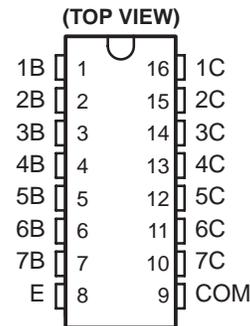


HIGH-VOLTAGE HIGH-CURRENT DARLINGTON TRANSISTOR ARRAYS

- 500-mA Rated Collector Current (Single Output)
- High-Voltage Outputs . . . 100 V
- Output Clamp Diodes
- Inputs Compatible With Various Types of Logic
- Relay Driver Applications
- Higher-Voltage Versions of ULN2003A and ULN2004A, for Commercial Temperature Range

SN75468 . . . D, N, OR NS PACKAGE
SN75469 . . . D OR N PACKAGE



description/ordering information

The SN75468 and SN75469 are high-voltage, high-current Darlington transistor arrays. Each consists of seven npn Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers.

The SN75468 has a 2700- Ω series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS. The SN75469 has a 10.5-k Ω series base resistor to allow its operation directly with CMOS or PMOS that use supply voltages of 6 to 15 V. The required input current is below that of the SN75468.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP (N)	Tube of 25	SN75468N	SN75468N
	SOIC (D)	Tube of 40	SN75468D	SN75468
		Reel of 2500	SN75468DR	
	SOP (NS)	Reel of 2000	SN75468NSR	SN75468
	PDIP (N)	Tube of 25	SN75469N	SN75469N
	SOIC (D)	Tube of 40	SN75469D	SN75469
Reel of 2500		SN75469DR		

† 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.

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.



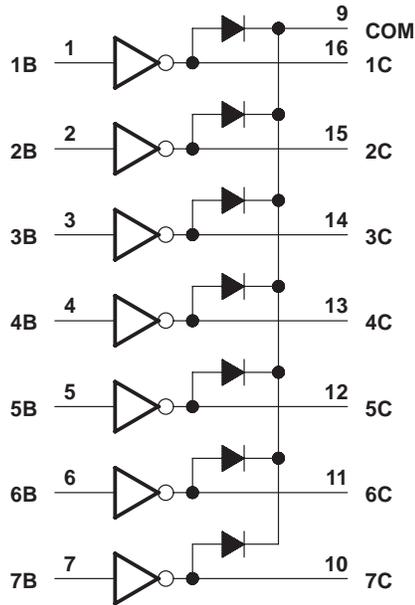
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2004, Texas Instruments Incorporated

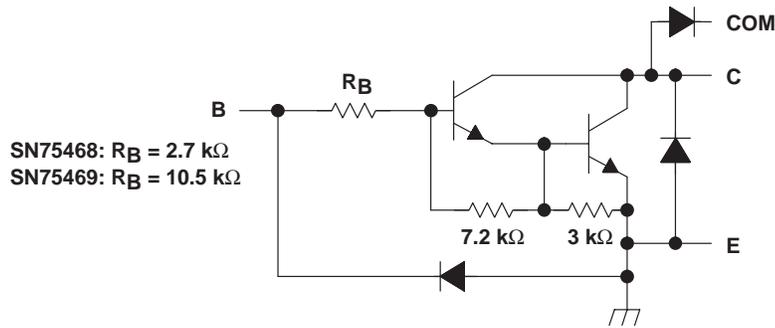
SN75468, SN75469 DARLINGTON TRANSISTOR ARRAYS

SLRS023D – DECEMBER 1976 – REVISED NOVEMBER 2004

logic diagram



schematic (each Darlington pair)



SN75468: $R_B = 2.7\text{ k}\Omega$
SN75469: $R_B = 10.5\text{ k}\Omega$

All resistor values shown are nominal.

absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)†

Collector-emitter voltage, V_{CE}	100 V
Input voltage, V_I (see Note 1)	30 V
Peak collector current (see Figures 14 and 15)	500 mA
Output clamp current, I_{OK}	500 mA
Total emitter-terminal current	–2.5 A
Package thermal impedance, θ_{JA} (see Notes 2 and 3): D package	73°C/W
N package	67°C/W
NS package	64°C/W
Operating virtual junction temperature, T_J	150°C
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. All voltage values are with respect to the emitter/substrate terminal E, unless otherwise noted.
 2. Maximum power dissipation is a function of $T_J(\max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 3. The package thermal impedance is calculated in accordance with JESD 51-7.



SN75468, SN75469 DARLINGTON TRANSISTOR ARRAYS

SLRS023D – DECEMBER 1976 – REVISED NOVEMBER 2004

electrical characteristics, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST FIGURE	TEST CONDITIONS	SN75468			SN75469			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{I(\text{on})}$ On-state input voltage	5	$V_{CE} = 2\text{ V}$	$I_C = 125\text{ mA}$					5	V
			$I_C = 200\text{ mA}$			2.4		6	
			$I_C = 250\text{ mA}$			2.7			
			$I_C = 275\text{ mA}$					7	
			$I_C = 300\text{ mA}$			3			
			$I_C = 350\text{ mA}$					8	
$V_{CE(\text{sat})}$ Collector-emitter saturation voltage	6	$I_I = 250\ \mu\text{A}$, $I_C = 100\text{ mA}$	0.9	1.1	0.9	1.1	V		
		$I_I = 350\ \mu\text{A}$, $I_C = 200\text{ mA}$	1	1.3	1	1.3			
		$I_I = 500\ \mu\text{A}$, $I_C = 350\text{ mA}$	1.2	1.6	1.2	1.6			
V_F Clamp-diode forward voltage	8	$I_F = 350\text{ mA}$	1.7	2	1.7	2	V		
I_{CEX} Collector cutoff current	1	$V_{CE} = 100\text{ V}$, $I_I = 0$		50		50	μA		
		$V_{CE} = 100\text{ V}$, $I_I = 0$		100		100			
	2	$T_A = 70^\circ\text{C}$, $V_I = 1\text{ V}$				500			
$I_{I(\text{off})}$ Off-state input current	3	$V_{CE} = 50\text{ V}$, $T_A = 70^\circ\text{C}$, $I_C = 500\ \mu\text{A}$	50	65	50	65	μA		
I_I Input current	4	$V_I = 3.85\text{ V}$	0.93	1.35			mA		
		$V_I = 5\text{ V}$			0.35	0.5			
		$V_I = 12\text{ V}$			1	1.45			
I_R Clamp-diode reverse current	7	$V_R = 100\text{ V}$		50		50	μA		
		$V_R = 100\text{ V}$, $T_A = 70^\circ\text{C}$		100		100			
C_i Input capacitance		$V_I = 0$, $f = 1\text{ MHz}$	15	25	15	25	pF		

switching characteristics, $T_A = 25^\circ\text{C}$ free-air temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} Propagation delay time, low-to-high-level output	$V_S = 50\text{ V}$, $R_L = 163\ \Omega$, $C_L = 15\text{ pF}$,		0.25	1	μs
t_{PHL} Propagation delay time, high-to-low-level output	See Figure 9		0.25	1	μs
V_{OH} High-level output voltage after switching	$V_S = 50\text{ V}$, $I_O \approx 300\text{ mA}$, See Figure 10	$V_S - 20$			mV



PARAMETER MEASUREMENT INFORMATION

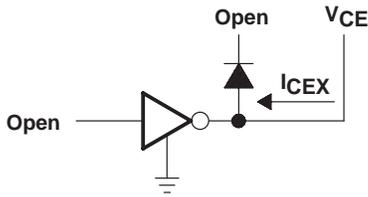


Figure 1. $I_{C EX}$

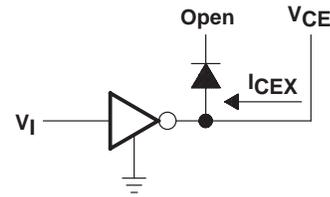


Figure 2. $I_{C EX}$

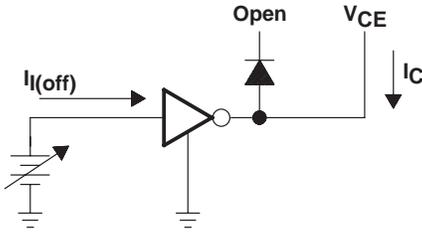


Figure 3. $I_{I(off)}$

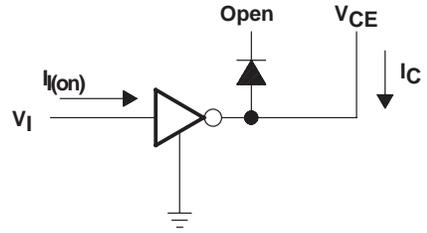


Figure 4. I_I

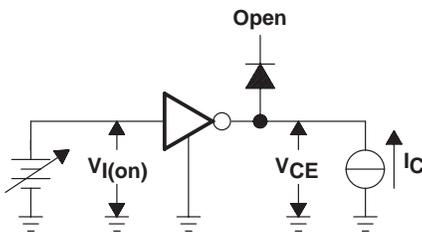
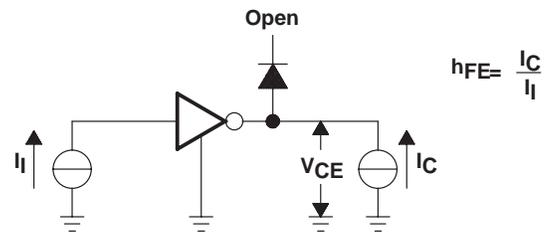


Figure 5. $V_{I(on)}$



NOTE: I_I is fixed for measuring $V_{CE(sat)}$, variable for measuring h_{FE} .

Figure 6. h_{FE} , $V_{CE(sat)}$

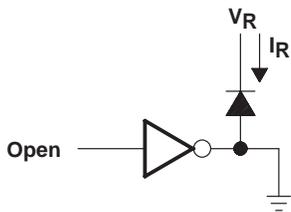


Figure 7. I_R

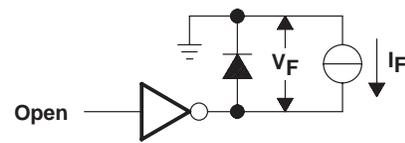


Figure 8. V_F

SN75468, SN75469 DARLINGTON TRANSISTOR ARRAYS

SLRS023D – DECEMBER 1976 – REVISED NOVEMBER 2004

PARAMETER MEASUREMENT INFORMATION

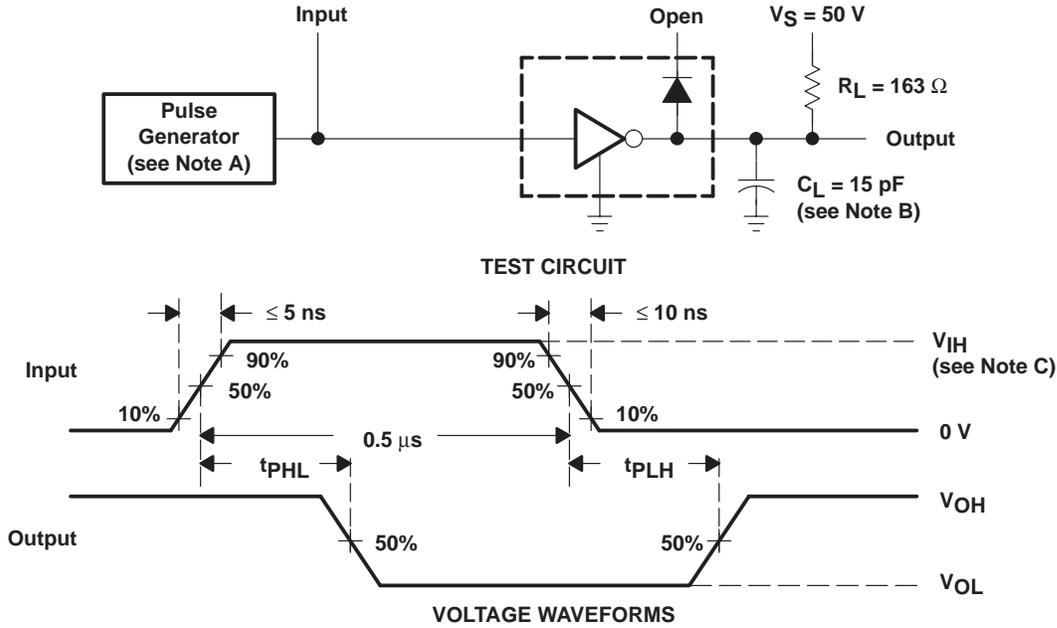


Figure 9. Test Circuit and Voltage Waveforms

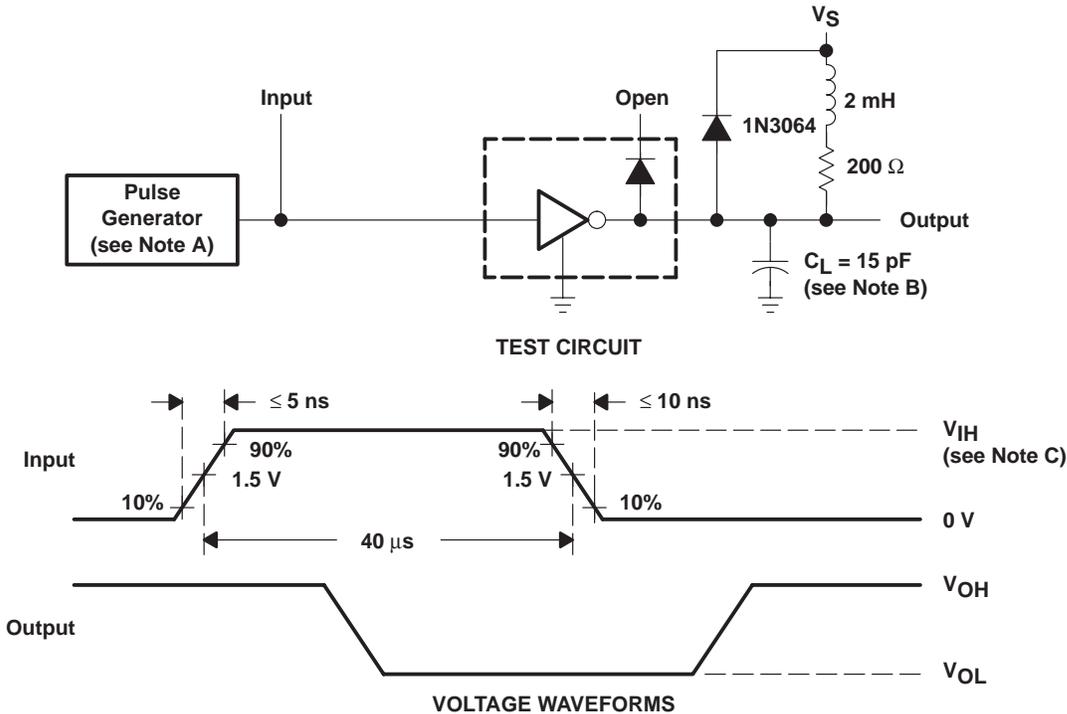


Figure 10. Latch-Up Test Circuit and Voltage Waveforms

- NOTES: A. The pulse generator has the following characteristics: PRR = 12.5 kHz, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.
 C. For testing the '468, $V_{IH} = 3 \text{ V}$; for the '469, $V_{IH} = 8 \text{ V}$.

TYPICAL CHARACTERISTICS

**COLLECTOR-EMITTER SATURATION VOLTAGE
 vs
 COLLECTOR CURRENT
 (ONE DARLINGTON)**

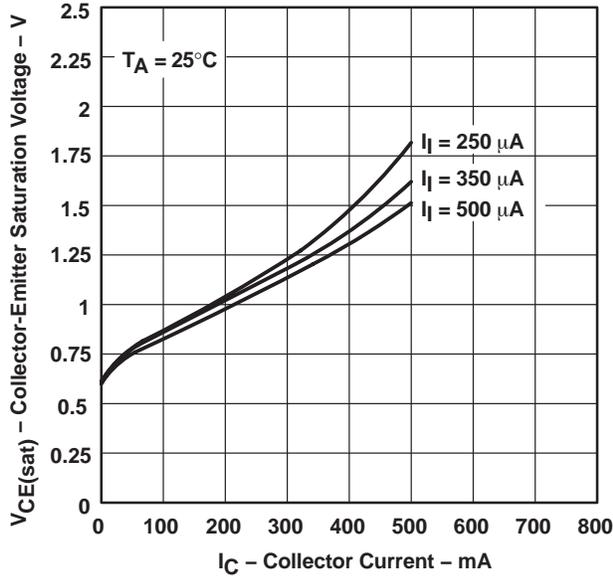


Figure 11

**COLLECTOR-EMITTER SATURATION VOLTAGE
 vs
 COLLECTOR CURRENT
 (TWO DARLINGTONS PARALLELED)**

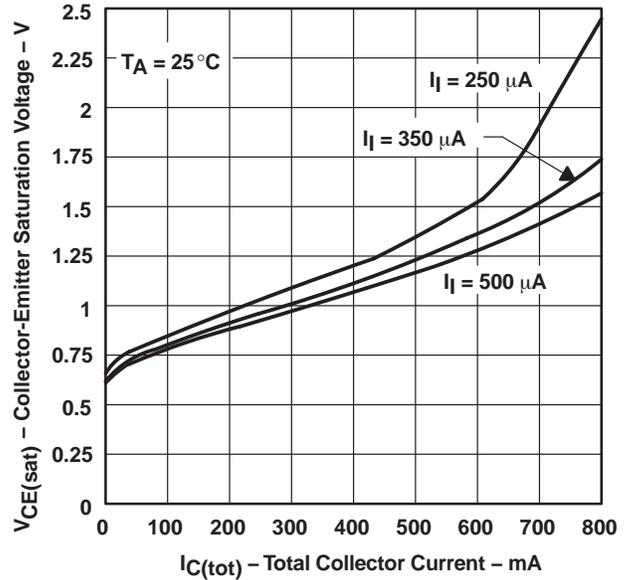


Figure 12

**COLLECTOR CURRENT
 vs
 INPUT CURRENT**

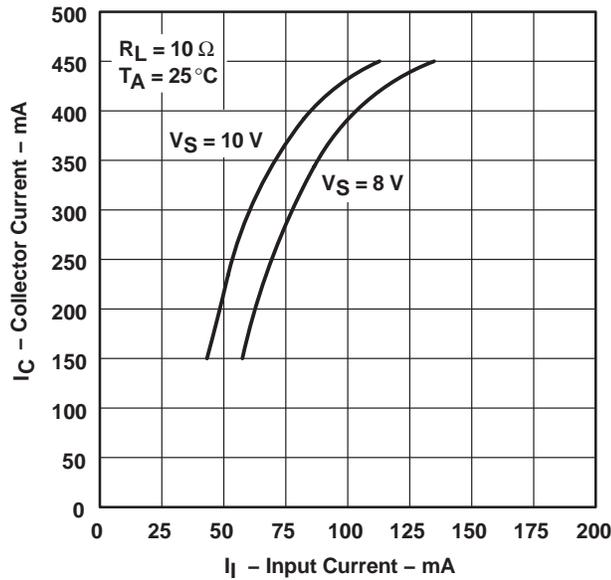


Figure 13

SN75468, SN75469 DARLINGTON TRANSISTOR ARRAYS

SLRS023D – DECEMBER 1976 – REVISED NOVEMBER 2004

THERMAL INFORMATION

**D PACKAGE
MAXIMUM COLLECTOR CURRENT
VS
DUTY CYCLE**

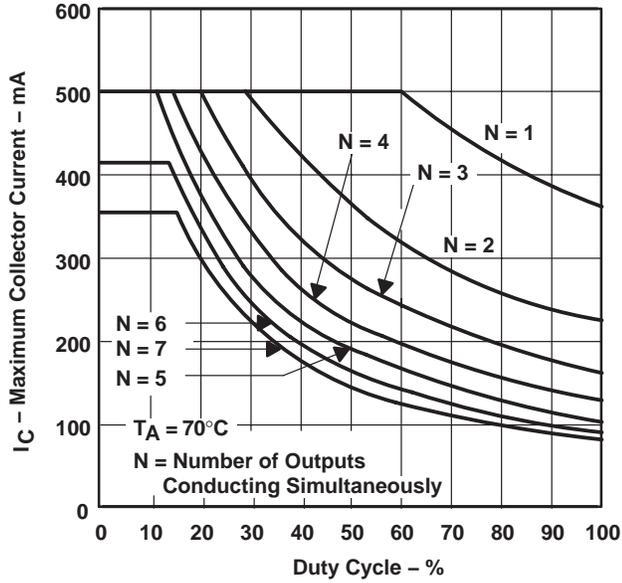


Figure 14

**N PACKAGE
MAXIMUM COLLECTOR CURRENT
VS
DUTY CYCLE**

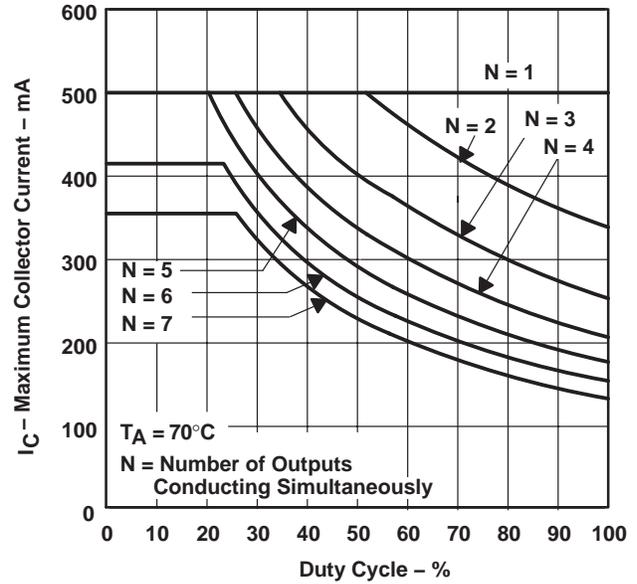


Figure 15

APPLICATION INFORMATION

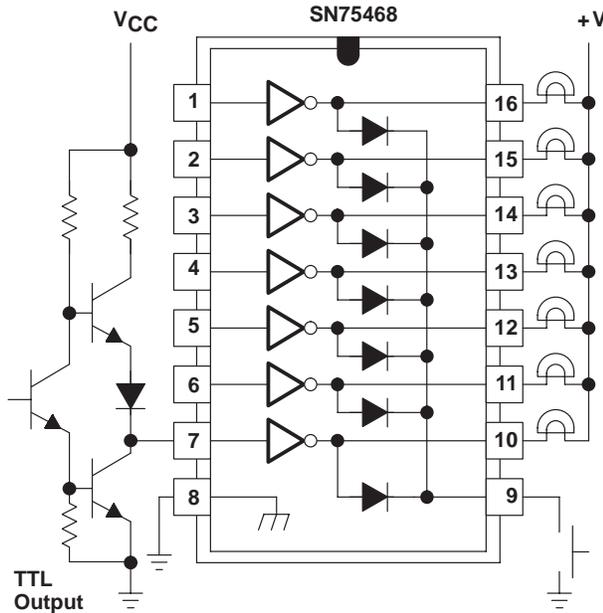


Figure 16. TTL to Load

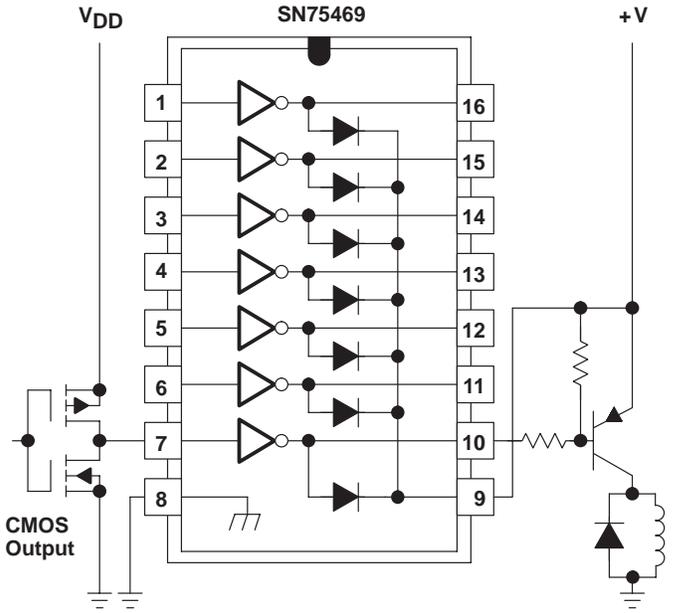


Figure 17. Buffer for Higher Current Loads

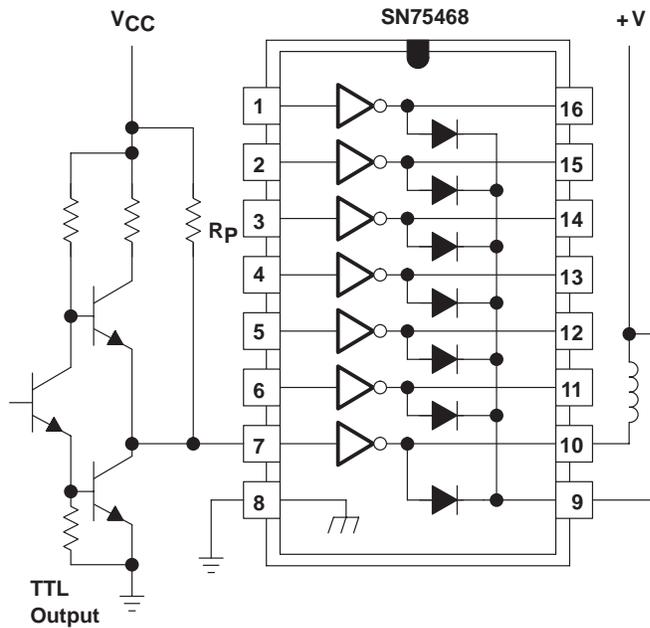


Figure 18. Use of Pullup Resistors to Increase Drive Current

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75468D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75468NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75468NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75468NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75469N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75469NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

⁽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.

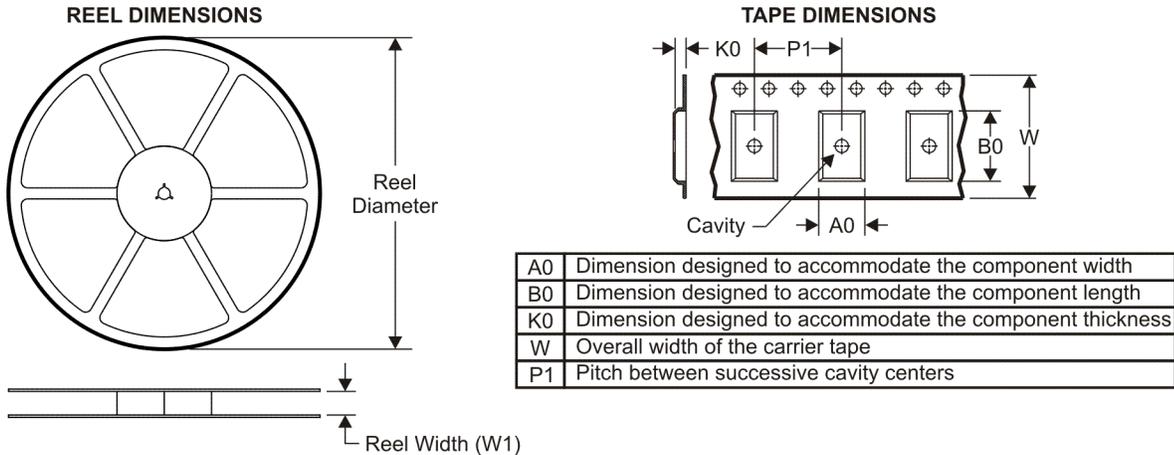
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

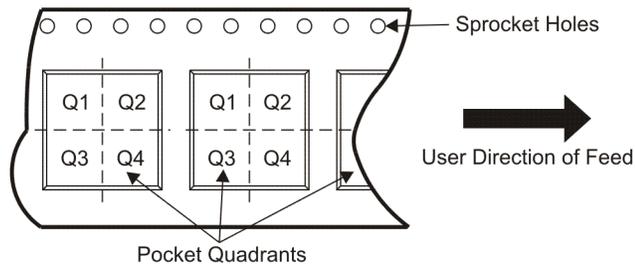
Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



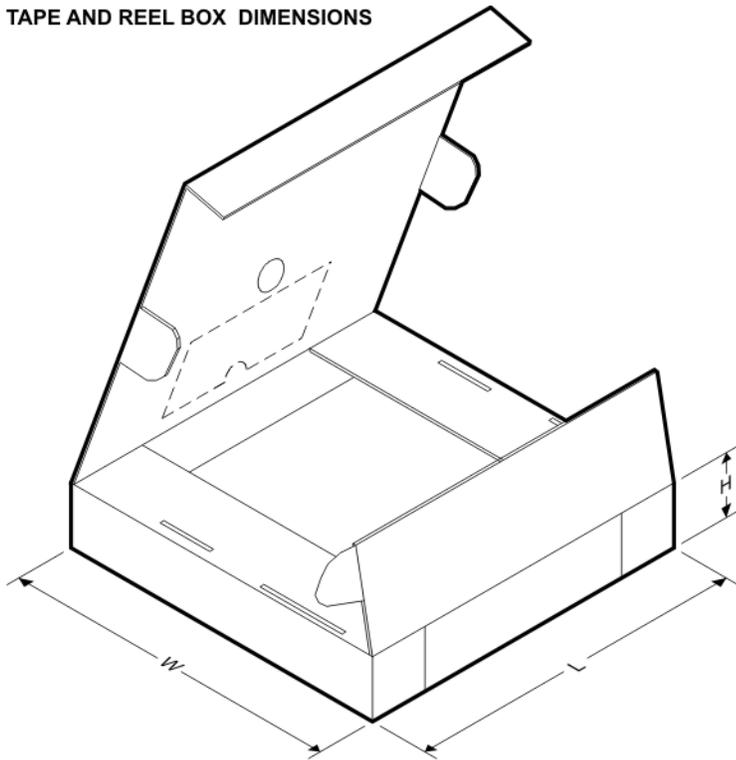
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75468NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN75469DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

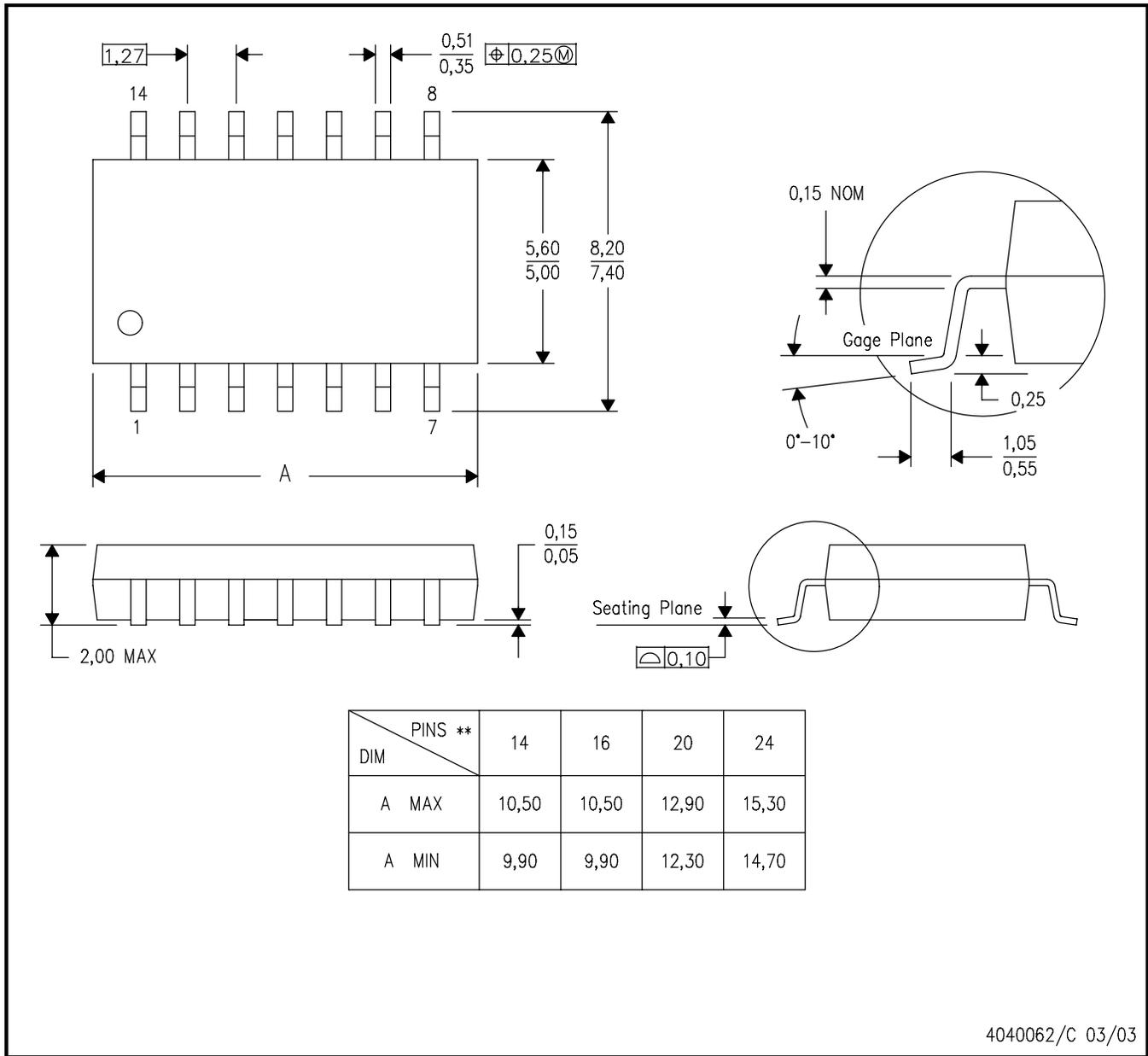
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75468NSR	SO	NS	16	2000	346.0	346.0	33.0
SN75469DR	SOIC	D	16	2500	333.2	345.9	28.6

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN

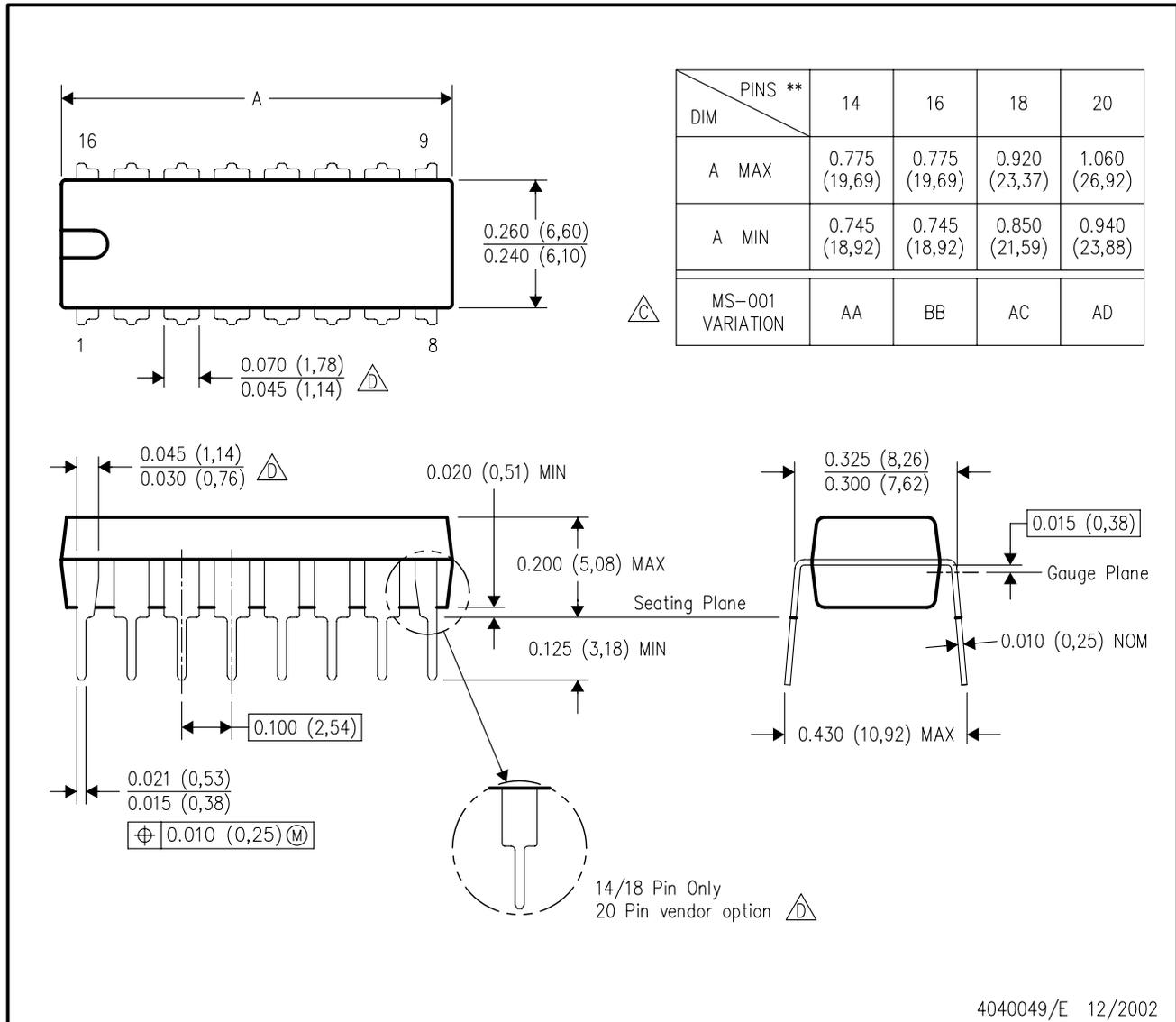


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated