

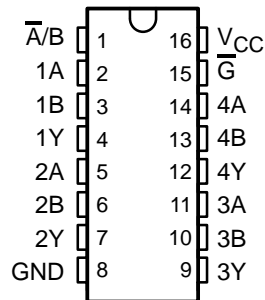
SN54LV157A, SN74LV157A

QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

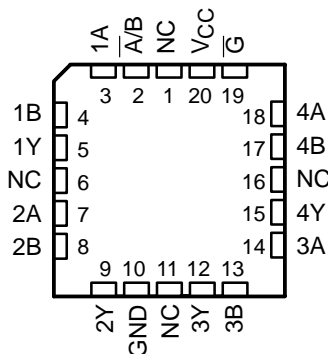
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- 2-V to 5.5-V V_{CC} Operation
- Max t_{pd} of 7.5 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce) <math><0.8\text{ V}</math> at V_{CC} , $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >math>>2.3\text{ V}</math> at V_{CC} , $T_A = 25^\circ\text{C}$
- I_{off} Supports Partial-Power-Down-Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

SN54LV157A ... J OR W PACKAGE
SN74LV157A ... D, DB, DGV, NS, OR PW PACKAGE
(TOP VIEW)



SN54LV157A ... FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The 'LV157A devices are quadruple 2-line to 1-line data selectors/multiplexers designed for 2-V to 5.5-V V_{CC} operation.

These devices contain inverters and drivers to supply full data selection to the four output gates. A separate strobe (\bar{G}) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'LV157A devices present true data.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	SOIC – D	Tube of 40	SN74LV157AD	LV157A
		Reel of 2500	SN74LV157ADR	
	SOP – NS	Reel of 2000	SN74LV157ANSR	74LV157A
	SSOP – DB	Reel of 2000	SN74LV157ADBR	LV157A
	TSSOP – PW	Tube of 90	SN74LV157APW	LV157A
		Reel of 2000	SN74LV157APWR	
Reel of 250		SN74LV157APWT		
	TVSOP – DGV	Reel of 2000	SN74LV157ADGVR	LV157A
–55°C to 125°C	CDIP – J	Tube of 25	SNJ54LV157AJ	SNJ54LV157AJ
	CFP – W	Tube of 150	SNJ54LV157AW	SNJ54LV157AW
	LCCC – FK	Tube of 55	SNJ54LV157AFK	SNJ54LV157AFK

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



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UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information 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.

**TEXAS
INSTRUMENTS**

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SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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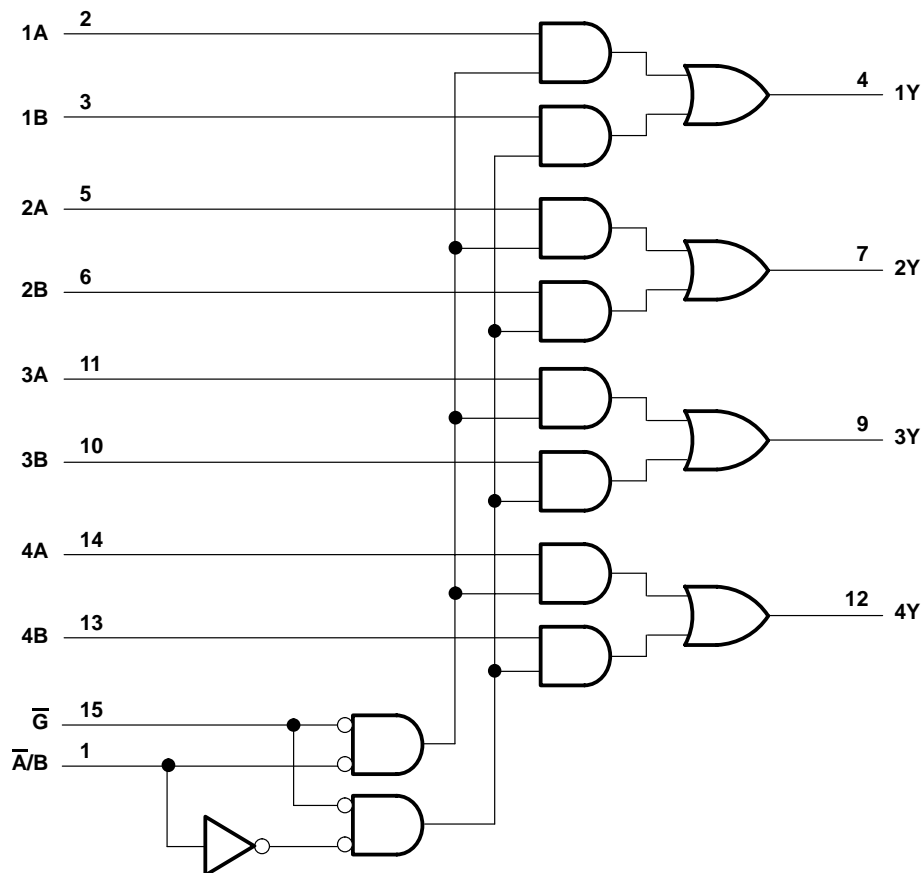
description/ordering information (continued)

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

FUNCTION TABLE

INPUTS				OUTPUT Y
\overline{G}	SELECT $\overline{A/B}$	DATA		
		A	B	
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

logic diagram (positive logic)



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

SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (see Note 1)	–0.5 V to 7 V
Output voltage range applied in high or low state, V_O (see Notes 1 and 2)	–0.5 V to $V_{CC} + 0.5$ V
Output voltage range applied in power-off state, V_O (see Note 1)	–0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$)	–20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±25 mA
Continuous current through V_{CC} or GND	±50 mA
Package thermal impedance, θ_{JA} (see Note 3):	
D package	73°C/W
DB package	82°C/W
DGV package	120°C/W
NS package	64°C/W
PW package	108°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. This value is limited to 5.5 V maximum.
 3. The package thermal impedance is calculated in accordance with JESD 51-7.

SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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recommended operating conditions (see Note 4)

		SN54LV157A		SN74LV157A		UNIT	
		MIN	MAX	MIN	MAX		
V _{CC}	Supply voltage	2	5.5	2	5.5	V	
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5	1.5		V	
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.7	V _{CC} × 0.7			
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.7	V _{CC} × 0.7			
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.7	V _{CC} × 0.7			
V _{IL}	Low-level input voltage	V _{CC} = 2 V		0.5	0.5	V	
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.3	V _{CC} × 0.3			
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.3	V _{CC} × 0.3			
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.3	V _{CC} × 0.3			
V _I	Input voltage	0	5.5	0	5.5	V	
V _O	Output voltage	0	V _{CC}	0	V _{CC}	V	
I _{OH}	High-level output current	V _{CC} = 2 V		-50	-50	μA	
		V _{CC} = 2.3 V to 2.7 V		-2	-2	mA	
		V _{CC} = 3 V to 3.6 V		-6	-6		
		V _{CC} = 4.5 V to 5.5 V		-12	-12		
I _{OL}	Low-level output current	V _{CC} = 2 V		50	50	μA	
		V _{CC} = 2.3 V to 2.7 V		2	2	mA	
		V _{CC} = 3 V to 3.6 V		6	6		
		V _{CC} = 4.5 V to 5.5 V		12	12		
Δt/Δv	Input transition rise or fall rate	V _{CC} = 2.3 V to 2.7 V		200	0	200	ns/V
		V _{CC} = 3 V to 3.6 V		100	0	100	
		V _{CC} = 4.5 V to 5.5 V		20	0	20	
T _A	Operating free-air temperature	-55	125	-40	85	°C	

NOTE 4: 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	V _{CC}	SN54LV157A			SN74LV157A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V _{OH}	I _{OH} = -50 μA	2 V to 5.5 V	V _{CC} -0.1			V _{CC} -0.1			V
	I _{OH} = -2 mA	2.3 V	2			2			
	I _{OH} = -6 mA	3 V	2.48			2.48			
	I _{OH} = -12 mA	4.5 V	3.8			3.8			
V _{OL}	I _{OL} = 50 μA	2 V to 5.5 V	0.1			0.1			V
	I _{OL} = 2 mA	2.3 V	0.4			0.4			
	I _{OL} = 6 mA	3 V	0.44			0.44			
	I _{OL} = 12 mA	4.5 V	0.55			0.55			
I _I	V _I = 5.5 V or GND	0 to 5.5 V	±1			±1			μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V	20			20			μA
I _{off}	V _I or V _O = 0 to 5.5 V	0	5			5			μA
C _i	V _I = V _{CC} or GND	3.3 V	1.7			1.7			pF

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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**switching characteristics over recommended operating free-air temperature range,
V_{CC} = 2.5 V ± 0.2 V (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN54LV157A		SN74LV157A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A or B	Y	C _L = 15 pF	7.4*	15.9*	1*	19.5*	1	19.5	ns	
	$\overline{A/B}$	Y		7.9*	19.4*	1*	23.5*	1	23.5		
	\overline{G}	Y		7.8*	19.8*	1*	24*	1	24		
t _{pd}	A or B	Y	C _L = 50 pF	9.4	18.8	1	22	1	22	ns	
	$\overline{A/B}$	Y		10.8	22.3	1	26	1	26		
	\overline{G}	Y		9.6	22.7	1	26.5	1	26.5		

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

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN54LV157A		SN74LV157A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A or B	Y	C _L = 15 pF	5.2*	9.7*	1*	11.5*	1	11.5	ns	
	$\overline{A/B}$	Y		5.8*	13.2*	1*	15.5*	1	15.5		
	\overline{G}	Y		5.5*	13.6*	1*	16*	1	16		
t _{pd}	A or B	Y	C _L = 50 pF	6.7	13.2	1	15	1	15	ns	
	$\overline{A/B}$	Y		7.6	16.7	1	19	1	19		
	\overline{G}	Y		7	17.1	1	19.5	1	19.5		

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

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN54LV157A		SN74LV157A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A or B	Y	C _L = 15 pF	3.6*	6.4*	1*	7.5*	1	7.5	ns	
	$\overline{A/B}$	Y		4.1*	8.1*	1*	9.5*	1	9.5		
	\overline{G}	Y		3.8*	8.6*	1*	10*	1	10		
t _{pd}	A or B	Y	C _L = 50 pF	4.8	8.4	1	9.5	1	9.5	ns	
	$\overline{A/B}$	Y		5.4	10.1	1	11.5	1	11.5		
	\overline{G}	Y		5	10.6	1	12	1	12		

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

noise characteristics, V_{CC} = 3.3 V, C_L = 50 pF, T_A = 25°C (see Note 5)

PARAMETER		SN74LV157A			UNIT
		MIN	TYP	MAX	
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}	0.3	0.8		V
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}	-0.1	-0.8		V
V _{OH(V)}	Quiet output, minimum dynamic V _{OH}	3.2			V
V _{IH(D)}	High-level dynamic input voltage	2.31			V
V _{IL(D)}	Low-level dynamic input voltage		0.99		V

NOTE 5: Characteristics are for surface-mount packages only.

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operating characteristics, $T_A = 25^\circ\text{C}$

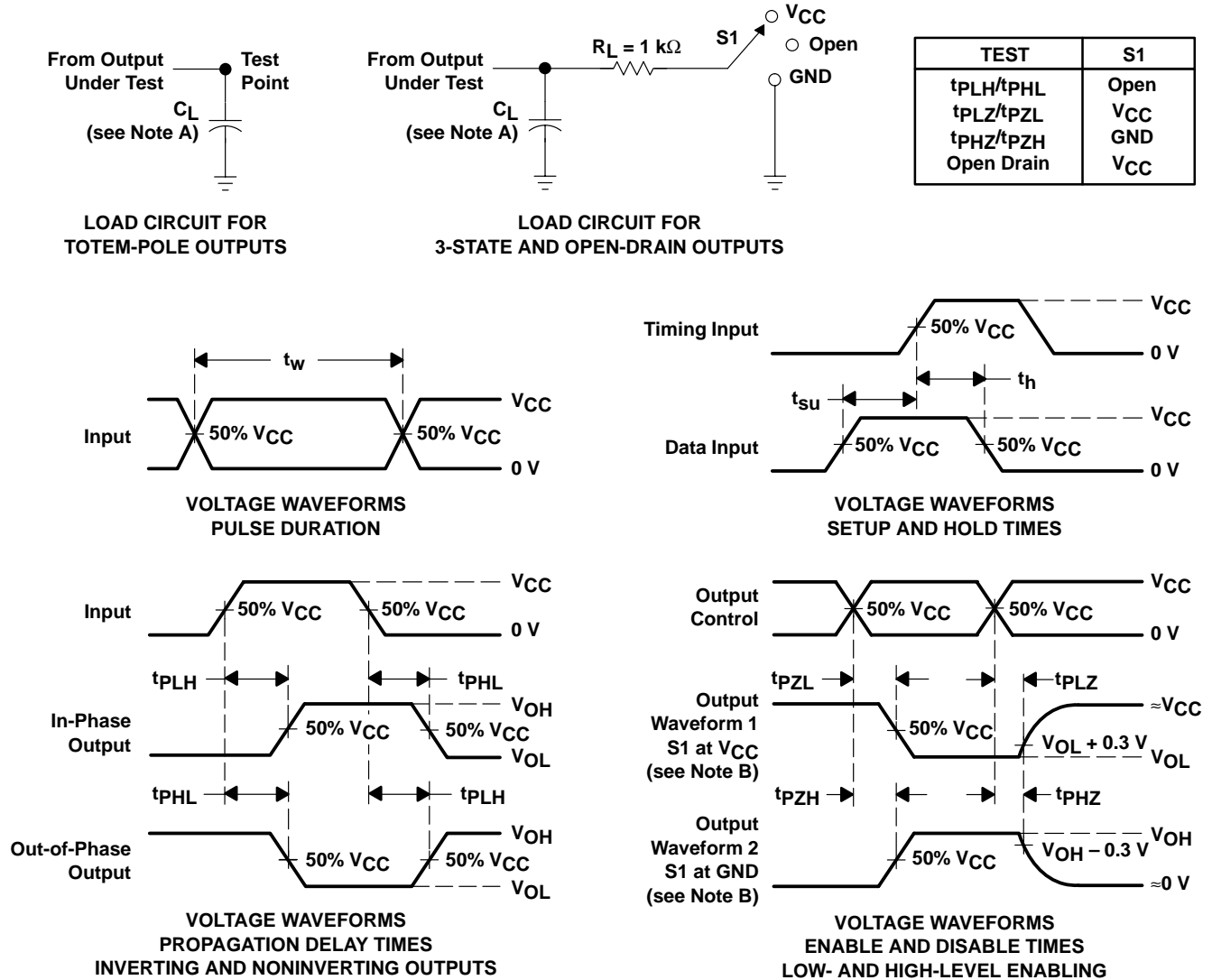
PARAMETER		TEST CONDITIONS	V _{CC}	TYP	UNIT
C _{pd}	Power dissipation capacitance	C _L = 50 pF, f = 10 MHz	3.3 V	12.1	pF
			5 V	13.1	



SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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PARAMETER MEASUREMENT INFORMATION





Input

t_w

$50\% V_{CC}$

$50\% V_{CC}$

V_{CC}

0 V

VOLTAGE WAVEFORMS PULSE DURATION



Timing Input

Data Input

t_{su}

t_h

$50\% V_{CC}$

$50\% V_{CC}$

V_{CC}

0 V

VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



Input

In-Phase Output

Out-of-Phase Output

t_{PLH}

t_{PHL}

t_{PHL}

t_{PLH}

$50\% V_{CC}$

$50\% V_{CC}$

$50\% V_{CC}$

$50\% V_{CC}$

V_{CC}

0 V

V_{OH}

V_{OL}

V_{OH}

V_{OL}

VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



Output Control

Output Waveform 1 S1 at V_{CC} (see Note B)

Output Waveform 2 S1 at GND (see Note B)

t_{PZL}

t_{PLZ}

t_{PZH}

t_{PHZ}

$50\% V_{CC}$

$50\% V_{CC}$

$50\% V_{CC}$

$50\% V_{CC}$

V_{CC}

0 V

$\approx V_{CC}$

$V_{OL} + 0.3\text{ V}$

V_{OL}

$V_{OH} - 0.3\text{ V}$

V_{OH}

$\approx 0\text{ V}$

VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

- 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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PHL} and t_{PLH} are the same as t_{pd} .
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 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 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



4040047-4/F 07/2004

- NOTES:
- 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-012 variation AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - 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**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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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