SDAS216A - APRIL 1982 - REVISED DECEMBER 1994

- 3-State Versions of the 'ALS153 and SN74AS153
- Permits Multiplexing From n Lines to One Line
- Performs Parallel-to-Serial Conversion
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

These data selectors/multiplexers contain inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate output control inputs are provided for each of the two 4-line sections.

The 3-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (at a high-impedance state), the low impedance of the single enabled output drives the bus line to a high or low logic level. Each output has its own output-enable (\overline{OE}) input. The output is disabled when \overline{OE} is high.

The SN54ALS253 is characterized for operation over the full military temperature range of -55° C to 125°C. The SN74ALS253 and SN74AS253A are characterized for operation from 0°C to 70°C.

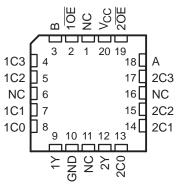
10E B 1C3 1C2 1C1 1C1 1C0 1Y GND	2 3 4 5 6 7	σ	14 13 12 11	V <u>CC</u> 20E A 2C3 2C2 2C1 2C0 2Y
	-			1

SN54ALS253 ... J PACKAGE

SN74ALS253, SN74AS253A ... D OR N PACKAGE

(TOP VIEW)

SN54ALS253 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

SELE	SELECT [†]		DA	TA		OE	OUTPUT
В	Α	C0	C1	C2	C3	UE	1
Х	Х	Х	Х	Х	Х	н	Z
L	L	L	Х	Х	Х	L	L
L	L	Н	Х	Х	Х	L	Н
L	Н	Х	L	Х	Х	L	L
L	Н	Х	Н	Х	Х	L	Н
н	L	Х	Х	L	Х	L	L
н	L	Х	Х	Н	Х	L	Н
н	Н	Х	Х	Х	L	L	L
н	н	х	Х	Х	н	L	н

FUNCTION TABLE

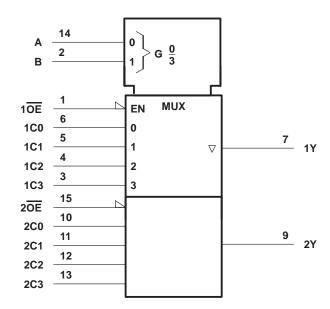
[†] Select inputs A and B are common to both sections.

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.

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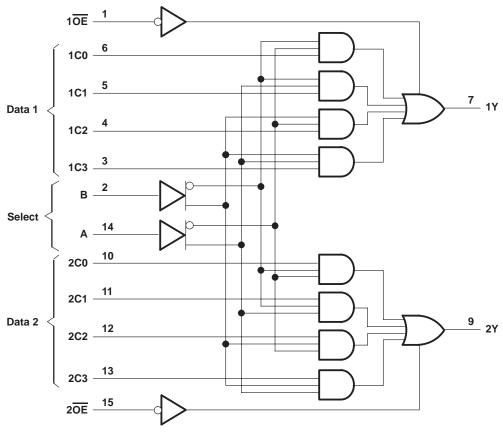
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logic symbol[†]



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for the D, J, and N packages.

logic diagram (positive logic)



Pin numbers shown are for the D, J, and N packages.



SDAS216A - APRIL 1982 - REVISED DECEMBER 1994

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

Supply voltage, V _{CC}	
Input voltage, V _I	/ V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range, T _A : SN54ALS253	-55°C to 125°C
SN74ALS253	0°C to 70°C
Storage temperature range	-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.

recommended operating conditions

		SN	54ALS2	53	SN	74ALS2	53	
		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	2			2			V
VIL	Low-level input voltage			0.7			0.8	V
ЮН	High-level output current			-1			-2.6	mA
IOL	Low-level output current			12			24	mA
Т _А	Operating free-air temperature	-55		125	0		70	°C

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

	7507.0		SN	54ALS2	53	SN	74ALS2	53		
PARAMETER	TEST C	ONDITIONS	MIN	TYP‡	MAX	MIN	typ‡	MAX	UNIT	
VIK	V _{CC} = 4.5 V,	lı = – 18 mA			-1.5			-1.5	V	
	$V_{CC} = 4.5 V$ to 5.5 V,	$I_{OH} = -0.4 \text{ mA}$	V _{CC} -2			V _{CC} -2	2			
VOH	V _{CC} = 4.5 V	$I_{OH} = -1 \text{ mA}$	2.4	3.3					V	
		I _{OH} = -2.6 mA				2.4	3.2			
		I _{OL} = 12 mA		0.25	0.4		0.25	0.4	V	
V _{OL}	$V_{CC} = 4.5 V$	I _{OL} = 24 mA					0.35	0.5	V	
IOZH	V _{CC} = 5.5 V,	V _O = 2.7 V			20			20	μΑ	
IOZL	V _{CC} = 5.5 V,	V _O = 0.4 V			-20			-20	μΑ	
lj	V _{CC} = 5.5 V,	V _I = 7 V			0.1			0.1	mA	
ЧΗ	V _{CC} = 5.5 V,	V _I = 2.7 V			20			20	μΑ	
۱ _{IL}	V _{CC} = 5.5 V,	$V_{ } = 0.4 V$			-0.1			-0.1	mA	
۱ ₀ §	V _{CC} = 5.5 V,	V _O = 2.25 V	-20		-112	-30		-112	mA	
1		Outputs high		6.5	12		6.5	12		
Icc	V _{CC} = 5.5 V	Outputs disabled		7.5	14		7.5	14	mA	

[‡] All typical values are at $V_{CC} = 5 V$, $T_A = 25^{\circ}C$.

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, IOS.



SDAS216A - APRIL 1982 - REVISED DECEMBER 1994

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	то (оитрит)	CL R1 R2 TA	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX [†] SN54ALS253 SN74ALS253					
			MIN	MAX	MIN	MAX			
tPLH			5	30	5	21			
tPHL	A or B	Any Y	5	27	5	21	ns		
^t PLH	Data		2	15	2	10			
^t PHL	(any C)	Any Y	3	18	3	14	ns		
^t PZH			3	20	3	14			
^t PZL	OE	Any Y	2	19	4	16	ns		
^t PHZ	OE	Anu V	2	12	2	10			
^t PLZ	UE	Any Y	2	18	2	14	ns		

⁺ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

Supply voltage, V _{CC}	7 V
Input voltage, V _I	
Operating free-air temperature range, T _A : SN74AS253A	0°C to 70°C
Storage temperature range	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.

recommended operating conditions

		SN	74AS253	BA	
		MIN	NOM	MAX	UNIT
VCC	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
VIL	Low-level input voltage			0.8	V
IOH	High-level output current			-15	mA
IOL	Low-level output current			48	mA
TA	Operating free-air temperature	0		70	°C



SDAS216A - APRIL 1982 - REVISED DECEMBER 1994

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

				SN	74AS253	3A		
	PARAMETER	TEST CONE	DITIONS	MIN	TYP†	MAX	UNIT	
VIK		V _{CC} = 4.5 V,	lı = – 18 mA			-1.2	V	
.,		$\begin{array}{c c c c c c c c c c c c c c c c c c c $.,			
VOH	Γ	V _{CC} = 4.5 V,	I _{OH} = – 15 mA	2.4	-1.2 V _{CC} -2 2.4 3.2 0.35 0.5 50 -50 0.2 0.1 40 20 -1 -0.5		V	
VOL		V _{CC} = 4.5 V,	I _{OL} = 48 mA		0.35	0.5	V	
IOZH		V _{CC} = 5.5 V,	V _O = 2.7 V			50	μA	
IOZL		V _{CC} = 5.5 V,	$V_{O} = 0.4 V$			-50	μA	
	А, В					0.2		
Ι _Ι	All others	$V_{CC} = 5.5 V,$	$V_{I} = 7 V$			0.1	mA	
	А, В					40		
ΙН	All others	$V_{CC} = 5.5 V,$	$V_{ } = 2.7 V$		MIN TYP† V _{CC} -2 2.4 3.2 2.4 3.2 0.35 -30 -30 18 20 20 20	20		μA
	А, В					-1		
ΊL	All others	$V_{CC} = 5.5 V,$	V _I = 0.4 V	MIN TYPT V _{CC} -2 A 2.4 3.2 0.35 	-0.5	mA		
10‡		V _{CC} = 5.5 V,	V _O = 2.25 V	-30		-112	mA	
			Outputs high		18	29		
ICC		$V_{CC} = 5.5 V$	Outputs low		20	32	mA	
			Outputs disabled		TYP1 MAX -1.2 -1.2 3.2 0.35 0.5 500 -500 0.1 -500 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 10 11 12 12 12 13 20 32			

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
 ‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

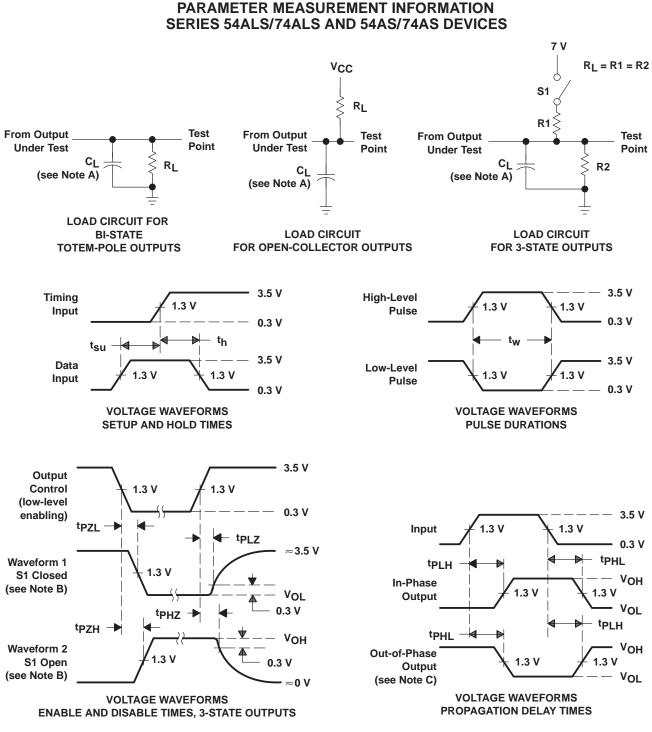
switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	C _L = 50 p R1 = 500 R2 = 500 T _A = MIN	$\label{eq:C} \begin{array}{l} V_{CC} = 4.5 \ V \ to \ 5.5 \ V, \\ C_L = 50 \ pF, \\ R1 = 500 \ \Omega, \\ R2 = 500 \ \Omega, \\ T_A = MIN \ to \ MAX\$ \\ \hline \end{array}$			
			MIN	MAX			
^t PLH	A	×.	3	13.5			
^t PHL	A or B	Y	3	11.5	ns		
^t PLH	Data	Y	2.5	7.5	ns		
^t PHL	(any C)	Ŷ	2.5	8			
^t PZH		Ann	2	12.5			
^t PZL	OE	Any Y	2.5	11.5	ns		
^t PHZ	OE	Any V	1	6			
^t PLZ	UE	Any Y	1	7	ns		

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



SDAS216A - APRIL 1982 - REVISED DECEMBER 1994



NOTES: A. CI 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
- D. All input pulses have the following characteristics: PRR \leq 1 MHz, t_r = t_f = 2 ns, duty cycle = 50%.
- The outputs are measured one at a time with one transition per measurement. E.

Figure 1. Load Circuits and Voltage Waveforms





25-Sep-2013

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
85096012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	85096012A SNJ54ALS 253FK	Samples
8509601EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8509601EA SNJ54ALS253J	Samples
8509601FA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8509601FA SNJ54ALS253W	Samples
SN74ALS253D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS253	Samples
SN74ALS253N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS253N	Samples
SN74ALS253NE4	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS253N	Samples
SN74ALS253NSR	OBSOLETE	SO	NS	16		TBD	Call TI	Call TI	0 to 70	ALS253	
SN74ALS253NSRE4	OBSOLETE	SO	NS	16		TBD	Call TI	Call TI	0 to 70		
SN74ALS253NSRG4	OBSOLETE	SO	NS	16		TBD	Call TI	Call TI	0 to 70		
SN74AS253AD	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS253A	Samples
SN74AS253ADE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS253A	Samples
SN74AS253ADG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS253A	Samples
SN74AS253AN	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70	SN74AS253AN	



25-Sep-2013

Orderable Device	Status	Package Type		Pins	-	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)		(3)		(4/5)	
SN74AS253ANE4	ACTIVE	PDIP	Ν	16		TBD	Call TI	Call TI	0 to 70		Samples
SNJ54ALS253FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	85096012A SNJ54ALS 253FK	Samples
SNJ54ALS253J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8509601EA SNJ54ALS253J	Samples
SNJ54ALS253W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8509601FA SNJ54ALS253W	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. **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.

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25-Sep-2013

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OTHER QUALIFIED VERSIONS OF SN54ALS253, SN74ALS253 :

• Catalog: SN74ALS253

Military: SN54ALS253

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

www.ti.com

TAPE AND REEL INFORMATION

REEL DIMENSIONS

Texas Instruments





TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	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

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ALS253DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

TEXAS INSTRUMENTS

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PACKAGE MATERIALS INFORMATION

17-Aug-2012



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS253DR	SOIC	D	16	2500	333.2	345.9	28.6

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-F16)

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-F16 and JEDEC MO-092AC



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-G16)

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 AC.



4211283-4/E 08/12

D (R-PDSO-G16) PLASTIC SMALL OUTLINE Stencil Openings (Note D) Example Board Layout (Note C) –16x0,55 -14x1,27 -14x1,27 16x1,50 5,40 5.40 Example Non Soldermask Defined Pad Example Pad Geometry (See Note C) 0,60 .55 Example 1. Solder Mask Opening (See Note E) -0,07 All Around

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.



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.



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Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have *not* been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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