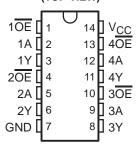
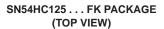
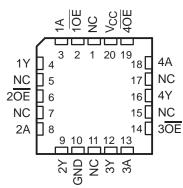
- Wide Operating Voltage Range of 2 V to 6 V
- High-Current 3-State Outputs Interface Directly With System Bus or Can Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80-μA Max I<sub>CC</sub>

SN54HC125...J OR W PACKAGE SN74HC125...D, DB, N, NS, OR PW PACKAGE (TOP VIEW)



- Typical t<sub>pd</sub> = 11 ns
- ±6-mA Output Drive at 5 V
- Low Input Current of 1 μA Max





NC - No internal connection

#### description/ordering information

These quadruple bus buffer gates feature independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable  $(\overline{OE})$  input is high.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### ORDERING INFORMATION

TA	PACKAG	<sub>GE</sub> †	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube of 25	SN74HC125N	SN74HC125N
4000 / 0500		Tube of 50	SN74HC125D	
	SOIC - D	Reel of 2500	SN74HC125DR	HC125
		Reel of 250	SN74HC125DT	
-40°C to 85°C	SOP - NS	Reel of 2000	SN74HC125NSR	HC125
	SSOP – DB	Reel of 2000	SN74HC125DBR	HC125
	TOCOD DW	Reel of 2000	SN74HC125PWR	110405
	TSSOP – PW	Reel of 250	SN74HC125PWT	HC125
	CDIP – J	Tube of 25	SNJ54HC125J	SNJ54HC125J
–55°C to 125°C	CFP – W	Tube of 150	SNJ54HC125W	SNJ54HC125W
	LCCC – FK	Tube of 55	SNJ54HC125FK	SNJ54HC125FK

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



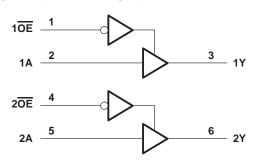
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

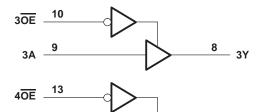


# FUNCTION TABLE (each buffer)

INPU	JTS	OUTPUT
OE	Α	Υ
L	Н	Н
L	L	L
Н	Χ	Z

#### logic diagram (positive logic)





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

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

Supply voltage range, $V_{CC}$	ee Note 1) (see Note 1)	±20 mA ±20 mA ±35 mA ±70 mA 86°C/W 96°C/W
	PW package	
Storage temperature range, T <sub>stg</sub>		

<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)

			SI	N54HC12	25	SN74HC125			шит
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage		2	5	6	2	5	6	V
		V <sub>CC</sub> = 2 V	1.5			1.5			
ViH	High-level input voltage	V <sub>CC</sub> = 4.5 V	3.15			3.15			V
		V <sub>CC</sub> = 6 V	4.2			4.2			
		V <sub>CC</sub> = 2 V			0.5			0.5	
$\vee_{IL}$	Low-level input voltage	V <sub>CC</sub> = 4.5 V			1.35			1.35	V
		VCC = 6 V			1.8			1.8	
٧ı	Input voltage		0		VCC	0		VCC	V
٧o	Output voltage		0		VCC	0		VCC	V
		V <sub>CC</sub> = 2 V			1000			1000	
Δt/Δν	Input transition rise/fall time	V <sub>CC</sub> = 4.5 V			500			500	ns
		VCC = 6 V			400			400	
TA	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.

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

		TEST CONDITIONS		Т	A = 25°C	;	SN54H	IC125	SN74H	C125	LINIT
PARAMETER	TEST CO	ONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
		I <sub>OH</sub> = -20 μA	2 V	1.9	1.998		1.9		1.9		
VOH			4.5 V	4.4	4.499		4.4		4.4		
	VI = VIH or VIL		6 V	5.9	5.999		5.9		5.9		V
		$I_{OH} = -6 \text{ mA}$	4.5 V	3.98	4.3		3.7		3.84		
		$I_{OH} = -7.8 \text{ mA}$	6 V	5.48	5.8		5.2		5.34		
	VI = VIH or VIL	I <sub>OL</sub> = 20 μA	2 V		0.002	0.1		0.1		0.1	
			4.5 V		0.001	0.1		0.1		0.1	
V <sub>OL</sub>			6 V		0.001	0.1		0.1		0.1	V
		I <sub>OL</sub> = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
		$I_{OL} = 7.8 \text{ mA}$	6 V		0.15	0.26		0.4		0.33	
lį	$V_I = V_{CC}$ or 0		6 V		±0.1	±100		±1000	:	±1000	nA
loz	VO = VCC or 0	•	6 V		±0.01	±0.5		±10		±5	μΑ
Icc	$V_I = V_{CC}$ or 0,	IO = 0	6 V			8		160	·	80	μΑ
C <sub>i</sub>			2 V to 6 V		3	10		10		10	pF

## SN54HC125, SN74HC125 QUADRUPLE BUS BUFFER GATES WITH 3-STATE OUTPUTS

SCLS104D - MARCH 1984 - REVISED AUGUST 2003

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

	FROM	то	.,	T	λ = 25°C	;	SN54H	C125	SN74H	IC125	
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>pd</sub> A		Y	2 V		48	120		150		150	
	Α		4.5 V		14	24		36		30	ns
			6 V		11	20		25		26	
			2 V		53	120		180		150	
t <sub>en</sub>	ŌĒ	Y	4.5 V		14	24		36		30	ns
			6 V		11	20		31		26	
			2 V		30	120		180		150	
<sup>t</sup> dis	ŌĒ	Y	4.5 V		15	24		36		30	ns
			6 V		14	20		31		26	
		Any	2 V		28	60		90		75	
t <sub>t</sub>			4.5 V		8	12		18		15	ns
-			6 V		6	10		15		13	

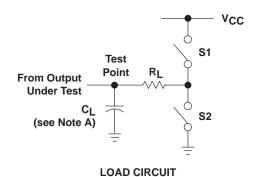
# switching characteristics over recommended operating free-air temperature range, $C_L$ = 150 pF (unless otherwise noted) (see Figure 1)

242445	FROM	TO (OUTPUT)	.,	T <sub>A</sub> = 25°C			SN54HC125		SN74HC125			
PARAMETER	(INPUT)		(OUTPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX
			2 V		67	150		225		190		
<sup>t</sup> pd	A	Y	4.5 V		19	30		45		38	ns	
r -			6 V		15	25		39		32		
		Y	2 V		100	135		200		170		
t <sub>en</sub>	ŌĒ		4.5 V		20	27		40		34	ns	
					6 V		17	23		34		29
			2 V		45	210		315		265		
t <sub>t</sub>		Any	4.5 V		17	42		63		53	ns	
			6 V		13	36		53		45		

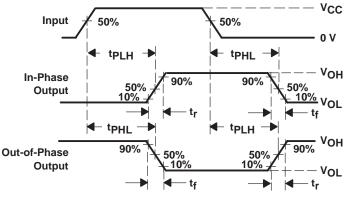
## operating characteristics, $T_A = 25^{\circ}C$

	PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance per gate	No load	45	pF

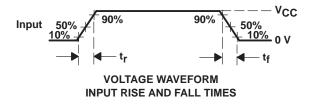
#### PARAMETER MEASUREMENT INFORMATION

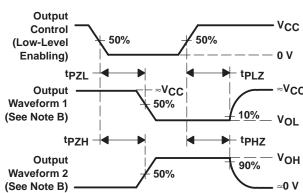


PARAI	METER	RL	CL	S1	S2
	tPZH	<b>1 k</b> Ω	50 pF or	Open	Closed
<sup>t</sup> en	tPZL	1 K22	150 pF	Closed	Open
4	tPHZ	<b>1 k</b> Ω	50 pF	Open	Closed
<sup>t</sup> dis	tPLZ	1 K22	50 pr	Closed	Open
t <sub>pd</sub> or	t <sub>pd</sub> or t <sub>t</sub>		50 pF or 150 pF	Open	Open



VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT TRANSITION 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<sub>O</sub> = 50  $\Omega$ , t<sub>f</sub> = 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





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#### **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
5962-87721012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-8772101CA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type
SN54HC125J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type
SN74HC125D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI
SN74HC125DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125DTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HC125N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74HC125NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HC125NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125NSRE4	ACTIVE	so	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125PWT	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC125PWTE4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM



#### PACKAGE OPTION ADDENDUM

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Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp (3)
SN74HC125PWTG4	ACTIVE	TSSOP	PW	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54HC125FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
SNJ54HC125J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type

<sup>(1)</sup> 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.

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#### OTHER QUALIFIED VERSIONS OF SN54HC125, SN74HC125:

Automotive: SN74HC125-Q1

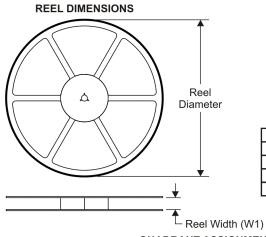
NOTE: Qualified Version Definitions:

Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

#### **PACKAGE MATERIALS INFORMATION**

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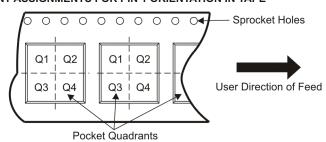
#### TAPE AND REEL INFORMATION





	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

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
SN74HC125DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74HC125DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HC125DT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74HC125NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HC125PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC125PWT	TSSOP	PW	14	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC125DBR	SSOP	DB	14	2000	346.0	346.0	33.0
SN74HC125DR	SOIC	D	14	2500	346.0	346.0	33.0
SN74HC125DT	SOIC	D	14	250	346.0	346.0	33.0
SN74HC125NSR	SO	NS	14	2000	346.0	346.0	33.0
SN74HC125PWR	TSSOP	PW	14	2000	346.0	346.0	29.0
SN74HC125PWT	TSSOP	PW	14	250	346.0	346.0	29.0

#### 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.

## 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



## N (R-PDIP-T\*\*)

#### PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN

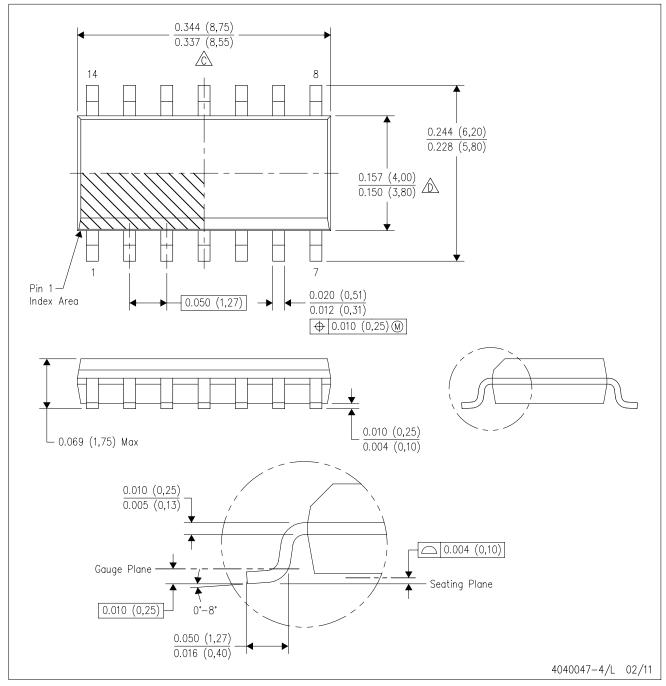


- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



## D (R-PDSO-G14)

#### PLASTIC SMALL OUTLINE

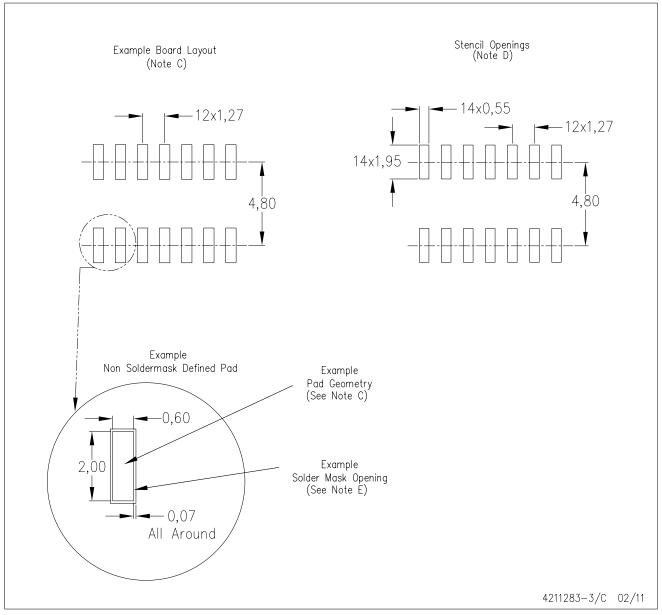


- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AB.



# D (R-PDSO-G14)

## PLASTIC SMALL OUTLINE



- 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

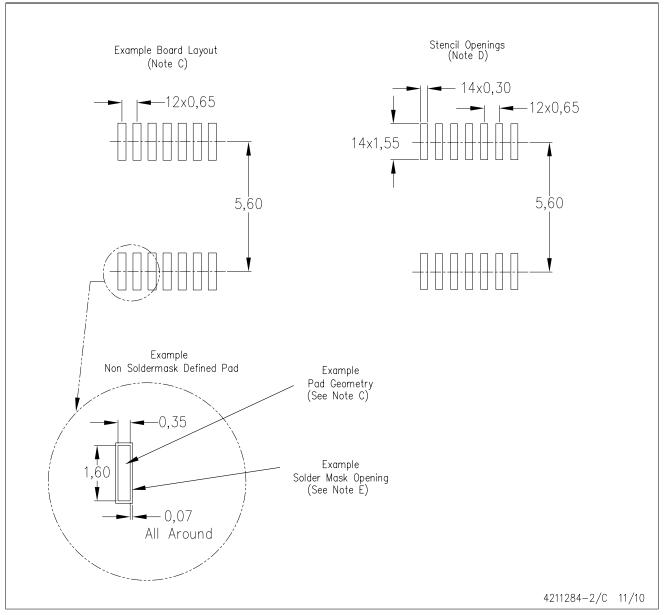


- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
  - Sody length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body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



- 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**

## 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.



#### 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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