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Texas Instruments SN74HC365N

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Datasheet of SN74HC365N - IC BUFF/DVR TRI-ST 6BIT 16DIP

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SN54HC365, SN74HC365 **HEX BUFFERS AND LINE DRIVERS** WITH 3-STATE OUTPUTS

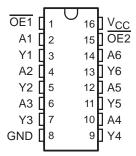
SCLS308D - JANUARY 1996 - REVISED OCTOBER 2003

- Wide Operating Voltage Range of 2 V to 6 V
- **High-Current 3-State Outputs Drive Bus** Lines, Buffer-Memory Address Registers, or Drive Up To 15 LSTTL Loads
- **True Outputs**
- Low Power Consumption, 80-µA Max I_{CC}
- Typical $t_{pd} = 10 \text{ ns}$
- ±6-mA Output Drive at 5 V
- Low Input Current of 1 µA Max

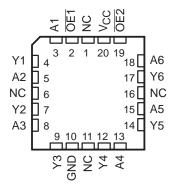
description/ordering information

These hex buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The 'HC365 devices contain six independent buffers/drivers with dual-gated output-enable (OE1 and OE2) inputs. When OE1 and OE2 are both low, the devices pass noninverted data from the A inputs to the Youtputs. If either (or both) output-enable terminal(s) is high, the outputs are in the high-impedance state.

SN54HC365...J OR W PACKAGE SN74HC365 . . . D, N, NS, OR PW PACKAGE (TOP VIEW)



SN54HC365 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

ORDERING INFORMATION

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube of 25	SN74HC365N	SN74HC365N
		Tube of 40	SN74HC365D	
	SOIC - D	Reel of 2500	SN74HC365DR	HC365
4000 (0500		Reel of 250	SN74HC365DT	
-40°C to 85°C	SOP - NS	Reel of 2000	SN74HC365NSR	HC365
		Reel of 90	SN74HC365PW	
	TSSOP - PW	Reel of 2000	SN74HC365PWR	HC365
		Reel of 250	SN74HC365PWT	
	CDIP – J	Tube of 25	SNJ54HC365J	SNJ54HC365J
-55°C to 125°C	CFP – W	Tube of 150	SNJ54HC365W	SNJ54HC365W
	LCCC - FK	Tube of 55	SNJ54HC365FK	SNJ54HC365FK

[†] 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.



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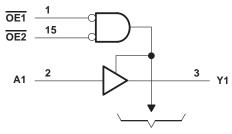
SN54HC365, SN74HC365 **HEX BUFFERS AND LINE DRIVERS** WITH 3-STATE OUTPUTS

SCLS308D - JANUARY 1996 - REVISED OCTOBER 2003

FUNCTION TABLE (each buffer/driver)

	INPUTS	OUTPUT	
OE1	OE2	Α	Υ
Н	Х	Χ	Z
Χ	Н	Χ	Z
L	L	Н	Н
L	L	L	L

logic diagram (positive logic)



To Five Other Channels

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

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

Supply voltage range, V _{CC}		0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (se	e Note 1)	±20 mA
Output clamp current, IOK (VO < 0 or VO > VCC	c) (see Note 1)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})		±35 mA
Continuous current through V _{CC} or GND		±70 mA
Package thermal impedance, θ_{JA} (see Note 2):	D package	73°C/W
	N package	67°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. The package thermal impedance is calculated in accordance with JESD 51-7.





Datasheet of SN74HC365N - IC BUFF/DVR TRI-ST 6BIT 16DIP

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SN54HC365, SN74HC365 HEX BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

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recommended operating conditions (see Note 3)

			SI	154HC36	5	SN	174HC36	i5	
			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 _{CC} = 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 _{CC} = 4.5 V			1.35			1.35	V
		VCC = 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	
Δt/Δν	Input transition rise/fall time	V _{CC} = 4.5 V			500			500	ns
		V _{CC} = 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_{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)

				Т	A = 25°C	;	SN54H	IC365	SN74H	C365	
PARAMETER	TEST CO	ONDITIONS	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
			2 V	1.9	1.998		1.9		1.9		
		I _{OH} = -20 μA	4.5 V	4.4	4.499		4.4		4.4		
Voн	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		
			2 V		0.002	0.1		0.1		0.1	
		I _{OL} = 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	
		$I_{OL} = 7.8 \text{ mA}$	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	$V_O = V_{CC}$ 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
Ci			2 V to 6 V		3	10		10		10	pF





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SN54HC365, SN74HC365 HEX BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

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

DADAMETED	FROM	то	.,	T	λ = 25°C	;	SN54H	IC365	SN74H	C365							
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT						
			2 V		50	95		145		120							
^t pd	Α	Υ	4.5 V		12	19		29		24	ns						
·			6 V		10	16		25		20							
			2 V		100	190		285		238							
t _{en}	ŌĒ	Y	4.5 V		26	38		57		48	ns						
			6 V		21	32		48		41							
			2 V		50	175		265		240							
^t dis	ŌE	Υ	Υ	Υ	Y	4.5 V		21	35		53		48	ns			
			6 V		19	30		45		41							
t _t		Any	Any	Any	2 V		28	60		90		75					
					Any	Any	Any	Any	Any	Any	Any	4.5 V		8	12		18
			6 V		6	10		15		13							

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

DADAMETED	PARAMETER FROM		V	T,	չ = 25°C	;	SN54H	IC365	SN74H	IC365	LINUT															
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT															
			2 V		70	120		180		150																
^t pd	Α	Y	4.5 V		17	24		36		30	ns															
			6 V		14	20		31		25																
			2 V		140	230		345		285																
t _{en}	ŌĒ	Υ	4.5 V		30	46		69		57	ns															
			6 V		28	39		59		48																
			2 V		45	210		315		265																
t _t		Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	4.5 V		17	42		63		53	ns
			6 V		13	36		53		45																

operating characteristics, T_A = 25°C

ĺ		PARAMETER	TEST CONDITIONS	TYP	UNIT
ľ	C _{pd}	Power dissipation capacitance per buffer/driver	No load	35	pF

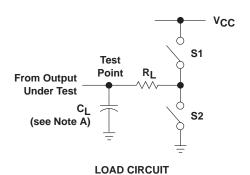


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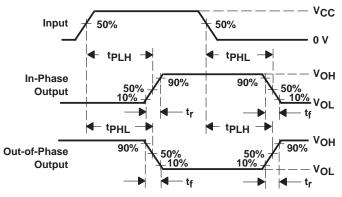
SN54HC365, SN74HC365 HEX BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

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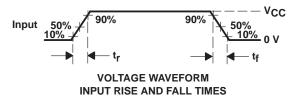
PARAMETER MEASUREMENT INFORMATION

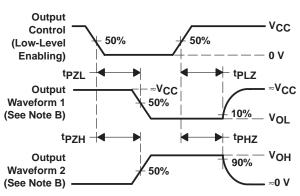


PARAI	METER	RL	CL	S1	S2
,	t _{en} t _{PZH}		50 pF	Open	Closed
^t en			or 150 pF	Closed	Open
4	tPHZ	1 kΩ	50 pF	Open	Closed
^t dis	tPLZ	1 K22	50 pF	Closed	Open
t _{pd} or	t _t		50 pF or 150 pF	Open	Open



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, $Z_O = 50 \Omega$, $t_f = 6 \text{ ns.}$
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. tpLH and tpHL are the same as tpd.
 - F. tpLZ and tpHZ are the same as tdis.
 - G. tpzL and tpzH are the same as ten.

Figure 1. Load Circuit and Voltage Waveforms





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PACKAGE OPTION ADDENDUM

17-Dec-2015

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package	Pins		Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
8500101EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8500101EA SNJ54HC365J	Sample
JM38510/65706BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65706BEA	Sample
M38510/65706BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65706BEA	Sample
SN54HC365J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54HC365J	Sample
SN74HC365D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC365N	Sample
SN74HC365NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC365N	Sample
SN74HC365NSR	ACTIVE	so	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample
SN74HC365PWT	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Sample

Addendum-Page 1



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Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74HC365PWTE4	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC365	Samples
SNJ54HC365J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8500101EA SNJ54HC365J	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.

(6) 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

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Addendum-Page 2



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PACKAGE OPTION ADDENDUM

www.ti.com 17-Dec-2015

OTHER QUALIFIED	VERSIONS	OF SN54HC365	, SN74HC365 :
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Military: SN54HC365

NOTE: Qualified Version Definitions:

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

Addendum-Page 3

Datasheet of SN74HC365N - IC BUFF/DVR TRI-ST 6BIT 16DIP

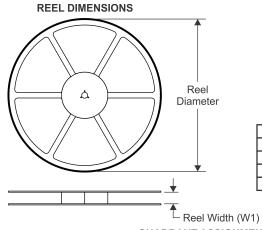
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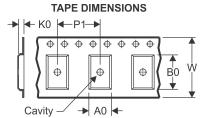


PACKAGE MATERIALS INFORMATION

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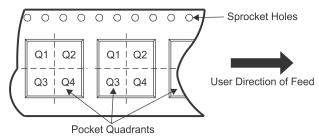
TAPE AND REEL INFORMATION





	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

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
SN74HC365DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC365PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC365PWT	TSSOP	PW	16	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1



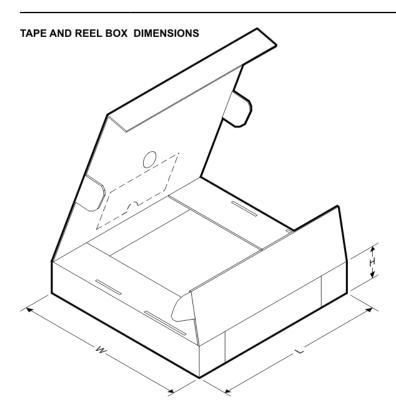
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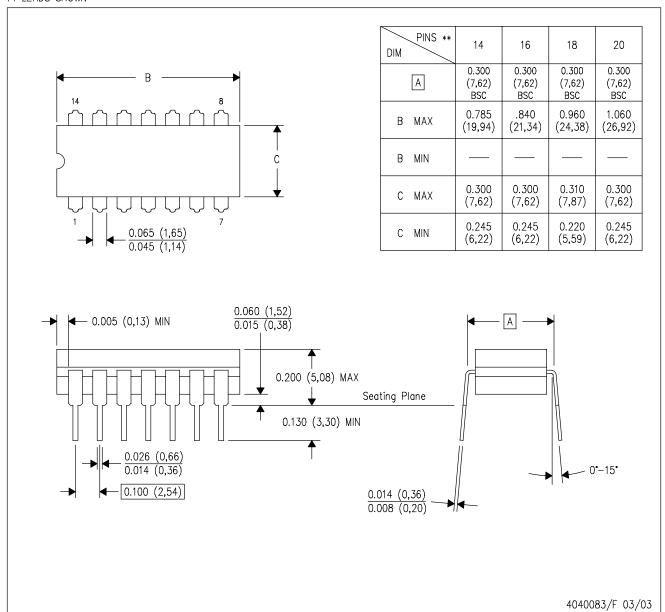
*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC365DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74HC365PWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74HC365PWT	TSSOP	PW	16	250	367.0	367.0	35.0

J (R-GDIP-T**)

CERAMIC DUAL IN-LINE PACKAGE

14 LEADS SHOWN



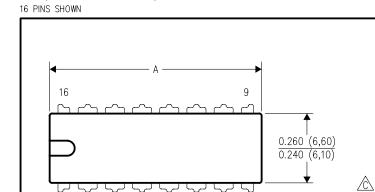
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.



MECHANICAL DATA

N (R-PDIP-T**)

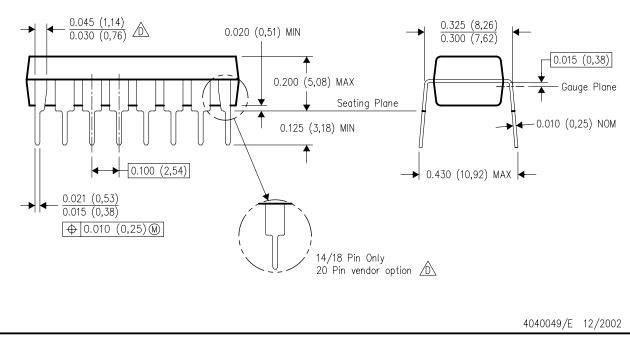
PLASTIC DUAL-IN-LINE PACKAGE



 $\frac{0.070 (1,78)}{0.045 (1,14)}$

8

PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	АА	ВВ	AC	AD



- . 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.

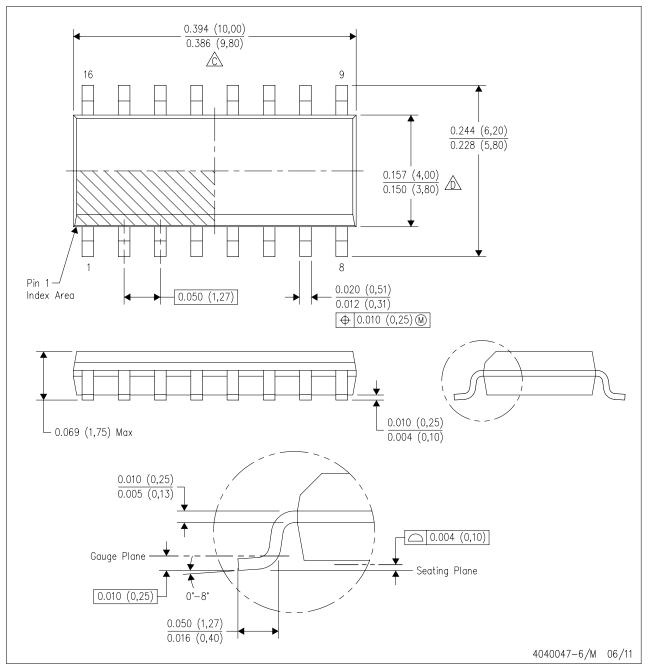




MECHANICAL DATA

D (R-PDSO-G16)

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 AC.



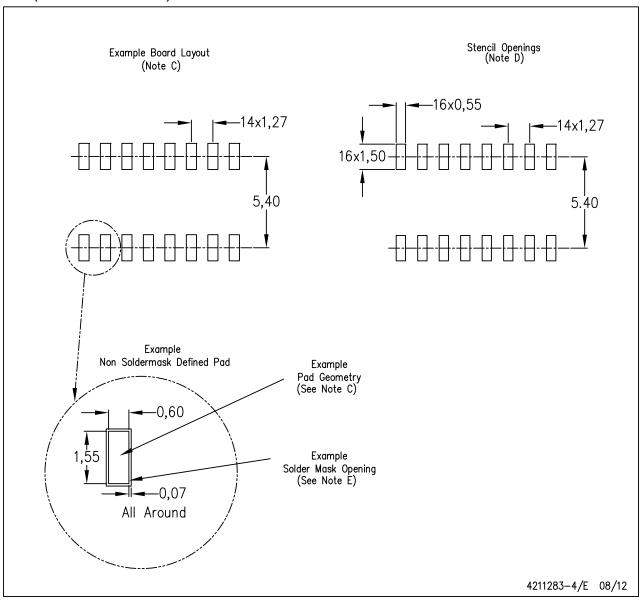




LAND PATTERN DATA

D (R-PDSO-G16)

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.



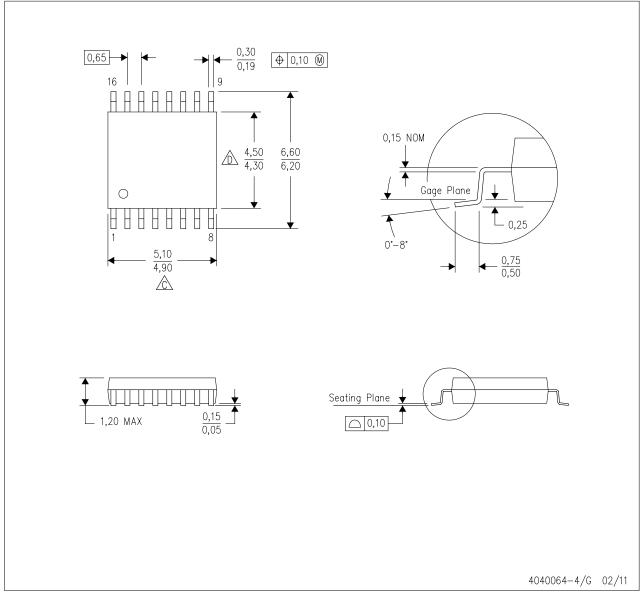




MECHANICAL DATA

PW (R-PDSO-G16)

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.
- 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



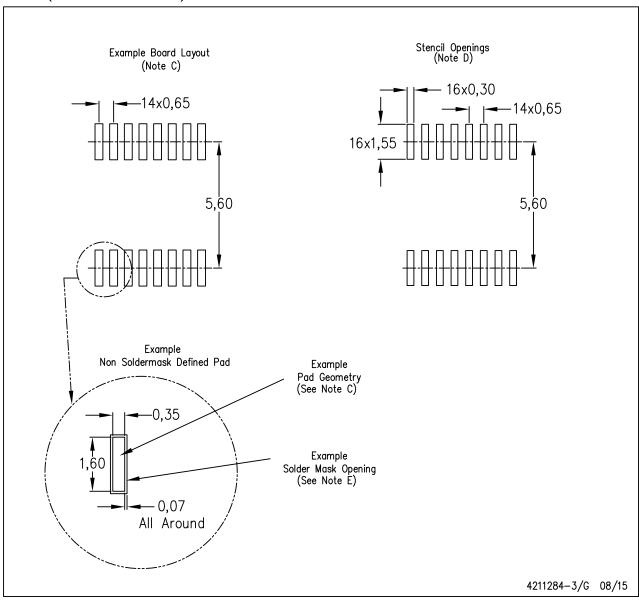




LAND PATTERN DATA

PW (R-PDSO-G16)

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.



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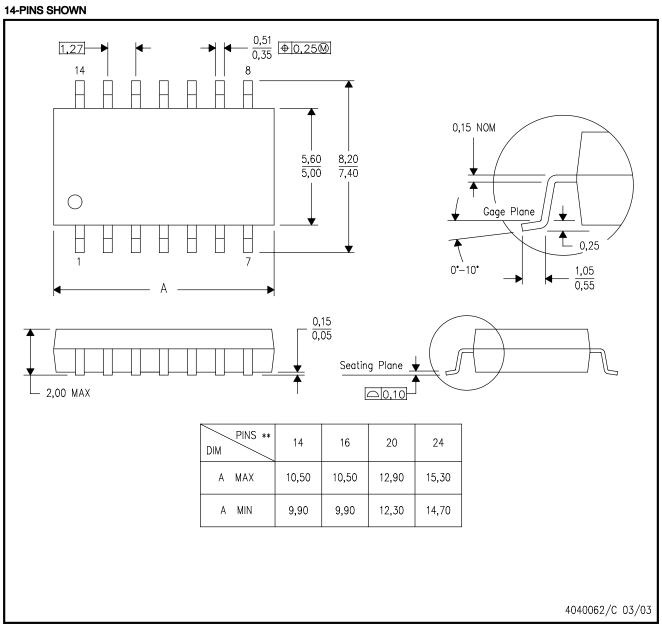


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MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.





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