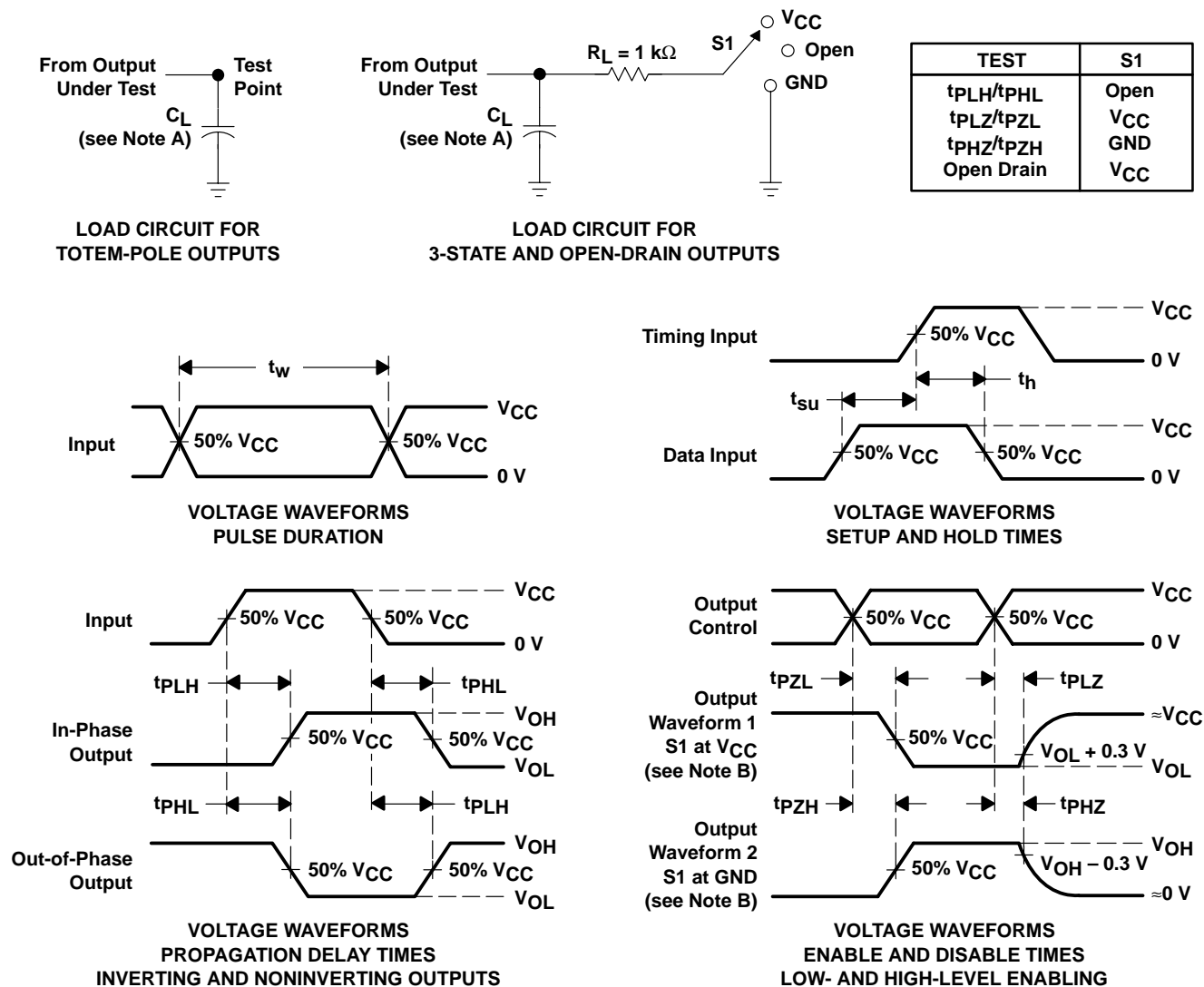
PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	18	pF



SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9686601Q2A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
5962-9686601QRA	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
5962-9686601QSA	ACTIVE	CFP	W	20	1	None	Call TI	Level-NC-NC-NC
SN74AHC373DBLE	OBSOLETE	SSOP	DB	20		None	Call TI	Call TI
SN74AHC373DBR	ACTIVE	SSOP	DB	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC373DGVR	ACTIVE	TVSOP	DGV	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74AHC373DW	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC373DWR	ACTIVE	SOIC	DW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC373N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AHC373NSR	ACTIVE	SO	NS	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC373PW	ACTIVE	TSSOP	PW	20	70	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74AHC373PWLE	OBSOLETE	TSSOP	PW	20		None	Call TI	Call TI
SN74AHC373PWR	ACTIVE	TSSOP	PW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SNJ54AHC373FK	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
SNJ54AHC373J	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
SNJ54AHC373W	ACTIVE	CFP	W	20	1	None	Call TI	Level-NC-NC-NC

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

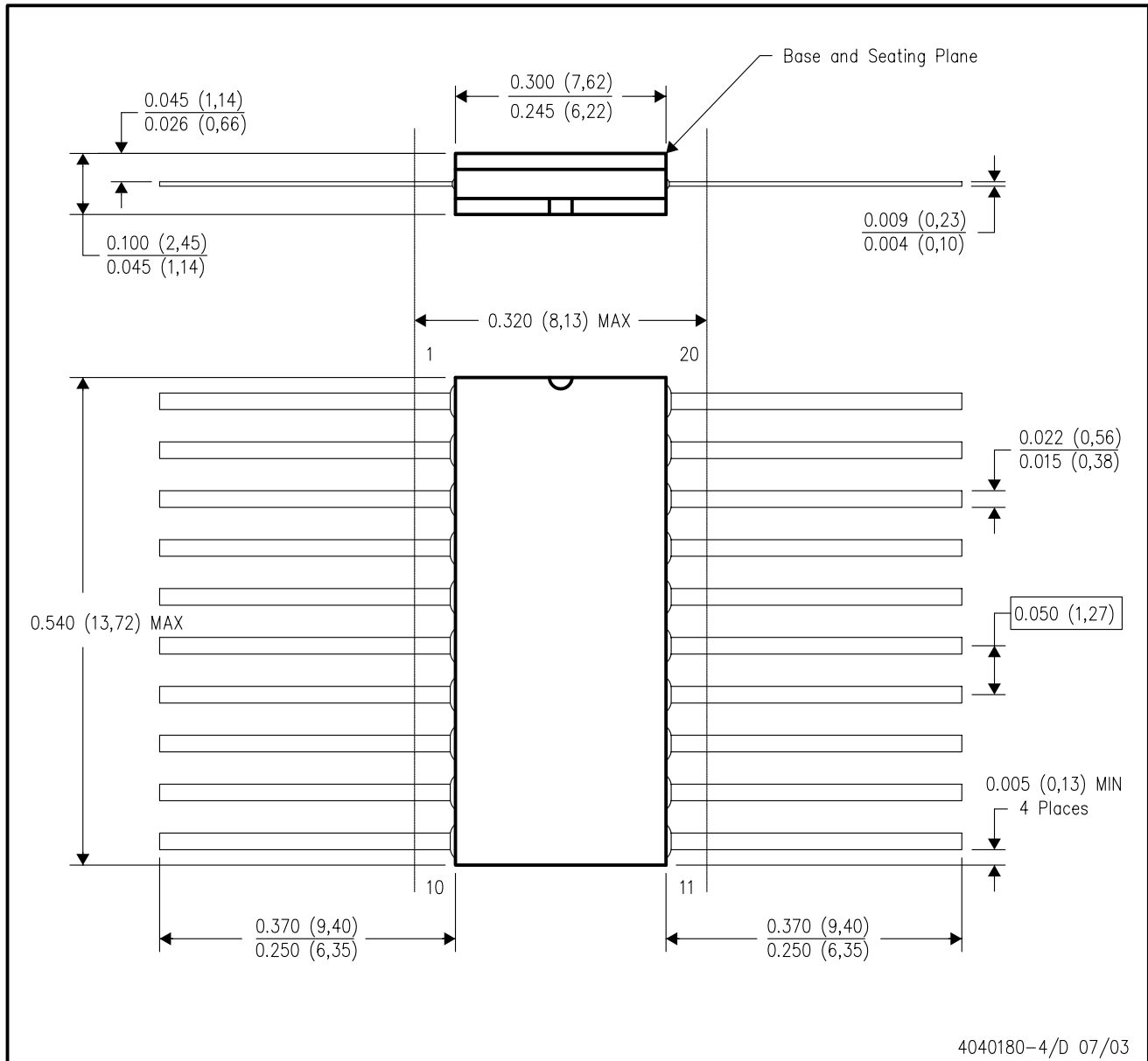


4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



4040140/D 10/96

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - (C) Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - (D) The 20 pin end lead shoulder width is a vendor option, either half or full width.

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



4073251/E 08/00

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-013 variation AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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