SCLS235I - OCTOBER 1995 - REVISED JULY 2003

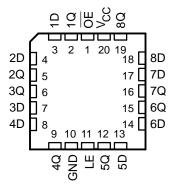
- Operating Range 2-V to 5.5-V V_{CC}
- Latch-Up Performance Exceeds 250 mA Per JESD 17

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

		U		ì
OE [1	\cup	20	V _{CC}
1Q [2		19] 8Q
1D [3		18] 8D
2D [17] 7D
2Q [5		16	7Q
3Q [6		15] 6Q
3D [7		14] 6D
4D [8		13] 5D
4Q [9		12] 5Q
GND [10		11	LE

- 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 . . . 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

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74AHC373N	SN74AHC373N
	SOIC - DW	Tube	SN74AHC373DW	AHC373
	301C - DW	Tape and reel	SN74AHC373DWR	AHC373
-40°C to 85°C	SOP – NS	Tape and reel	SN74AHC373NSR	AHC373
-40 C to 65 C	SSOP – DB	Tape and reel	SN74AHC373DBR	HA373
	TSSOP – PW	Tube	SN74AHC373PW	HA373
	1330F - FW	Tape and reel	SN74AHC373PWR	ПАЗТЗ
	TVSOP – DGV	Tape and reel	SN74AHC373DGVR	HA373
	CDIP – J	Tube	SNJ54AHC373J	SNJ54AHC373J
–55°C to 125°C	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.



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

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description/ordering information (continued)

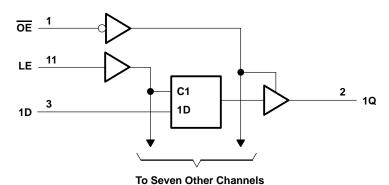
OE does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

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
OE	LE	D	Q
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q_0
Н	Χ	Χ	Z

logic diagram (positive logic)



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

Supply voltage range, V _{CC}		
Output voltage range, VO (see Note 1)		0.5 V to V _{CC} + 0.5 V
Input clamp current, $I_{IK}(V_I < 0)$		
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{CO}	c)	±20 mA
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$		±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}		

[†] 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.

^{2.} The package thermal impedance is calculated in accordance with JESD 51-7.



NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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recommended operating conditions (see Note 3)

			SN54A	SN54AHC373		SN74AHC373		
			MIN	MAX	MIN	MAX	UNIT	
Vсс	Supply voltage		2	5.5	2	5.5	V	
		V _{CC} = 2 V	1.5		1.5			
VIН	High-level input voltage	V _{CC} = 3 V	2.1		2.1		V	
		V _{CC} = 5.5 V	3.85		3.85			
		V _{CC} = 2 V		0.5		0.5		
VIL	Low-level input voltage	V _{CC} = 3 V		0.9		0.9	V	
		V _{CC} = 5.5 V		1.65		1.65		
٧ı	Input voltage		0	5.5	0	5.5	V	
٧o	Output voltage		0	VCC	0	VCC	V	
		V _{CC} = 2 V		-50		-50	μΑ	
IOH	High-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		-4		-4	mA	
		$V_{CC} = 5 V \pm 0.5 V$		-8		-8	IIIA	
		V _{CC} = 2 V		50		50	μΑ	
lOL	Low-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		4		4	mA	
		$V_{CC} = 5 V \pm 0.5 V$		8		8	IIIA	
Δt/Δν	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		100		100	ns/V	
Δι/Δν	Input transition rise or fall rate $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$			20		20	115/ V	
TA	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	Vaa	T,	_A = 25°(3	SN54A	HC373	SN74AI	HC373	UNIT
PARAMETER	TEST CONDITIONS	Vcc -	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII
		2 V	1.9			1.9		1.9		
	I _{OH} = -50 μA	3 V	2.9			2.9		2.9		
Voн		4.5 V	4.4			4.4		4.4		V
	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48		2.48		
	I _{OH} = -8 mA	4.5 V	3.94			3.8		3.8		
		2 V			0.1		0.1		0.1	
	I _{OL} = 50 μA	3 V			0.1		0.1		0.1	
V _{OL}		4.5 V			0.1		0.1		0.1	V
	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	
ΙΙ	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1*		±1	μΑ
loz	$V_I = V_{IH} \text{ or } V_{IL}, \qquad V_O = V_{CC} \text{ or GND}$	5.5 V			±0.25		±2.5		±2.5	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40		40	μΑ
C _i	$V_I = V_{CC}$ or GND	5 V		4	10				10	pF
Co	$V_O = V_{CC}$ or GND	5 V		6						pF

 $^{^{\}star}$ 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 = :	T _A = 25°C		SN54AHC373 SN74AHC3			UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	UNIT
t _W	Pulse duration, LE high	5		5		5		ns
t _{su}	Setup time, data before LE↓	4		4		4		ns
th	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°C		SN54AHC373		SN74AHC373		UNIT	
		MIN	MAX	MIN	MAX	MIN	MAX	UNIT	
t _W	Pulse duration, LE high	5		5		5		ns	
t _{su}	Setup time, data before LE↓	4		4		4		ns	
th	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)

00	•		, ,	_	-																									
PARAMETER	FROM	то	LOAD	T,	չ = 25°C	;	SN54A	HC373	SN74AI	HC373	UNIT																			
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT																			
^t PLH	D	Q	C _L = 15 pF		7.3*	11.4*	1*	13.5*	1	13.5	ns																			
^t PHL]	Q	CL = 13 μ		7.3*	11.4*	1*	13.5*	1	13.5	115																			
^t PLH	LE	Q	C _L = 15 pF		7*	11*	1*	13*	1	13	ns																			
^t PHL		Q	OL = 13 pi		7*	11*	1*	13*	1	13	113																			
^t PZH	ŌĒ	Q	C _L = 15 pF		7.3*	11.4*	1*	13.5*	1	13.5	ns																			
^t PZL	OE .	<u> </u>	Q	OL = 13 pi		7.3*	11.4*	1*	13.5*	1	13.5	113																		
^t PHZ	ŌĒ	0	Q	C _I = 15 pF		7*	10*	1*	12*	1	12	ns																		
^t PLZ	OE .	ď	OL = 13 pi		7*	10*	1*	12*	1	12	113																			
^t PLH	D	Q	C _L = 50 pF		9.8	14.9	1	17	1	17	ns																			
^t PHL		ď	OL = 30 pi		9.8	14.9	1	17	1	17	113																			
^t PLH	LE	0	0	Q	0	C _L = 50 pF		9.5	14.5	1	16.5	1	16.5	ns																
^t PHL		•	OL = 30 βi		9.5	14.5	1	16.5	1	16.5	113																			
^t PZH	ŌĒ	Q	C _I = 50 pF		9.8	14.9	1	17	1	17	ns																			
^t PZL	OE .	•	□ = 00 pi		9.8	14.9	1	17	1	17	110																			
^t PHZ	ŌĒ	0	C _I = 50 pF		9.5	13.2	1	15	1	15	ns																			
^t PLZ	OE .	Q .	Ų.	Q	ų ,	ų	Q	¥	<u> </u>	Ų	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q CL = 50 pF		9.5	13.2	1	15	1	15	113
^t sk(o)			$C_{L} = 50 pF$			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.

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

PARAMETER	FROM	то	LOAD	T _A = 25°C		SN54A	HC373	SN74A	HC373	UNIT		
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII	
t _{PLH}	D	Q	C _I = 15 pF		5*	7.2*	1*	8.5*	1	8.5	ns	
^t PHL		α	CL = 15 pr		5*	7.2*	1*	8.5*	1	8.5	115	
t _{PLH}	LE	Q	C _I = 15 pF		4.9*	7.2*	1*	8.5*	1	8.5	ns	
tPHL		ď	CL = 15 pr		4.9*	7.2*	1*	8.5*	1	8.5	115	
^t PZH	ŌĒ	Q	C _I = 15 pF		5.5*	8.1*	1*	9.5*	1	9.5	no	
tpZL	OE .	Q	CL = 15 pr		5.5*	8.1*	1*	9.5*	1	9.5	ns	
^t PHZ		Q	C ₁ = 15 pF		5*	7.2*	1*	8.5*	1	8.5	ns	
^t PLZ	ŌĒ	OE	Q	C[= 15 pr		5*	7.2*	1*	8.5*	1	8.5	115
^t PLH	D	Q	C 50 pF		6.5	9.2	1	10.5	1	10.5	ns	
t _{PHL}		ď	C _L = 50 pF		6.5	9.2	1	10.5	1	10.5	115	
^t PLH	LE	Q	C 50 pF		6.4	9.2	1	10.5	1	10.5	no	
^t PHL	LE	3	C _L = 50 pF		6.4	9.2	1	10.5	1	10.5	ns	
^t PZH		Q	C 50 pF		7	10.1	1	11.5	1	11.5	no	
t _{PZL}	ŌĒ	Q	C _L = 50 pF		7	10.1	1	11.5	1	11.5	ns	
^t PHZ		Q	C. = 50 pE		6.5	9.2	1	10.5	1	10.5	ns	
t _{PLZ}	ŌĒ	Ų	$C_L = 50 \text{ pF}$		6.5	9.2	1	10.5	1	10.5	115	
t _{sk(o)}			C _L = 50 pF			1**				1	ns	

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

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

	PARAMETER			
	PARAMETER	MIN	MAX	UNIT
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}		0.8	V
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}		-0.8	V
VOH(V)	Quiet output, minimum dynamic VOH	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

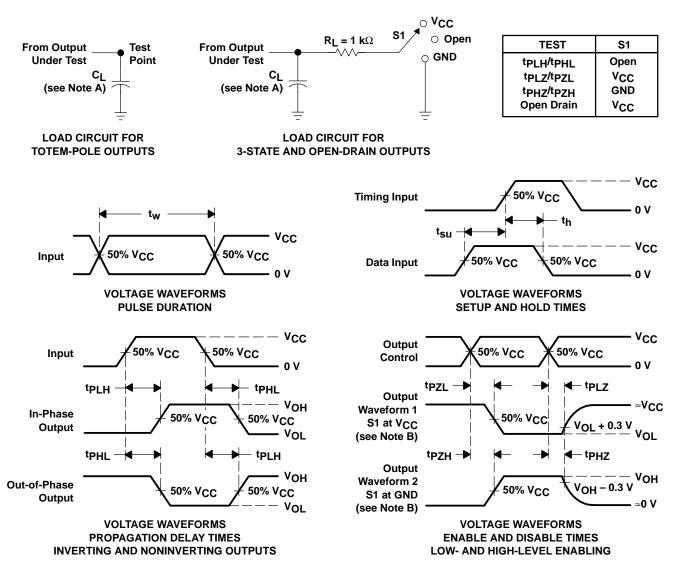
NOTE 4: Characteristics are for surface-mount packages only.

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

	PARAMETER	TEST CO	ONDITIONS	TYP	UNIT
Cpd	Power dissipation capacitance	No load,	f = 1 MHz	18	pF

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

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 MHz, Z_O = 50 Ω , t_f \leq 3 ns, t_f \leq 3 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	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9686601Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
5962-9686601QRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
5962-9686601QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
SN74AHC373DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI
SN74AHC373DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DGVR	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DGVRE4	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AHC373NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373PWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI
SN74AHC373PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC373PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54AHC373FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54AHC373J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54AHC373W	ACTIVE	CFP	W	20	1	TBD	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 - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.



PACKAGE OPTION ADDENDUM

26-Sep-2005

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 (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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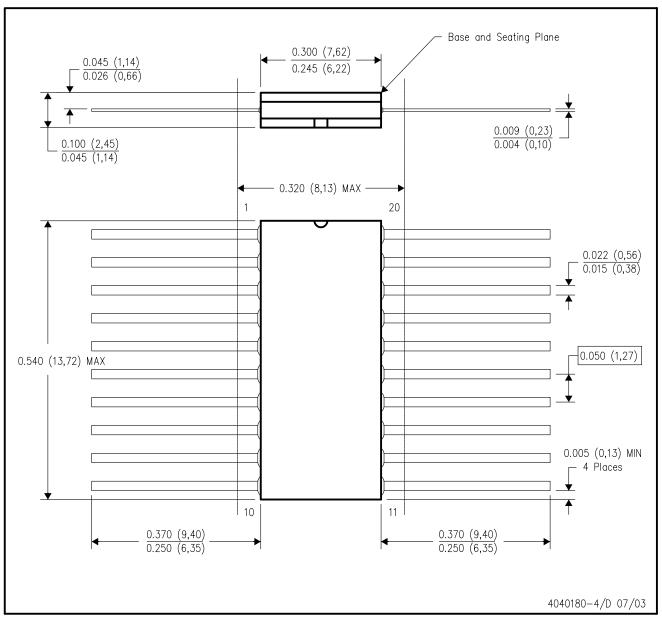
14 LEADS SHOWN



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

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- 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**)

28 TERMINAL SHOWN

LEADLESS CERAMIC CHIP CARRIER



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



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



DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



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



- 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**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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**)

14 PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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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Mailing Address: Texas Instruments

Post Office Box 655303 Dallas, Texas 75265

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