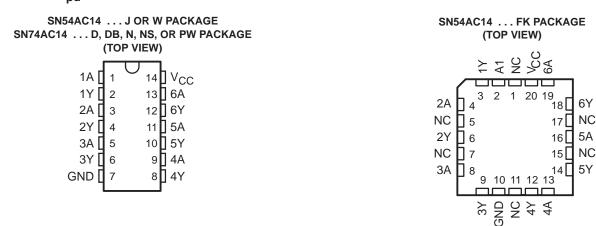
SCAS522G - AUGUST 1995 - REVISED AUGUST 2008

6Y

NC

5A

- 2-V to 6-V V_{CC} Operation
- Inputs Accept Voltages to 6 V
- Max t_{pd} of 9.5 ns at 5 V



NC - No internal connection

description/ordering information

These Schmitt-trigger devices contain six independent inverters. They perform the Boolean function $Y = \overline{A}$. Because of the Schmitt action, they have different input threshold levels for positive-going (V_{T+}) and for negative-going (V_T) signals.

These circuits are temperature compensated and can be triggered from the slowest of input ramps and still give clean, jitter-free output signals. They also have a greater noise margin than conventional inverters.

т _А	PACKAGE	Eţ	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N Tube		SN74AC14N	SN74AC14N
–40°C to 85°C		Tube	SN74AC14D	1011
	SOIC – D	Tape and reel	SN74AC14DR	AC14
	SOP – NS	Tape and reel	SN74AC14NSR	AC14
	SSOP – DB	Tape and reel	SN74AC14DBR	AC14
		Tube	SN74AC14PW	1011
	TSSOP – PW	Tape and reel	SN74AC14PWR	AC14
	CDIP – J	Tube	SNJ54AC14J	SNJ54AC14J
–55°C to 125°C	CFP – W	Tube	SNJ54AC14W	SNJ54AC14W
	LCCC – FK	Tube	SNJ54AC14FK	SNJ54AC14FK

ORDERING INFORMATION

[†] 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.

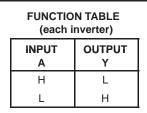
PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



Copyright © 2008, Texas Instruments Incorporated On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all par rameters.

SN54AC14, SN74AC14 HEX SCHMITT-TRIGGER INVERTERS

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logic diagram, each inverter (positive logic)



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

Supply voltage range, V _{CC} Input voltage range, V _I (see Note 1)		
Output voltage range, V _O (see Note 1)		–0.5 V to V _{CC} + 0.5 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)		±20 mA
Output clamp current, I_{OK} (V _O < 0 or V _O > V _{CO}	с)	±20 mA
Continuous output current, $I_O (V_O = 0 \text{ to } V_{CC})$	-	±50 mA
Continuous current through V _{CC} or GND		±200 mA
Package thermal impedance, θ_{JA} (see Note 2):	: D package	
	DB package	
	N package	
	NS package	
	PW package	113°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.

recommended operating conditions (see Note 3)

			SN54	AC14	SN74	AC14	
			MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage		2	6	2	6	V
VI	Input voltage		0	VCC	0	VCC	V
VO	Output voltage		0	VCC	0	V _{CC}	V
		$V_{CC} = 3 V$		-12		-12	
ЮН	High-level output current	$V_{CC} = 4.5 V$		-24		-24	mA
		$V_{CC} = 5.5 V$		-24		-24	
		$V_{CC} = 3 V$		12		12	
IOL	Low-level output current	$V_{CC} = 4.5 V$		24		24	mA
		$V_{CC} = 5.5 V$		24		24	
ТА	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.



SN54AC14, SN74AC14 HEX SCHMITT-TRIGGER INVERTERS

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			т	A = 25°C	;	SN54	AC14	SN74/	AC14	
PARAMETER	TEST CONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
V _{T+}		3 V	0.8	1.8	2.2	0.8	2.2	0.8	2.2	
Positive-going		4.5 V	1.5	2.6	3.2	1.5	3.2	1.5	3.2	V
threshold		5.5 V	1.6	3.2	3.9	1.6	3.9	1.6	3.9	
V _{T-}		3 V	0.5	0.8	1	0.5	1.2	0.5	1	
Negative-going		4.5 V	0.9	1.4	1.8	0.9	1.8	0.9	1.8	V
threshold		5.5 V	1.1	1.8	2.3	1.1	2.3	1.1	2.3	
ΔVτ		3 V	0.3	1	1.2	0.3	1.2	0.3	1.2	
Hysteresis		4.5 V	0.4	1.2	1.4	0.4	1.4	0.4	1.4	V
$(V_{T+} - V_{T-})$		5.5 V	0.5	1.4	1.6	0.5	1.6	0.5	1.6	
Vон		3 V	2.9			2.9		2.9		
	I _{OH} = -50 μA	4.5 V	4.4			4.4		4.4		
		5.5 V	5.4			5.4		5.4		
	I _{OH} = -12 mA	3 V	2.56			2.4		2.48		V
		4.5 V	3.86			3.7		3.8		
	I _{OH} = -24 mA	5.5 V	4.86			4.7		4.8		
	I _{OH} = -50 mA [†]	5.5 V				3.85				
	I _{OH} = -75 mA [†]	5.5 V						3.85		
		3 V		0.002	0.1		0.1		0.1	
	I _{OL} = 50 μA	4.5 V		0.001	0.1		0.1		0.1	
		5.5 V		0.001	0.1		0.1		0.1	
	I _{OL} = 12 mA	3 V			0.36		0.5		0.44	
V _{OL}		4.5 V			0.36		0.5		0.44	V
	I _{OL} = 24 mA	5.5 V			0.36		0.5		0.44	
	I _{OL} = 50 mA [†]	5.5 V					1.65			
	I _{OL} = 75 mA [†]	5.5 V							1.65	
lj	$V_{I} = V_{CC} \text{ or } GND$	5.5 V			±0.1		±1		±1	μA
ICC	$V_{I} = V_{CC} \text{ or } GND, \qquad I_{O} = 0$	5.5 V			2		40		20	μA
Ci	VI = V _{CC} or GND	5 V		4.5						pF

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

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

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

	FROM TO		T,	₄ = 25°C	;	SN54/	AC14	SN74	AC14	
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
^t PLH	•	V	1.5	6	13.5	1	16	1.5	15	
^t PHL	А	Y	1.5	6	11.5	1	14	1.5	13	ns



SN54AC14, SN74AC14 HEX SCHMITT-TRIGGER INVERTERS

SCAS522G - AUGUST 1995 - REVISED AUGUST 2008

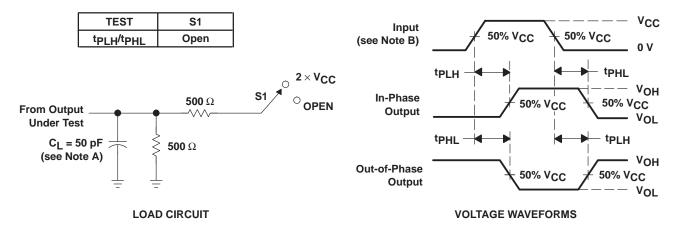
switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

	FROM	то	T	₄ = 25°C	;	SN54	AC14	SN74	AC14	
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
^t PLH	•	X	1.5	5	10	1.5	12	1.5	11	
^t PHL	А	Y	1.5	5	8.5	1.5	10	1.5	9.5	ns

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

	PARAMETER	TEST C	CONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance	C _L = 50 pF,	f = 1 MHz	25	pF

PARAMETER MEASUREMENT INFORMATION



NOTES: A. CL includes probe and jig capacitance.

B. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, Z_O = 50 Ω , t_r \leq 2.5 ns, t_f \leq 2.5 ns.

C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms





10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	•	Pins	•		Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
5962-87624012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 87624012A SNJ54AC 14FK	Samples
5962-8762401CA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401CA SNJ54AC14J	Samples
5962-8762401DA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401DA SNJ54AC14W	Samples
5962-8762401VCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401VC A SNV54AC14J	Samples
5962-8762401VDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401VD A SNV54AC14W	Samples
5962-8762402VCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762402VC A SNV54AC14J	Samples
5962-8762402VDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762402VD A SNV54AC14W	Samples
SN74AC14D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI	-40 to 85		
SN74AC14DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14N	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AC14N	Samples



PACKAGE OPTION ADDENDUM

10-Jun-2014

Orderable Device	Status	Package Type	•	Pins	•	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74AC14NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AC14N	Samples
SN74AC14NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14PWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 85		
SN74AC14PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SN74AC14PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC14	Samples
SNJ54AC14FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 87624012A SNJ54AC 14FK	Samples
SNJ54AC14J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401CA SNJ54AC14J	Samples
SNJ54AC14W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8762401DA SNJ54AC14W	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⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), 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.

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.



PACKAGE OPTION ADDENDUM

10-Jun-2014

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above. 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.

⁽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.

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

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OTHER QUALIFIED VERSIONS OF SN54AC14, SN54AC14-SP, SN74AC14 :

- Catalog: SN74AC14, SN54AC14
- Automotive: SN74AC14-Q1, SN74AC14-Q1
- Military: SN54AC14
- Space: SN54AC14-SP

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects





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10-Jun-2014

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





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
SN74AC14DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AC14DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AC14DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AC14NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AC14PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TEXAS INSTRUMENTS

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PACKAGE MATERIALS INFORMATION

17-Jan-2014



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AC14DBR	SSOP	DB	14	2000	367.0	367.0	38.0
SN74AC14DR	SOIC	D	14	2500	333.2	345.9	28.6
SN74AC14DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74AC14NSR	SO	NS	14	2000	367.0	367.0	38.0
SN74AC14PWR	TSSOP	PW	14	2000	367.0	367.0	35.0

J (R-GDIP-T**) 14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



NOTES: 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-F14)

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 GDFP1-F14



LEADLESS CERAMIC CHIP CARRIER

FK (S-CQCC-N**) 28 TERMINAL SHOWN



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. Falls within JEDEC MS-004



N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- 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).
- \triangle The 20 pin end lead shoulder width is a vendor option, either half or full width.



D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters).

- 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 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AB.





NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- 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.



PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



A. An integration of the information o

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-G14)

PLASTIC SMALL OUTLINE



- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- 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.



MECHANICAL DATA

PLASTIC SMALL-OUTLINE PACKAGE

0,51 0,35 ⊕0,25⊛ 1,27 8 14 0,15 NOM 5,60 8,20 5,00 7,40 \bigcirc Gage Plane ₽ 0,25 7 1 1,05 0,55 0°-10° Δ 0,15 0,05 Seating Plane — 2,00 MAX 0,10PINS ** 14 16 20 24 DIM 10,50 10,50 12,90 15,30 A MAX A MIN 9,90 9,90 12,30 14,70 4040062/C 03/03

NOTES: A. All linear dimensions are in millimeters.

NS (R-PDSO-G**)

14-PINS SHOWN

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



MECHANICAL DATA

MSSO002E - JANUARY 1995 - REVISED DECEMBER 2001

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



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