SN54HCT373, SN74HCT373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS009D - MARCH 1984 - REVISED AUGUST 2003

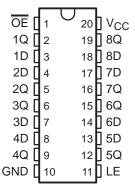
- Operating Voltage Range of 4.5 V to 5.5 V
- High-Current 3-State True Outputs Can Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80-μA Max I_{CC}
- Typical t_{pd} = 21 ns
- ±6-mA Output Drive at 5 V
- Low Input Current of 1 μA Max
- Inputs Are TTL-Voltage Compatible
- Eight High-Current Latches in a Single Package
- Full Parallel Access for Loading

description/ordering information

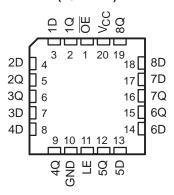
These 8-bit latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight latches of the 'HCT373 devices are transparent D-type latches. While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the levels that were set up at the D inputs.

SN54HCT373 . . . J OR W PACKAGE SN74HCT373 . . .DB, DW, N, NS, OR PW PACKAGE (TOP VIEW)



SN54HCT373 . . .FK PACKAGE (TOP VIEW)



ORDERING INFORMATION

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube of 20	SN74HCT373N	SN74HCT373N
	SOIC - DW	Tube of 25	SN74HCT373DW	HCT373
	30IC - DVV	Reel of 2000	SN74HCT373DWR	HC1373
-40°C to 85°C	SOP - NS	Reel of 2000	SN74HCT373NSR	HCT373
-40 C to 65 C	SSOP – DB	Reel of 2000	SN74HCT373DBR	HT373
		Tube of 70	SN74HCT373PW	
	TSSOP - PW	Reel of 2000	SN74HCT373PWR	HT373
		Reel of 250	SN74HCT373PWT	
	CDIP – J	Tube of 20	SNJ54HCT373J	SNJ54HCT373J
–55°C to 125°C	CFP – W	Tube of 85	SNJ54HCT373W	SNJ54HCT373W
	LCCC – FK	Tube of 55	SNJ54HCT373FK	SNJ54HCT373FK

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



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description/ordering information (continued)

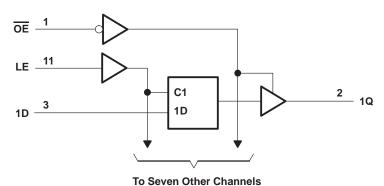
An output-enable (\overline{OE}) input places the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the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

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 off.

FUNCTION TABLE (each latch)

	INPUTS		ОИТРИТ
OE	LE	D	Q
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q_0
Н	X	Χ	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 clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see	ee Note 1)	±20 mA
Output clamp current, IOK (VO < 0 or VO > VCO	c) (see Note 1)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	- 	±35 mA
Continuous current through V _{CC} or GND		±70 mA
Package thermal impedance, θ _{JA} (see Note 2):	: DB package	70°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 _{sto}		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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recommended operating conditions (see Note 3)

			SN	54HCT3	73	SN	74HCT3	73	UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
VCC	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	V _{CC} = 4.5 V to 5.5 V	2			2			V
VIL	Low-level input voltage	V _{CC} = 4.5 V to 5.5 V			0.8			0.8	V
٧ _I	Input voltage		0		VCC	0		VCC	V
Vo	Output voltage		0		VCC	0		VCC	V
Δt/Δν	Input transition rise/fall time				500			500	ns
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 CO	NDITIONS	Vaa	Т	A = 25°C	;	SN54H	CT373	SN74H	CT373	UNIT
PARAMETER	1231 00	NOTIONS	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
Vou	VI = VIH or VIL	$I_{OH} = -20 \mu A$	4.5 V	4.4	4.499		4.4		4.4		V
VOH	AI = AIH OL AIL	$I_{OH} = -6 \text{ mA}$	4.5 V	3.98	4.3		3.7		3.84		V
Vai	\\ \\ or \\.	I _{OL} = 20 μA	4.5 V		0.001	0.1		0.1		0.1	V
VOL	VI = VIH or VIL	I _{OL} = 6 mA	4.5 V		0.17	0.26		0.4		0.33	V
ΙĮ	$V_I = V_{CC}$ or 0		5.5 V		±0.1	±100		±1000		±1000	nA
loz	VO = VCC or 0		5.5 V		±0.01	±0.5		±10		±5	μΑ
Icc	$V_I = V_{CC}$ or 0,	I _O = 0	5.5 V			8		160		80	μΑ
∆l _{CC} †	One input at 0.5 V Other inputs at 0 or		5.5 V		1.4	2.4		3		2.9	mA
C _i			4.5 V to 5.5 V		3	10		10		10	pF

[†] This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

timing requirements over recommended operating free-air temperature range (unless otherwise noted)

		Vaa	T _A = 2	25°C	SN54H	CT373	SN74H	CT373	UNIT
		VCC	MIN	MAX	MIN	MAX	MIN	MAX	UNIT
	Pulse duration, LE high	4.5 V	20		30		25		ne
t _W	Pulse duration, LE mign	5.5 V	17		27		23		ns
	Setup time, data before LE↓	4.5 V	10		15		13		no
t _{su}	Setup time, data before LEV	5.5 V	9		14		12		ns
.	Hold time, data after LE↓	4.5 V	10		10		10		ne
t _h	i ioiu iiiie, uata aitei LLV	5.5 V	10		10		10		ns



SN54HCT373, SN74HCT373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	Vaa	TA	√ = 25°C	;	SN54H	CT373	SN74H0	CT373	UNIT	
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT	
	D	Q	4.5 V		25	35		53		44		
	Ь	ď	5.5 V		21	32		48		40	ns	
^t pd	LE	Any O	4.5 V		28	35		53		44	115	
	LE	Any Q	5.5 V		25	32		48		40		
4	ŌĒ	A O	Δην. Ο	4.5 V		26	35		53		44	no
^t en	OE	Any Q	5.5 V		23	32		48		40	ns	
+	ŌĒ	Any Q	4.5 V		23	35		53		44	ns	
^t dis	OE	Ally Q	5.5 V		22	32		48		40	115	
4.		Any O	4.5 V		10	12		18		15	no	
t _t		Any Q	5.5 V		9	11		16		14	ns	

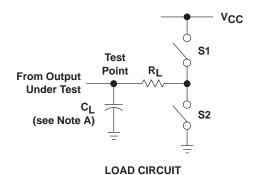
switching characteristics over recommended operating free-air temperature range, C_L = 150 pF (unless otherwise noted) (see Figure 1)

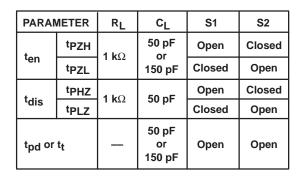
PARAMETER	FROM	то	Vaa	T,	չ = 25°C	;	SN54H	CT373	SN74H	CT373	UNIT
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
	D	Q	4.5 V		32	52		79		65	
. .	D	ď	5.5 V		27	47		71		59	20
¹ pd	^t pd LE		4.5 V		38	52		79		65	ns
	LL	Any Q	5.5 V		36	47		71		59	
+	ŌĒ	Any Q	4.5 V		33	52		79		65	nc
^t en	OE	Ally Q	5.5 V		28	47		71		59	ns
4.		Δην. Ο	4.5 V		18	42		63		53	no
t _t		Any Q	5.5 V		16	38		57		48	ns

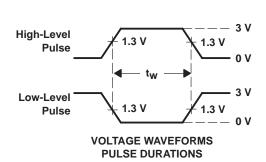
operating characteristics, T_A = 25°C

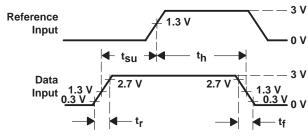
	PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance per latch	No load	50	pF

PARAMETER MEASUREMENT INFORMATION

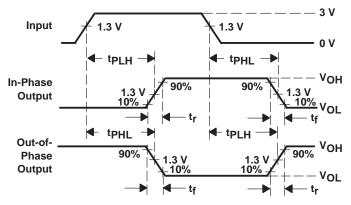


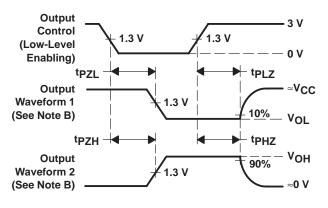






VOLTAGE WAVEFORMS
SETUP AND HOLD AND INPUT RISE AND FALL TIMES





VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

NOTES: A. C_L includes probe and test-fixture 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. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. tpLz and tpHz are the same as tdis.
- F. tpzL and tpzH are the same as ten.
- G. tpLH and tpHL are the same as tpd.

Figure 1. Load Circuit and Voltage Waveforms







28-Jul-2020

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material ⁽⁶⁾	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
5962-86867012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 86867012A SNJ54HCT 373FK	Samples
5962-8686701RA	ACTIVE	CDIP	J	20	1	TBD	SNPB	N / A for Pkg Type	-55 to 125	5962-8686701RA SNJ54HCT373J	Samples
5962-8686701VSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-8686701VS A SNV54HCT373W	Samples
JM38510/65453BRA	ACTIVE	CDIP	J	20	1	TBD	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65453BRA	Samples
JM38510/65453BSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	JM38510/ 65453BSA	Samples
M38510/65453BRA	ACTIVE	CDIP	J	20	1	TBD	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65453BRA	Samples
M38510/65453BSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	JM38510/ 65453BSA	Samples
SN54HCT373J	ACTIVE	CDIP	J	20	1	TBD	SNPB	N / A for Pkg Type	-55 to 125	SN54HCT373J	Samples
SN74HCT373DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HCT373	Samples
SN74HCT373DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HCT373	Samples
SN74HCT373DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HCT373	Samples
SN74HCT373N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	NIPDAU	N / A for Pkg Type	-40 to 85	SN74HCT373N	Samples
SN74HCT373NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	NIPDAU	N / A for Pkg Type	-40 to 85	SN74HCT373N	Samples
SN74HCT373NSR	ACTIVE	so	NS	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HCT373	Samples
SN74HCT373PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HT373	Samples



PACKAGE OPTION ADDENDUM

28-Jul-2020

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
SN74HCT373PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HT373	Samples
SN74HCT373PWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HT373	Samples
SN74HCT373PWT	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HT373	Samples
SNJ54HCT373FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 86867012A SNJ54HCT 373FK	Samples
SNJ54HCT373J	ACTIVE	CDIP	J	20	1	TBD	SNPB	N / A for Pkg Type	-55 to 125	5962-8686701RA SNJ54HCT373J	Samples
SNJ54HCT373W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	SNJ54HCT373W	Samples

(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) RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- ⁽⁴⁾ There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.



PACKAGE OPTION ADDENDUM

28-Jul-2020

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF SN54HCT373, SN54HCT373-SP, SN74HCT373:

Catalog: SN74HCT373, SN54HCT373

Military: SN54HCT373

Space: SN54HCT373-SP

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications
- Space Radiation tolerant, ceramic packaging and qualified for use in Space-based application

PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

All differsions are norminal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74HCT373DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74HCT373NSR	SO	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74HCT373PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74HCT373PWT	TSSOP	PW	20	250	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

www.ti.com 2-Oct-2019



*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HCT373DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74HCT373NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74HCT373PWR	TSSOP	PW	20	2000	367.0	367.0	38.0
SN74HCT373PWT	TSSOP	PW	20	250	367.0	367.0	38.0

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.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
 C. Publication IPC-7351 is recommended for alternate design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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.





SOIC



- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOIC



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- 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



- 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. Falls within JEDEC MS-004



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.



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