

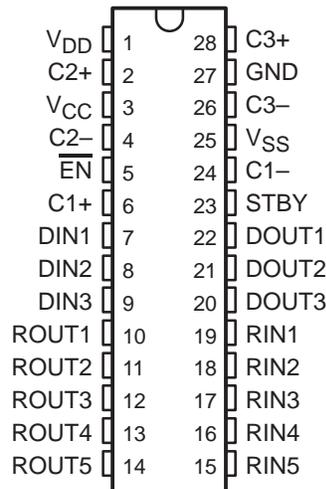
SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

- **Single-Chip and Single-Supply Interface for IBM PC/AT™ Serial Port**
- **Meets or Exceeds the Requirements of TIA/EIA-232-F and ITU v.11 Standards**
- **Operates With 3.3-V or 5-V Supplies**
- **One Receiver Remains Active During Standby (Wake-up Mode)**
- **Designed to Operate at 128 kbit/s Over a 3-m Cable**
- **Low Standby Current . . . 5 μ A Max**
- **ESD Protection on RS-232 Pins Meets or Exceeds 4 kV (HBM) and 1.5 kV (HBM) on All Pins Per MIL-STD-883, Method 3015**
- **External Capacitors . . . 0.1 μ F ($V_{CC} = 3.3$ V . . . Five External Capacitors) ($V_{CC} = 5$ V . . . Four External Capacitors)**
- **Accepts 5-V Logic Input With 3.3-V Supply**
- **Applications**
 - RS-232 Interface
 - Battery-Powered Systems, PDAs
 - Notebook, Laptop, and Palmtop PCs
 - External Modems and Hand-Held Terminals
- **Packaged in Shrink Small-Outline Package**

**DB PACKAGE†
(TOP VIEW)**



† The DB package is only available in left-ended tape and reel (order part number SN75LV4737ADBR).

description

The SN75LV4737A‡ consists of three line drivers, five line receivers, and a charge-pump circuit. It provides the electrical interface between an asynchronous communication controller and the serial-port connector, and meets the requirements of TIA/EIA-232-F. This combination of drivers and receivers matches those needed for the typical serial port used in an IBM PC/AT or compatibles. The charge pump and five small external capacitors allow operation from a single 3.3-V supply, and four capacitors allow operation from a 5-V supply.

The device has flexible control options for power management when the serial port is inactive. A common disable for all of the drivers and receivers is provided with the active-high STBY input. The active-low \overline{EN} input is an enable for one receiver to implement a wake-up feature for the serial port. All the logic inputs can accept signals from controllers operating from a 5-V supply, even though the SN75LV4737A is operating from 3.3 V.

The SN75LV4737A is characterized for operation over the temperature range of 0°C to 70°C.



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.

‡ Patent-pending design

IBM and PC/AT are trademarks of International Business Machines Corporation.

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.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2000, Texas Instruments Incorporated

SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

Function Tables

EACH DRIVER

INPUTS		OUTPUT
DIN	STBY	DOUT
X	H	Z
L	L	H
H	L	L
Open	L	L

H = high level, L = low level,
 X = irrelevant, Z = high impedance

EACH RECEIVER

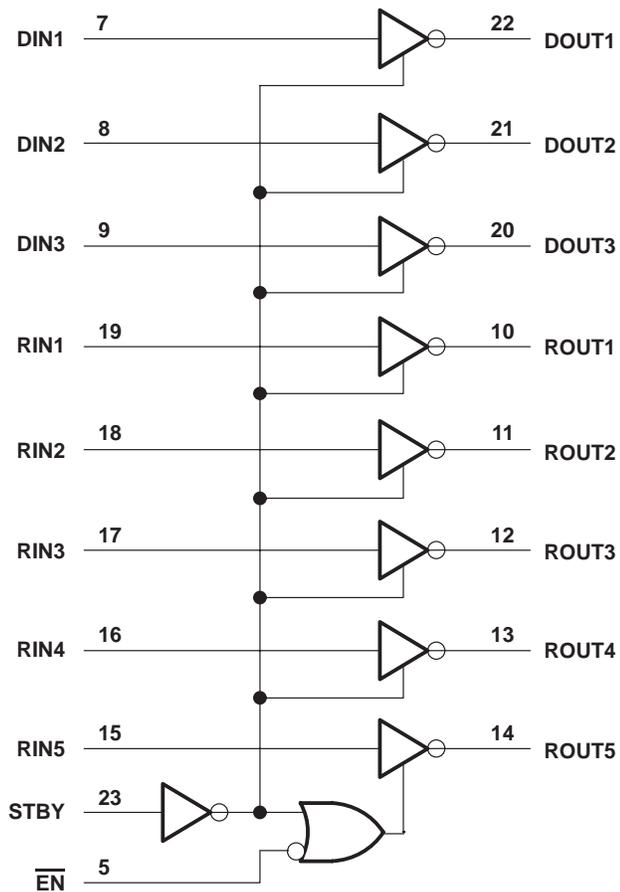
INPUTS				OUTPUTS	
STBY	$\overline{\text{EN}}$	RIN5	RIN1–RIN4	ROUT5	ROUT1–ROUT4
H	H	X	X	Z	Z
H	L	H	X	L	Z
H	L	L	X	H	Z
L	X	L	L	H	H
L	X	H	H	L	L

H = high level, L = low level, X = irrelevant, Z = high impedance

SN75LV4737A
3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

logic diagram (positive logic)

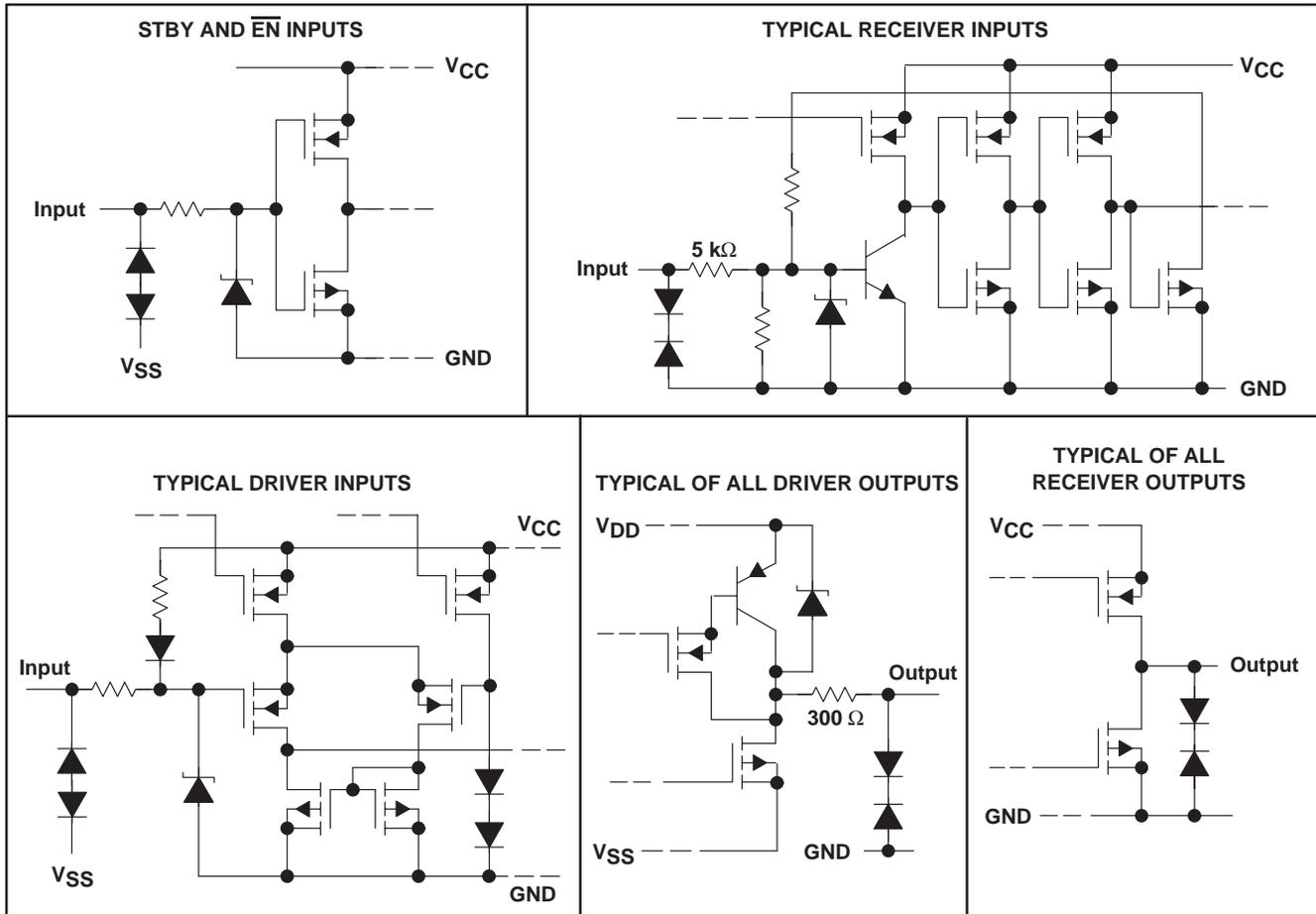


SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

schematics of inputs and outputs



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

Supply voltage, V_{CC}	7 V
Positive output supply voltage, V_{DD} (see Note 1)	15 V
Negative output supply voltage, V_{SS}	-15 V
Input voltage range, V_I : Driver	-3 V to 7 V
Receiver	-30 V to 30 V
Output voltage range, V_O : Driver	$V_{SS} - 0.3$ V to $V_{DD} + 0.3$ V
Receiver	-0.3 V to 7 V
Package thermal impedance, θ_{JA} (see Note 2)	62°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°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 voltages are with respect to network GND.
 2. The package thermal impedance is calculated in accordance with JESD 51.



SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

recommended operating conditions

			MIN	NOM	MAX	UNIT	
V _{CC}	Supply voltage	V _{CC} = 3.3 V	3	3.3	3.6	V	
		V _{CC} = 5 V	4.5	5	5.5	V	
V _{IH}	Driver high-level input voltage	DIN, $\overline{\text{EN}}$, STBY	V _{CC} = 3.3 V			V	
		DIN	2				
		$\overline{\text{EN}}$, STBY	V _{CC} = 5 V				
V _{IL}	Driver low-level input voltage	DIN, $\overline{\text{EN}}$, STBY			0.8	V	
V _I	Receiver input voltage				±30	V	
	External capacitor	3.3-V operation (C1, C2, C3, C4, C5), 5-V operation (C1, C3, C4, C5), See Note 3 and Figures 6 and 7			0.1	μF	
T _A	Operating free-air temperature				0	70	°C

NOTE 3: C2 is needed only for 3.3-V operation.

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (see Figures 6 and 7) (unless otherwise noted)

PARAMETER		TEST CONDITIONS	V _{CC} = 3.3 V			V _{CC} = 5 V			UNIT		
			MIN	TYP†	MAX	MIN	TYP†	MAX			
V _{DD}	Positive supply voltage	No load	8	10		7	8.7		V		
V _{SS}	Negative supply voltage	No load			-9.5	-7		-8	-6	V	
I _I	Input current ($\overline{\text{EN}}$, STBY)	See Notes 4 and 5						±2	±2	μA	
I _{CC}	Supply current	No load, Inputs open	STBY at GND, $\overline{\text{EN}}$ at V _{CC} or GND		8.4	10	18	10	12	20.7	mA
	Supply current (standby mode) (see Note 4)		$\overline{\text{EN}}$, STBY at V _{CC}				5			5	μA
	Supply current (wake-up mode) (see Note 5)		$\overline{\text{EN}}$ at GND, STBY at V _{CC}				10			10	

† All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

NOTES: 4. When standby mode is not used, STBY input must be taken low.
5. When wake-up mode is not used, $\overline{\text{EN}}$ input must be taken high.



SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

DRIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V _{OH} High-level output voltage	R _L = 3 kΩ	5.5	7		V
V _{OL} Low-level output voltage	R _L = 3 kΩ		-6	-5	V
I _{IH} High-level input current	V _I = V _{CC}			1	μA
I _{IL} Low-level input current	V _I at GND			-10	μA
I _{OS} Short-circuit output current (see Note 6)	V _{CC} = 3.6 V, V _O = 0 V		±15	±40	mA
	V _{CC} = 5.5 V, V _O = 0 V				
r _o Output resistance	V _{CC} = V _{DD} = V _{SS} = 0 V, V _O = ±2 V	300	500		Ω

† All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

NOTE 6: Short-circuit durations should be controlled to prevent exceeding the device absolute maximum power dissipation ratings, and not more than one output should be shorted at a time.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT	
t _{PLH} Propagation delay time, low- to high-level output	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 1	V _{CC} = 3.3 V	100	500	850	ns
		V _{CC} = 5 V	100	500	850	
t _{PHL} Propagation delay time, high- to low-level output	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 1	V _{CC} = 3.3 V	100	500	850	ns
		V _{CC} = 5 V	100	500	850	
t _{PZH} Output enable time to high level	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 2		1	5	ms	
t _{PZL} Output enable time to low level	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 2		3	7	ms	
t _{PHZ} Output disable time from high level	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 2	V _{CC} = 3.3 V		0.9	3	μs
		V _{CC} = 5 V		0.6	3	
t _{PLZ} Output disable time from low level	C _L = 50 pF, R _L = 3 kΩ to 7 kΩ, See Figure 2	V _{CC} = 3.3 V		0.5	3	μs
		V _{CC} = 5 V		0.3	3	
SR Slew rate	C _L = 50 pF, See Figure 1		4	30	V/μs	
SR(tr) Slew rate, transition region	C _L = 2500 pF, See Figure 3		3	30	V/μs	

† All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.



SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

RECEIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V _{OH}	High-level output voltage	I _{OH} = -2 mA	V _{CC} = 3.3 V	2.4	3	V
			V _{CC} = 5 V	3.5	5	
V _{OL}	Low-level output voltage	I _{OL} = 2 mA		0.2	0.4	V
V _{IT+}	Positive-going input threshold voltage			2.2	2.6	V
V _{IT-}	Negative-going input threshold voltage		0.6	1		V
V _{hys}	Input hysteresis (V _{IT+} - V _{IT-})		0.5	1.2	1.8	V
r _i	Input resistance	V _I = ±3 V to ±25 V	3	5	7	kΩ

† All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF, R_L = 3 kΩ to GND

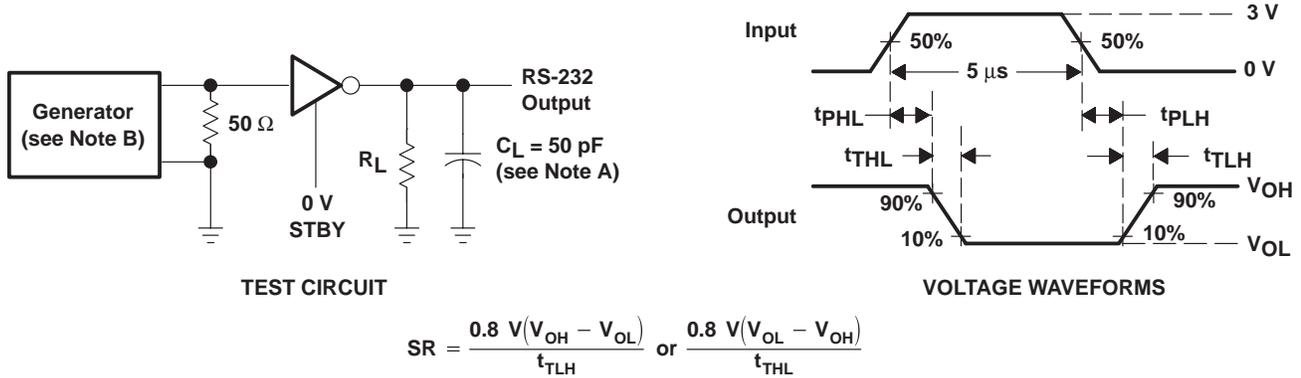
PARAMETER	TEST CONDITIONS	V _{CC} = 3.3 V			V _{CC} = 5 V			UNIT		
		MIN	TYP	MAX	MIN	TYP	MAX			
t _{PLH}	Propagation delay time, low- to high-level output	See Figure 4	10	70	200	10	70	200	ns	
t _{PHL}	Propagation delay time, high- to low-level output		10	60	200	10	55	200	ns	
t _{PLH}	Propagation delay time, low- to high-level output (wake-up mode)		40	200		40	200	μs		
t _{PHL}	Propagation delay time, high- to low-level output (wake-up mode)		90	500		70	500	ns		
t _{pZH}	Output enable time to high level		See Figure 5	3	10		1.2	10	μs	
t _{pZL}	Output enable time to low level			100	250		60	250	ns	
t _{PHZ}	Output disable time from high level			100	200	600	100	150	600	ns
t _{PLZ}	Output disable time from low level			130	250		60	250	ns	

SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

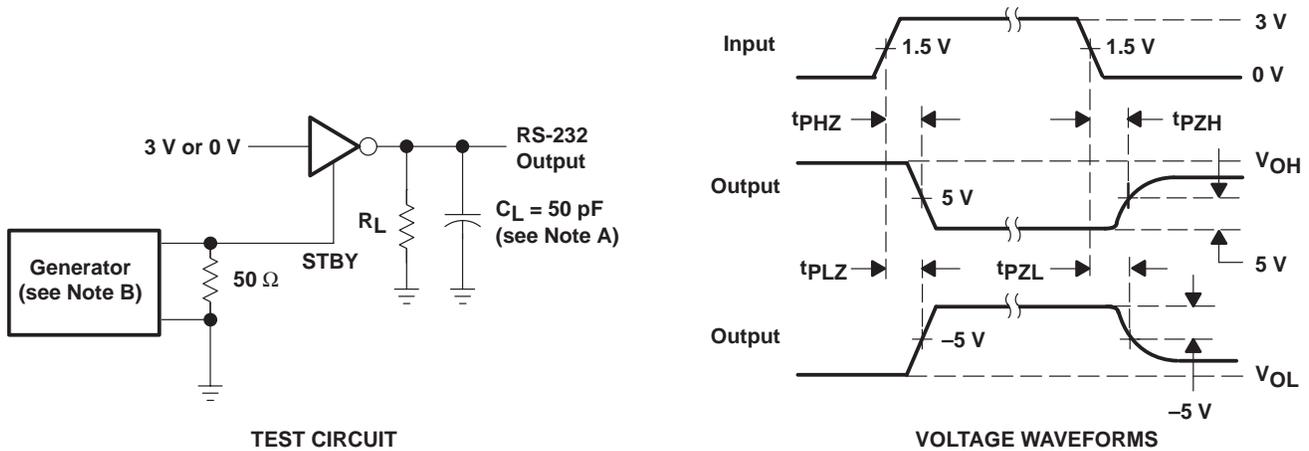
SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.
 B. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, 50% duty cycle, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

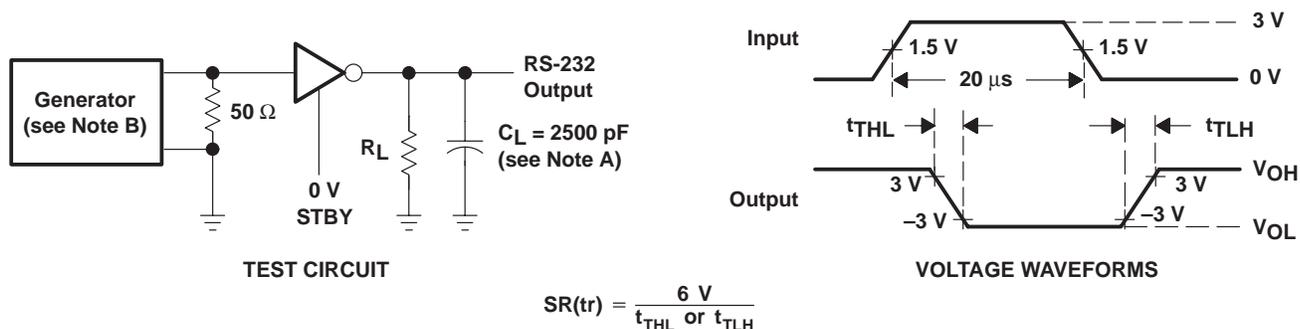
Figure 1. Driver Propagation Delay Times and Slew Rate (5-μs Input)



NOTES: A. C_L includes probe and jig capacitance.
 B. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, 50% duty cycle, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

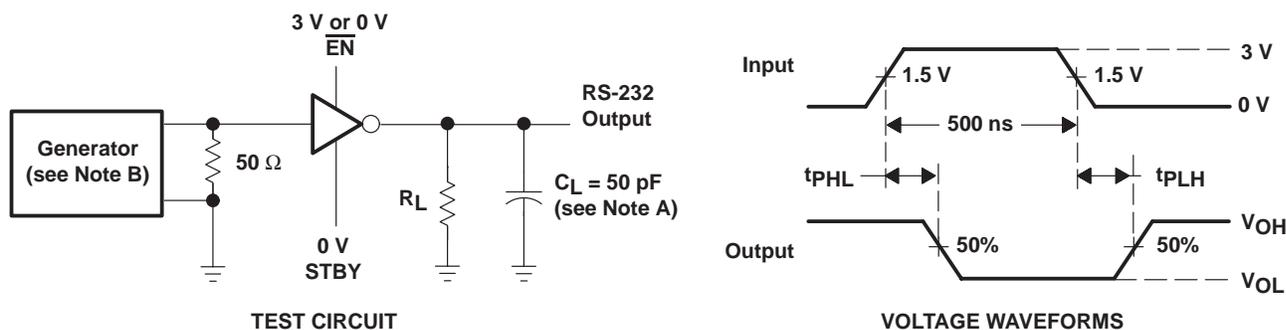
Figure 2. Driver Enable and Disable Test Times

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, 50% duty cycle, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

Figure 3. Driver Transition Times and Slew Rate (20-µs Input)



NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: PRR = 1 MHz, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

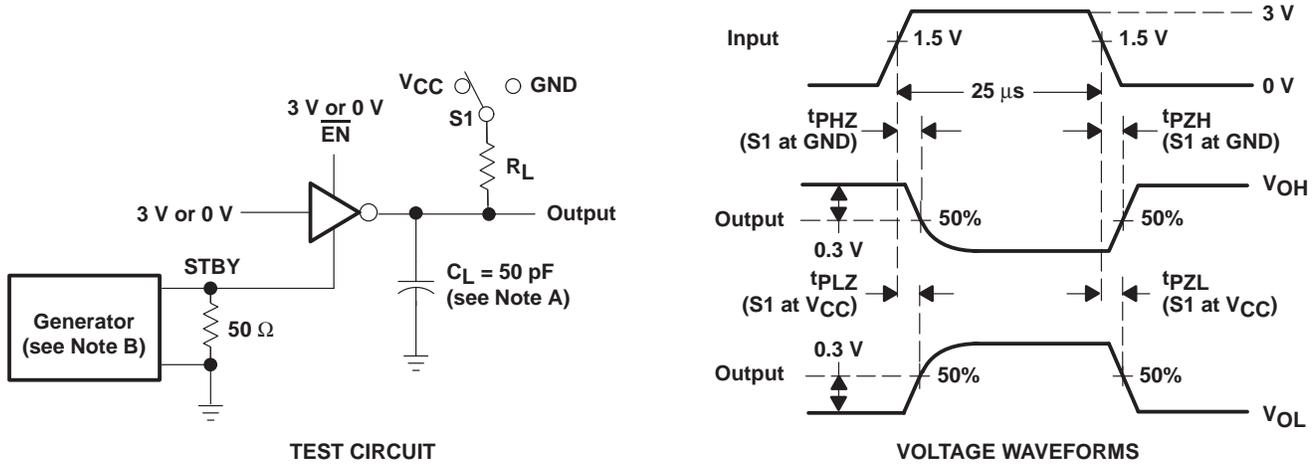
Figure 4. Receiver Propagation Delay Times

SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

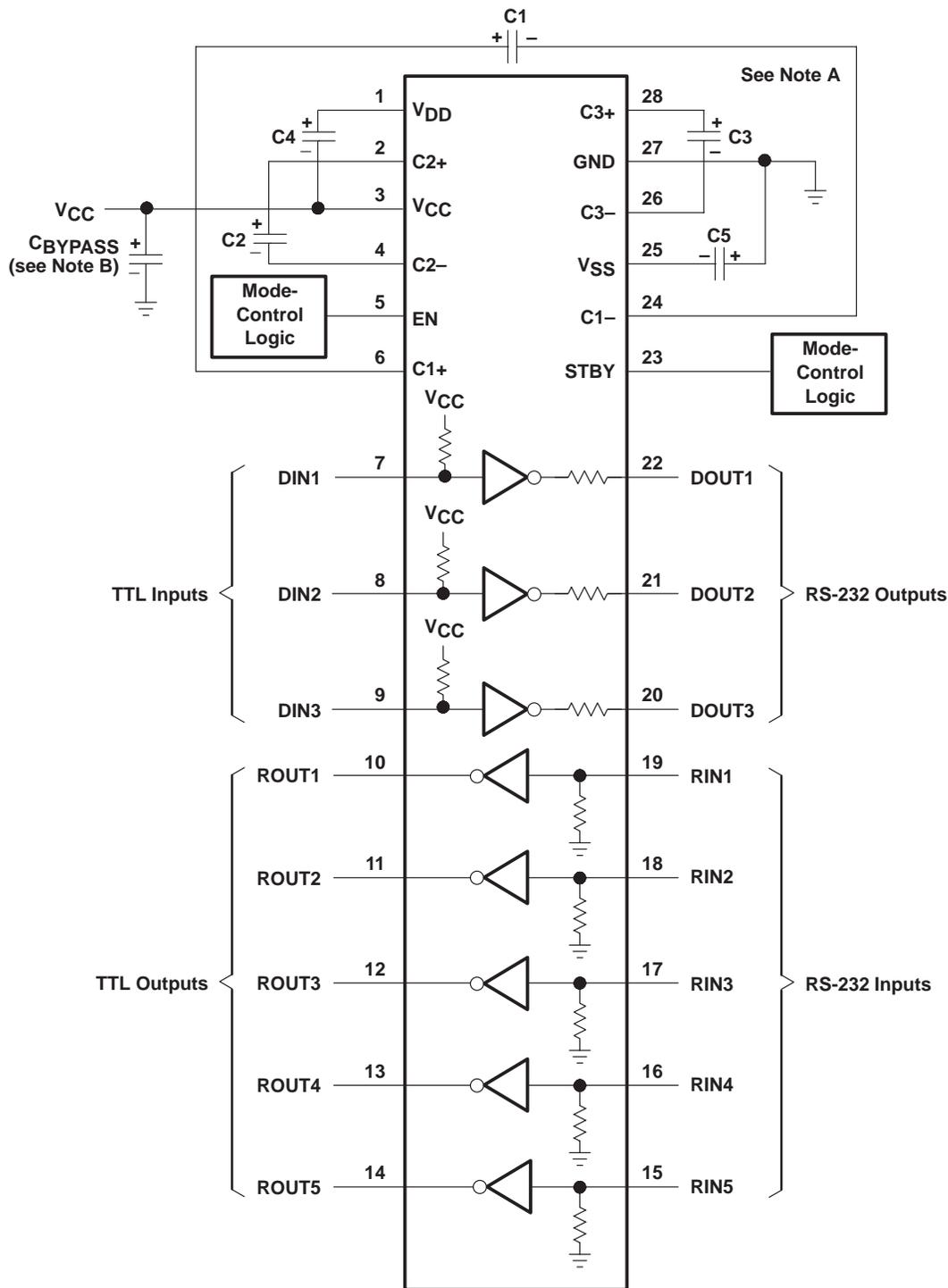
PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
 B. The pulse generator has the following characteristics: PRR = 1 MHz, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \leq 10$ ns, $t_f \leq 10$ ns.

Figure 5. Receiver Enable and Disable Times

APPLICATION INFORMATION



NOTES: A. C1 = C2 = C3 = C4 = C5 = CBYPASS = 0.1 μ F
B. CBYPASS is used as a decoupling capacitor.

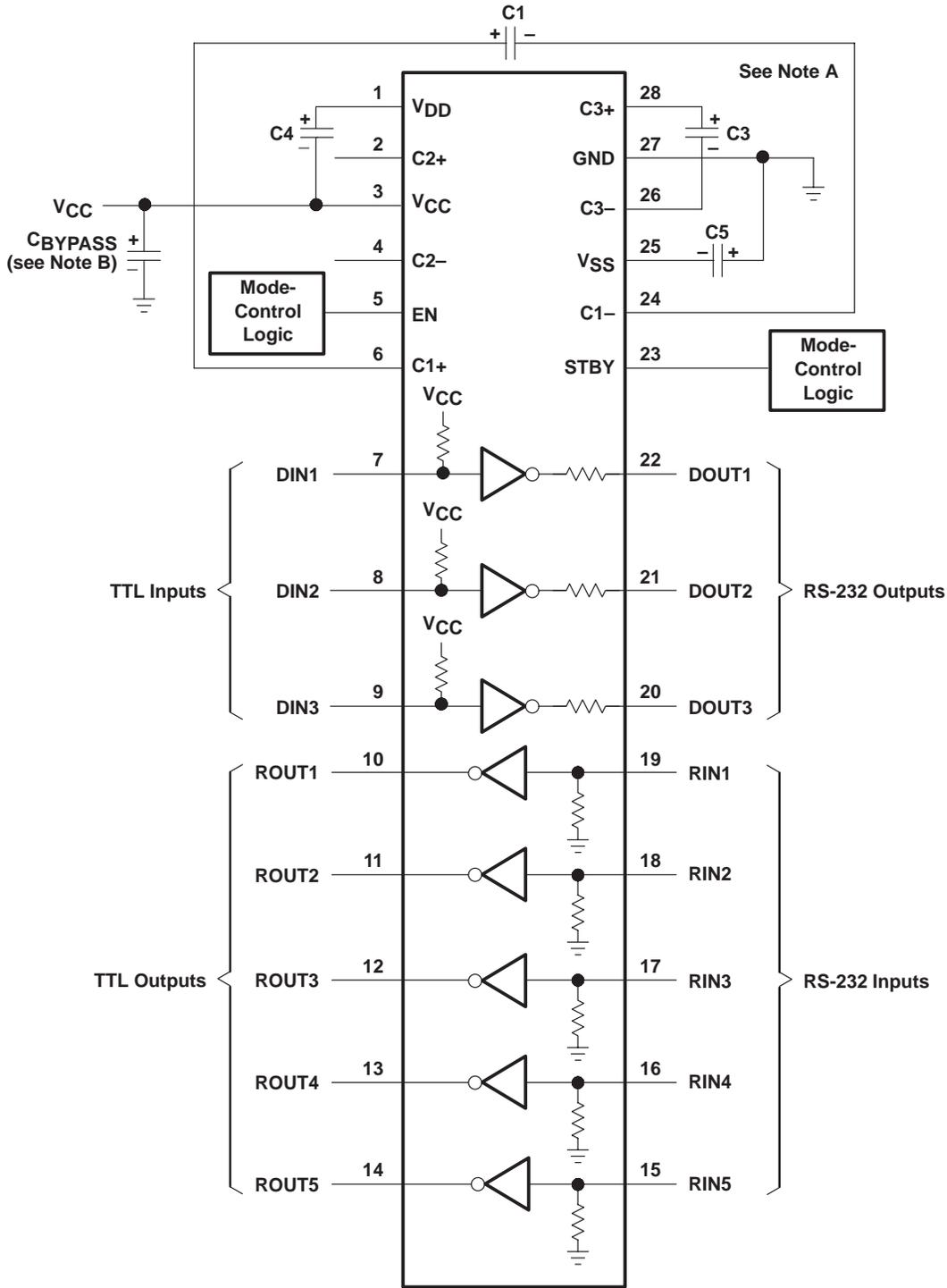
Figure 6. Typical 3.3-V Operating Circuit

SN75LV4737A

3.3-V/5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER

SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

APPLICATION INFORMATION



NOTES: A. C2 is not used. C1 = C3 = C4 = C5 = C_{BYPASS} = 0.1 μF
 B. C_{BYPASS} is used as a decoupling capacitor.

Figure 7. Typical 5-V Operating Circuit



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75LV4737ADB	ACTIVE	SSOP	DB	28	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LV4737ADBE4	ACTIVE	SSOP	DB	28	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LV4737ADBG4	ACTIVE	SSOP	DB	28	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LV4737ADBLE	OBSOLETE	SSOP	DB	28		TBD	Call TI	Call TI
SN75LV4737ADBR	ACTIVE	SSOP	DB	28	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LV4737ADBRE4	ACTIVE	SSOP	DB	28	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LV4737ADBRG4	ACTIVE	SSOP	DB	28	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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.

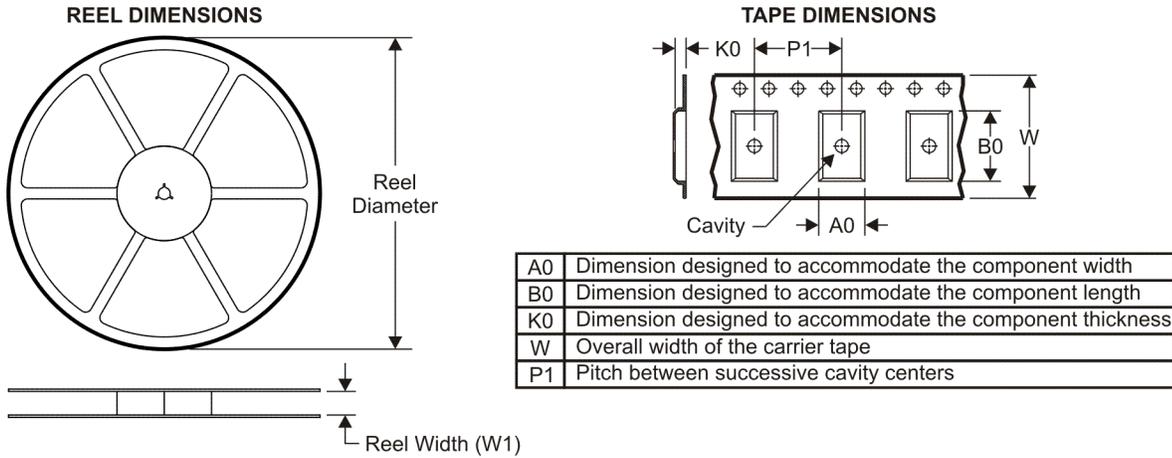
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

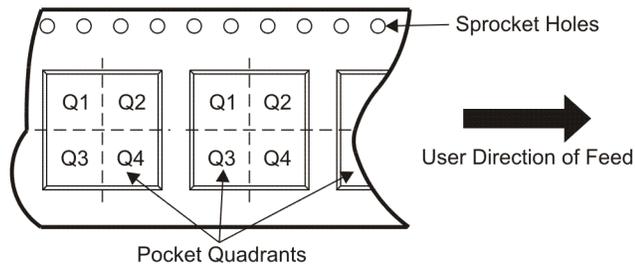
Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. 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



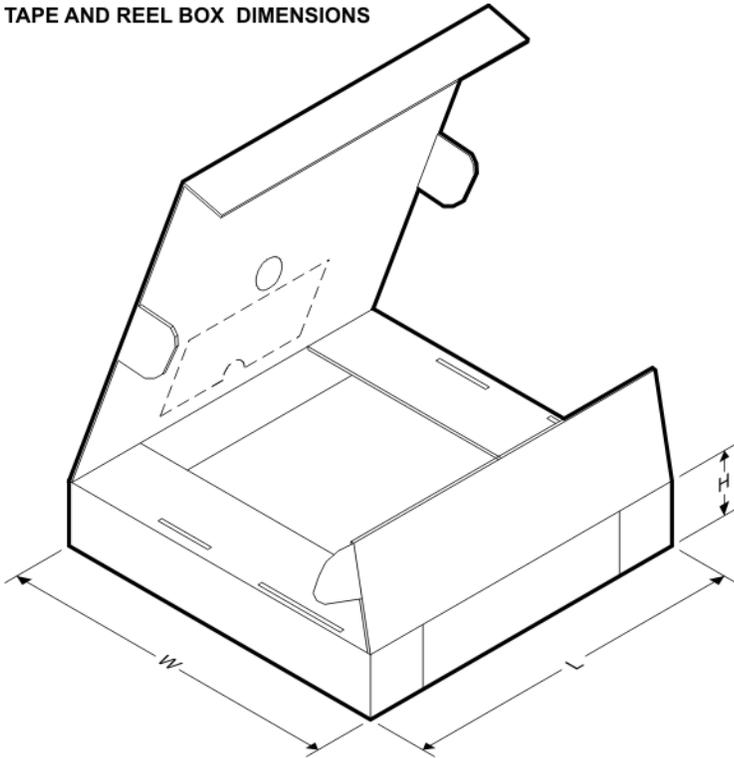
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN75LV4737ADBR	SSOP	DB	28	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



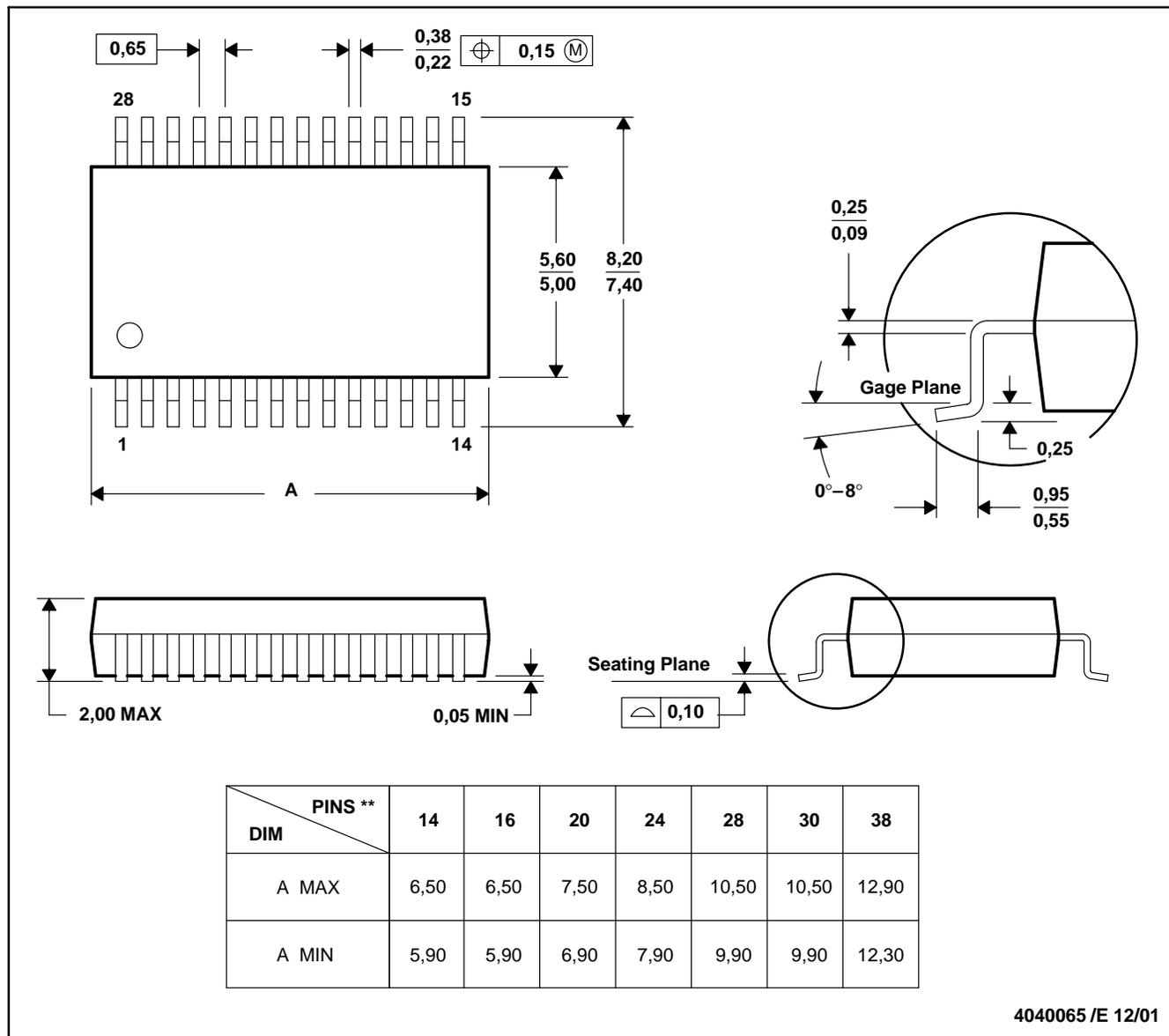
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75LV4737ADBR	SSOP	DB	28	2000	346.0	346.0	33.0

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

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