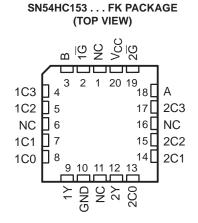
- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80-μA Max I<sub>CC</sub>
- Typical t<sub>pd</sub> = 9 ns
- ±6-mA Output Drive at 5 V

#### SN54HC153 . . . J OR W PACKAGE SN74HC153 . . . D, N, NS, OR PW PACKAGE (TOP VIEW)

1 <mark>G</mark>	1	Ο	16	] V <sub>CC</sub> ] 2G
B			15	] 2 <mark>G</mark>
1C3	3		14	ΠA
1C2	4		13	2C3 2C2 2C1
1C1	5		12	2C2
1C0	6		11	2C1
1Y	7		10	2C0
GND	8		9	] 2Y

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- Low Input Current of 1 μA Max
- Permit Multiplexing from n Lines to One Line
- Perform Parallel-to-Serial Conversion
- Strobe (Enable) Line Provided for Cascading (N Lines to n Lines)



NC - No internal connection

#### description/ordering information

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	PDIP – N	Tube of 25	SN74HC153N	SN74HC153N	
		Tube of 40	SN74HC153D		
	SOIC – D	Reel of 2500	SN74HC153DR	HC153	
4000 1- 0500		Reel of 250	SN74HC153DT	]	
-40°C to 85°C	SOP – NS	Reel of 2000	SN74HC153NSR	HC153	
		Tube of 90 SN74HC153PW			
	TSSOP – PW	Reel of 2000	SN74HC153PWR	HC153	
		Reel of 250	SN74HC153PWT		
	CDIP – J	Tube of 25	SNJ54HC153J	SNJ54HC153J	
–55°C to 125°C	CFP – W	Tube of 150	SNJ54HC153W	SNJ54HC153W	
	LCCC – FK	Tube of 55	SNJ54HC153FK	SNJ54HC153FK	

# Each of these data selectors/multiplexers contains inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate strobe ( $\overline{G}$ ) inputs are provided for each of the two 4-line sections.

ORDERING INFORMATION

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



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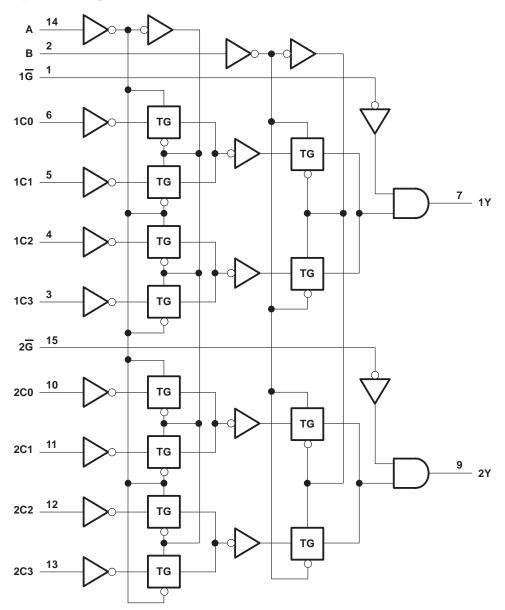
			FUNCT	ION TAB	LE		
			INPUTS				
SELE	ЕСТ†		DA	TA		G	OUTPUT
В	Α	C0	C1	C2	C3	G	•
Х	Х	Х	Х	Х	Х	Н	L
L	L	L	Х	Х	Х	L	L
L	L	Н	Х	Х	Х	L	Н
L	Н	Х	L	Х	Х	L	L
L	Н	Х	Н	Х	Х	L	Н
н	L	Х	Х	L	Х	L	L
н	L	Х	Х	Н	Х	L	Н
Н	Н	Х	Х	Х	L	L	L
н	Н	Х	Х	Х	Н	L	Н

<sup>†</sup>Select inputs A and B are common to both sections.



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## logic diagram (positive logic)



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



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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

	ee Note 1)	±20 mA ±20 mA ±35 mA ±70 mA 73°C/W 67°C/W
Storage temperature range, T <sub>stg</sub>	PW package –	

<sup>†</sup> 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)

			SN	154HC15	i3	SN	174HC15	i3	
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
VCC	Supply voltage		2	5	6	2	5	6	V
		$V_{CC} = 2 V$	1.5			1.5			
VIH	High-level input voltage	V <sub>CC</sub> = 4.5 V	3.15			3.15			V
		$V_{CC} = 6 V$	4.2			4.2			
		$V_{CC} = 2 V$			0.5			0.5	
VIL	Low-level input voltage	V <sub>CC</sub> = 4.5 V			1.35			1.35	V
		$V_{CC} = 6 V$			1.8			1.8	
VI	Input voltage		0		VCC	0		VCC	V
VO	Output voltage		0		VCC	0		VCC	V
		$V_{CC} = 2 V$			1000			1000	
$\Delta t / \Delta v$	Input transition rise/fall time	V <sub>CC</sub> = 4.5 V			500			500	ns
		$V_{CC} = 6 V$			400			400	
Т <sub>А</sub>	Operating free-air temperature		-55		125	-40		85	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.



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

	7507.00			Т	A = 25°C	;	SN54H	IC153	SN74H	C153	
PARAMETER	TEST CO	NDITIONS	Vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
			2 V	1.9	1.998		1.9		1.9		
		l <sub>OH</sub> = -20 μA	4.5 V	4.4	4.499		4.4		4.4		
VOH	VI = VIH or VIL		6 V	5.9	5.999		5.9		5.9		V
		I <sub>OH</sub> = -6 mA	4.5 V	3.98	4.3		3.7		3.84		
		I <sub>OH</sub> = -7.8 mA	6 V	5.48	5.8		5.2		5.34		
			2 V		0.002	0.1		0.1		0.1	
		I <sub>OL</sub> = 20 μA	4.5 V		0.001	0.1		0.1		0.1	
VOL	VI = VIH or VIL		6 V		0.001	0.1		0.1		0.1	V
		$I_{OL} = 6 \text{ mA}$	4.5 V		0.17	0.26		0.4		0.33	
		I <sub>OL</sub> = 7.8 mA	6 V		0.15	0.26		0.4		0.33	
lı	$V_I = V_{CC} \text{ or } 0$		6 V		±0.1	±100		±1000		±1000	nA
ICC	$V_I = V_{CC} \text{ or } 0,$	IO = 0	6 V			8		160		80	μΑ
Ci			2 V to 6 V		3	10		10		10	pF

# switching characteristics over recommended operating free-air temperature range, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	V	Τį	<b>₄ = 25°C</b>	;	SN54H	IC153	SN74H	IC153	LINUT													
PARAMETER	(INPUT)	(OUTPUT)	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT													
			2 V		90	150		225		190														
	A or B	Y	4.5 V		21	30		45		38														
			6 V		17	26		38		32														
			2 V		73	126		189		158														
<sup>t</sup> pd	Data (Any C)	Y	Y	4.5 V		17	28		42		35	ns												
	(/ (/) ())		6 V		14	23		35		29														
			2 V		38	95		150		125														
	G	Y	Y	Y	Y	Y	Y	Y	4.5 V		11	19		28		24								
			6 V		9	16		24		20														
			2 V		20	60		90		75														
t	Y	Y	Y 4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	4.5 V		8	12		18		15	ns
			6 V		6	10		15		13														



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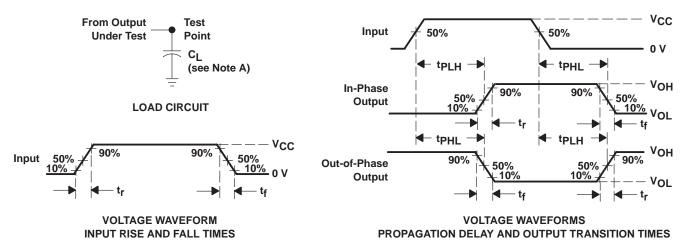
# switching characteristics over recommended operating free-air temperature range, $C_L = 150 \text{ pF}$ (unless otherwise noted) (see Figure 1)

	FROM	то		Тд	( = 25°C	;	SN54H	IC153	SN74H	IC153								
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT							
			2 V		105	235		355		295								
	A or B	Y	4.5 V		27	47		71		59								
			6 V		21	41		60		51								
			2 V		93	220		335		274								
<sup>t</sup> pd	Data (Any C)	Y	4.5 V		23	44		67		55	ns							
·	(/ (/ y C))		6 V		19	38		57		48								
			2 V		60	185		280		230	30							
	G	Y	4.5 V		17	37		56		46								
			6 V		14	32		48		40								
			2 V		45	210		315		265								
tt	t	Y	Y	Y	Y	Y	Y	Y	Y	4.5 V		17	42		63		53	ns
			6 V		13	36		53		45								

#### operating characteristics, T<sub>A</sub> = 25°C

	PARAMETER	TEST CONDITIONS	TYP	UNIT
Cpd	Power dissipation capacitance per multiplexer	No load	40	pF

### PARAMETER MEASUREMENT INFORMATION



NOTES: A. CL includes probe and test-fixture capacitance.

- B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z<sub>O</sub> = 50 Ω, t<sub>f</sub> = 6 ns, t<sub>f</sub> = 6 ns.
- C. The outputs are measured one at a time with one input transition per measurement.
- D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit 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
5962-8409301VEA	ACTIVE	CDIP	J	16	25	TBD	A42	N / A for Pkg Type		5962-8409301VE A SNV54HC153J	Samples
5962-8409301VFA	ACTIVE	CFP	W	16	25	TBD	A42	N / A for Pkg Type		5962-8409301VF A SNV54HC153W	Samples
84093012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	84093012A SNJ54HC 153FK	Samples
8409301EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8409301EA SNJ54HC153J	Samples
8409301FA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8409301FA SNJ54HC153W	Samples
SN54HC153J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54HC153J	Samples
SN74HC153D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153DTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samples
SN74HC153N	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC153N	Samples



## PACKAGE OPTION ADDENDUM

25-Sep-2013

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)	Samp
SN74HC153NE4	ACTIVE	PDIP	N	16	25	Pb-Free	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC153N	
						(RoHS)					Samp
SN74HC153NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153PWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153PWLE	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		
SN74HC153PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samj
SN74HC153PWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samp
SN74HC153PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samj
SN74HC153PWT	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Samj
SN74HC153PWTE4	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Sam
SN74HC153PWTG4	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC153	Sam
SNJ54HC153FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	84093012A SNJ54HC 153FK	Sam
SNJ54HC153J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8409301EA SNJ54HC153J	Sam
SNJ54HC153W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8409301FA SNJ54HC153W	Sam

<sup>(1)</sup> The marketing status values are defined as follows:



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**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)

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

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(<sup>5)</sup> 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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#### OTHER QUALIFIED VERSIONS OF SN54HC153, SN54HC153-SP, SN74HC153 :

- Catalog: SN74HC153, SN54HC153
- Military: SN54HC153
- Space: SN54HC153-SP

NOTE: Qualified Version Definitions:

## PACKAGE OPTION ADDENDUM



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- 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





### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



All dimensions are nominal Device	1	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74HC153DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC153NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HC153PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC153PWT	TSSOP	PW	16	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TEXAS INSTRUMENTS

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## PACKAGE MATERIALS INFORMATION

26-Jan-2013



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC153DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74HC153NSR	SO	NS	16	2000	367.0	367.0	38.0
SN74HC153PWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74HC153PWT	TSSOP	PW	16	250	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-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.



PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



NOTES:

A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.  $\beta$ . 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-G16)

# 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.



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