

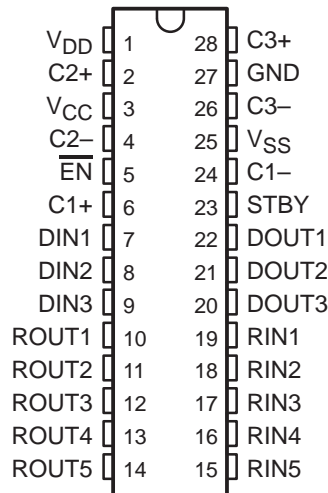
SN75LV4737A

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

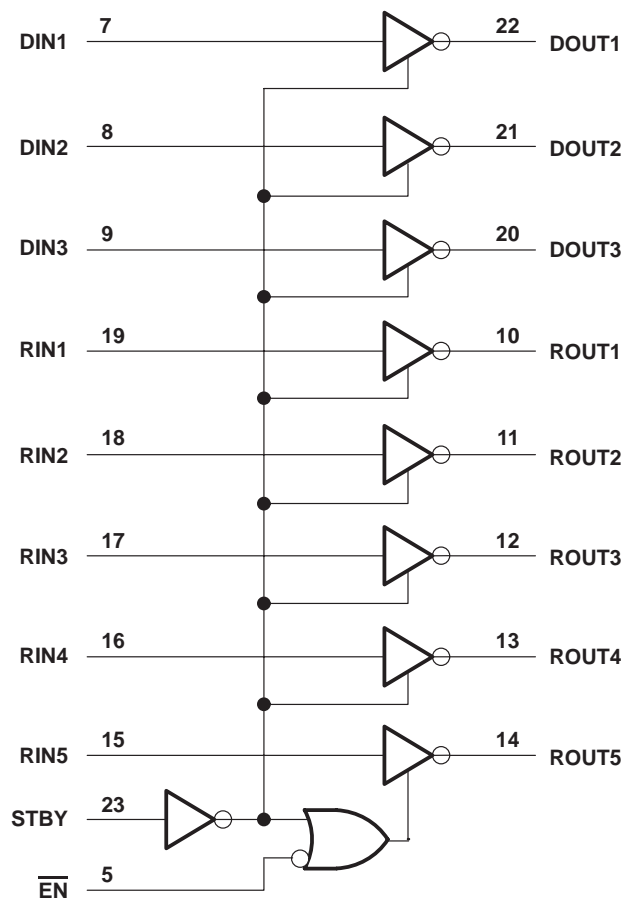
H = high level, L = low level,
X = irrelevant, Z = high
impedance

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

logic diagram (positive logic)

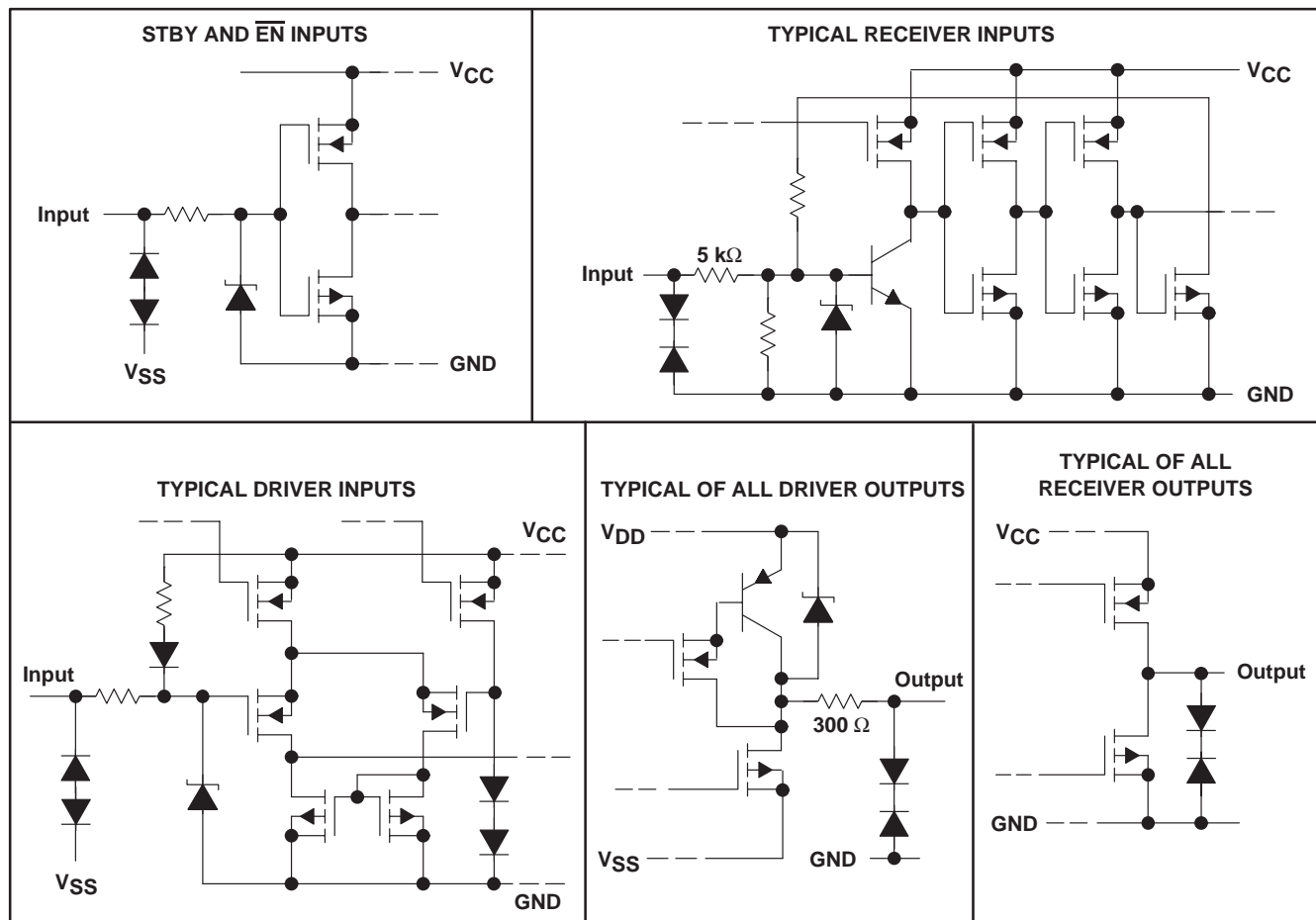


SN75LV4737A

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	mA
	Supply current (standby mode) (see Note 4)		$\overline{\text{EN}}$, STBY at V _{CC}					5	
	Supply current (wake-up mode) (see Note 5)		$\overline{\text{EN}}$ at GND, STBY at V _{CC}					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	$R_L = 3\text{ k}\Omega$	5.5	7		V
V_{OL} Low-level output voltage	$R_L = 3\text{ k}\Omega$		–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)	$V_{CC} = 3.6\text{ V}, V_O = 0\text{ V}$		± 15	± 40	mA
	$V_{CC} = 5.5\text{ V}, V_O = 0\text{ V}$				
r_o Output resistance	$V_{CC} = V_{DD} = V_{SS} = 0\text{ V}, V_O = \pm 2\text{ V}$	300	500		Ω

† All typical values are at $V_{CC} = 3.3\text{ V}$ or $V_{CC} = 5\text{ V}$, and $T_A = 25^\circ\text{C}$.

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
tPLH	Propagation delay time, low- to high-level output	CL = 50 pF, RL = 3 kΩ to 7 kΩ, See Figure 1	VCC = 3.3 V	100	500	850	ns
	VCC = 5 V		100	500	850		
tPHL	Propagation delay time, high- to low-level output		VCC = 3.3 V	100	500	850	ns
			VCC = 5 V	100	500	850	
tPZH	Output enable time to high level	CL = 50 pF, See Figure 2	RL = 3 kΩ to 7 kΩ,		1	5	ms
tPZL	Output enable time to low level				3	7	ms
tPHZ	Output disable time from high level	CL = 50 pF, RL = 3 kΩ to 7 kΩ, See Figure 2	VCC = 3.3 V		0.9	3	μs
			VCC = 5 V		0.6	3	
tPLZ	Output disable time from low level		VCC = 3.3 V		0.5	3	μs
			VCC = 5 V		0.3	3	
SR	Slew rate	CL = 50 pF, See Figure 1	RL = 3 kΩ to 7 kΩ,	4		30	V/μs
SR(tr)	Slew rate, transition region	CL = 2500 pF, See Figure 3	RL = 3 kΩ to 7 kΩ,	3		30	V/μs

† All typical values are at $V_{CC} = 3.3\text{ V}$ or $V_{CC} = 5\text{ V}$, and $T_A = 25^\circ\text{C}$.



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
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

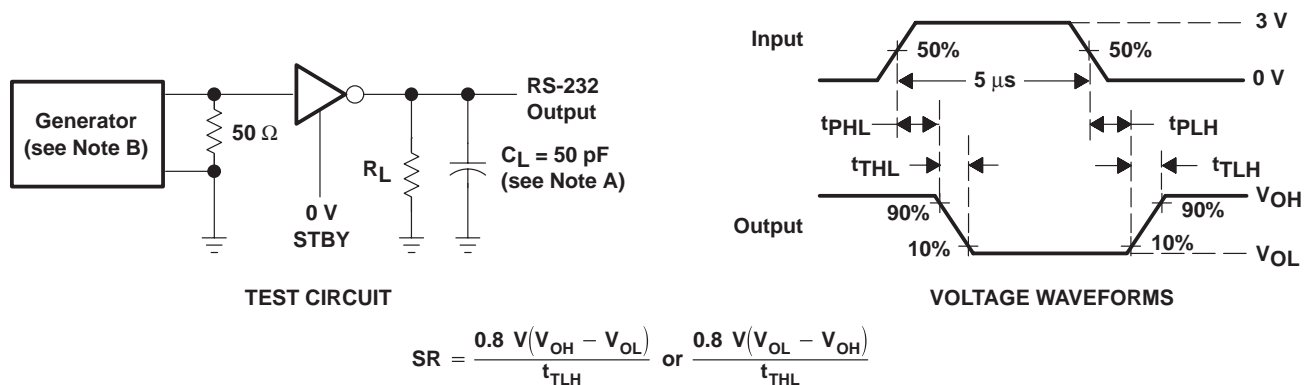


SN75LV4737A

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

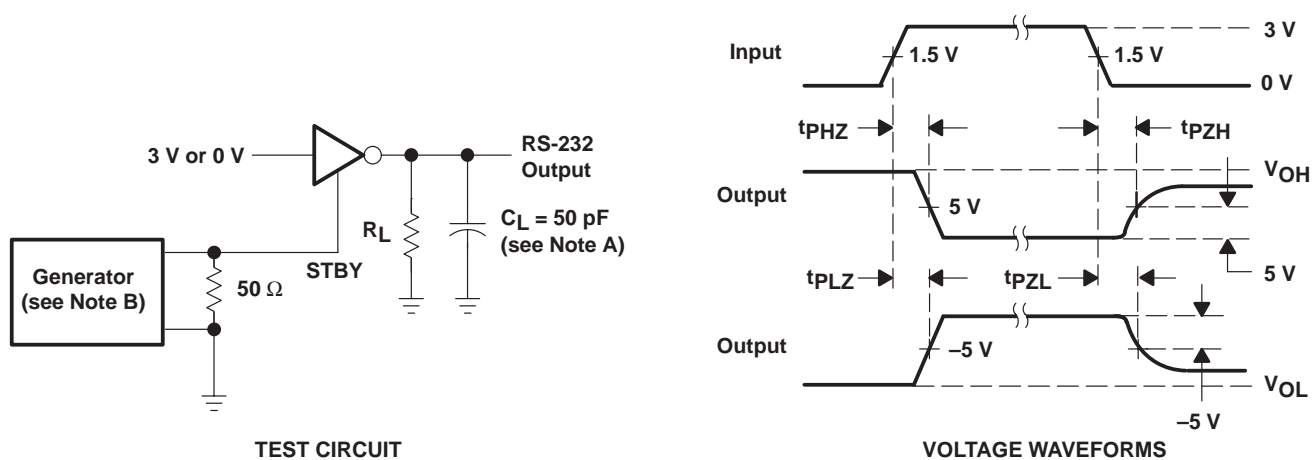
SLLS178D – APRIL 1994 – REVISED FEBRUARY 2000

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, $t_r \leq 10$ ns, $t_f \leq 10$ ns.

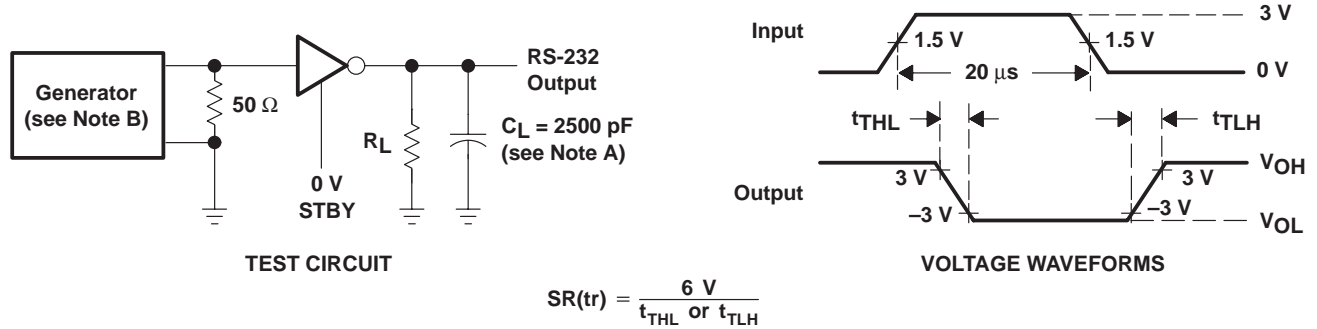
Figure 1. Driver Propagation Delay Times and Slew Rate (5-μs Input)



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

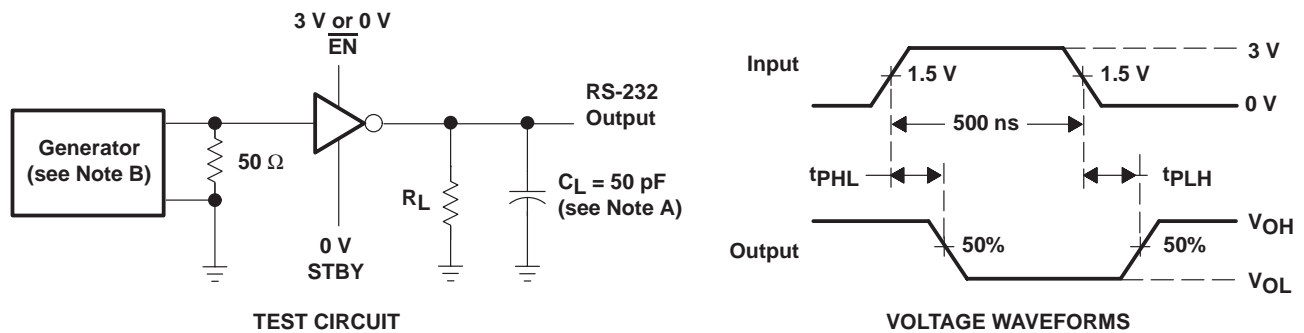
Figure 2. Driver Enable and Disable Test Times

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- μ s 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, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

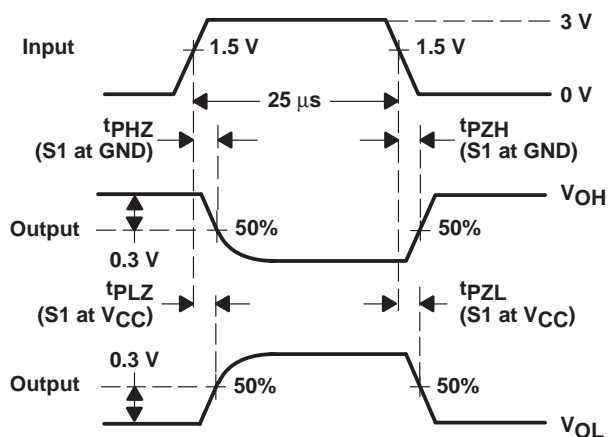
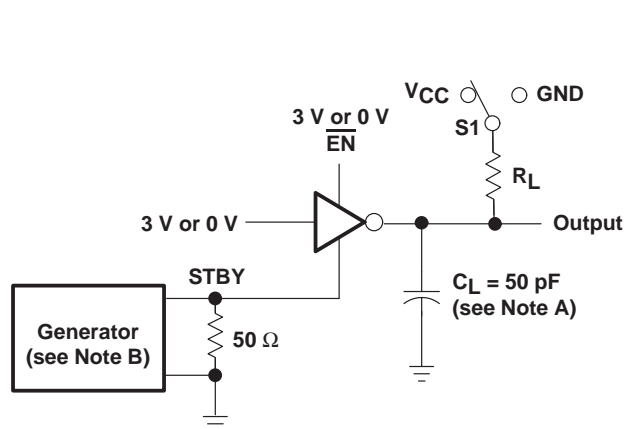
Figure 4. Receiver Propagation Delay Times

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

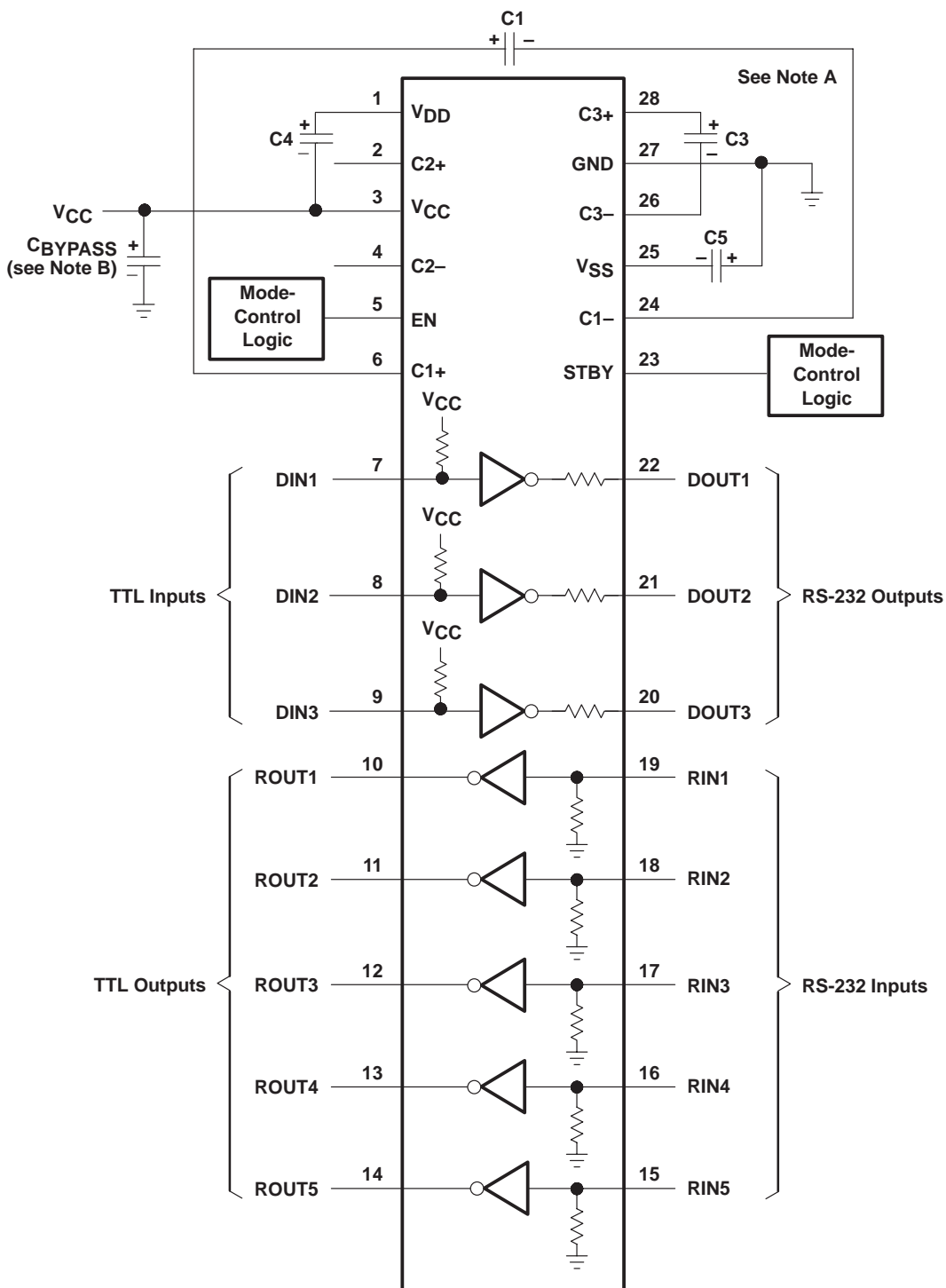
Pin configuration diagram for the RS-232C to TTL converter IC. The diagram shows a 28-pin package with pins 1 through 28. Pins 1, 2, 3, 4, 5, and 6 are labeled VDD, C2+, VCC, C2-, EN, and C1+ respectively. Pins 7, 8, and 9 are labeled DIN1, DIN2, and DIN3. Pins 10, 11, 12, 13, and 14 are labeled ROUT1, ROUT2, ROUT3, ROUT4, and ROUT5. Pins 15, 16, 17, 18, and 19 are labeled RIN1, RIN2, RIN3, RIN4, and RIN5. Pins 20, 21, and 22 are labeled DOUT3, DOUT2, and DOUT1. Pins 23, 24, 25, 26, 27, and 28 are labeled STBY, C1-, VSS, C3-, GND, and C3+ respectively. The diagram also shows the internal circuitry, including Mode-Control Logic, TTL Inputs, TTL Outputs, and RS-232C Inputs/Outputs. Various capacitors (C1, C2, C3, C4, C5) and resistors are shown connected to the pins. A note "See Note A" is present near pin 28, and a note "Mode-Control Logic" is present near pins 5 and 6.

Figure 6. Typical 3.3-V Operating Circuit

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 μ F
B. C_{BYPASS} is used as a decoupling capacitor.

Figure 7. Typical 5-V Operating Circuit

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN75LV4737ADB	Active	Production	SSOP (DB) 28	50 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75LV4737A
SN75LV4737ADB.A	Active	Production	SSOP (DB) 28	50 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75LV4737A
SN75LV4737ADBR	Active	Production	SSOP (DB) 28	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75LV4737A
SN75LV4737ADBR.A	Active	Production	SSOP (DB) 28	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75LV4737A

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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



*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	8.45	10.55	2.5	12.0	16.2	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

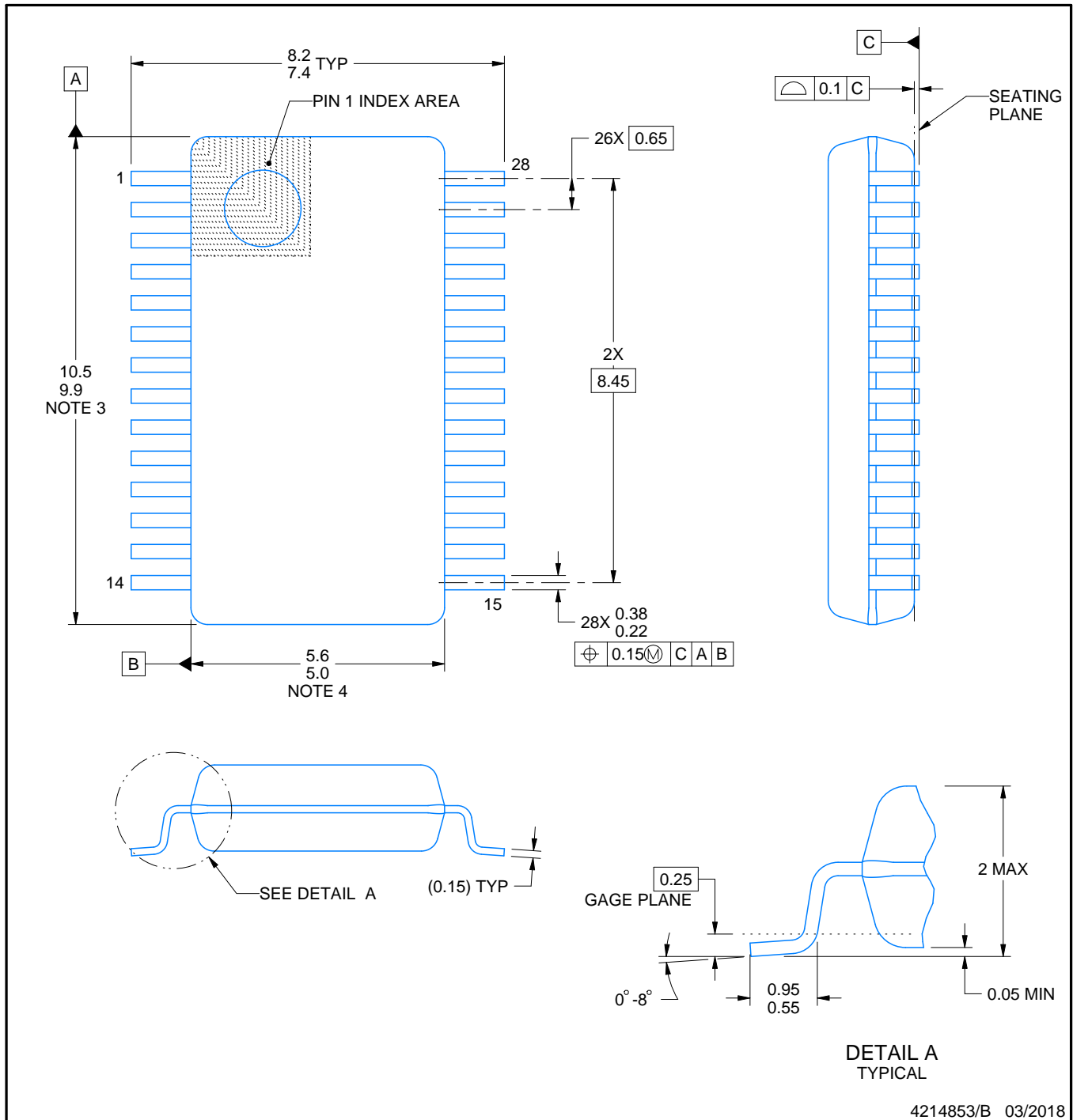
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75LV4737ADBR	SSOP	DB	28	2000	353.0	353.0	32.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN75LV4737ADB	DB	SSOP	28	50	530	10.5	4000	4.1
SN75LV4737ADB.A	DB	SSOP	28	50	530	10.5	4000	4.1



NOTES:

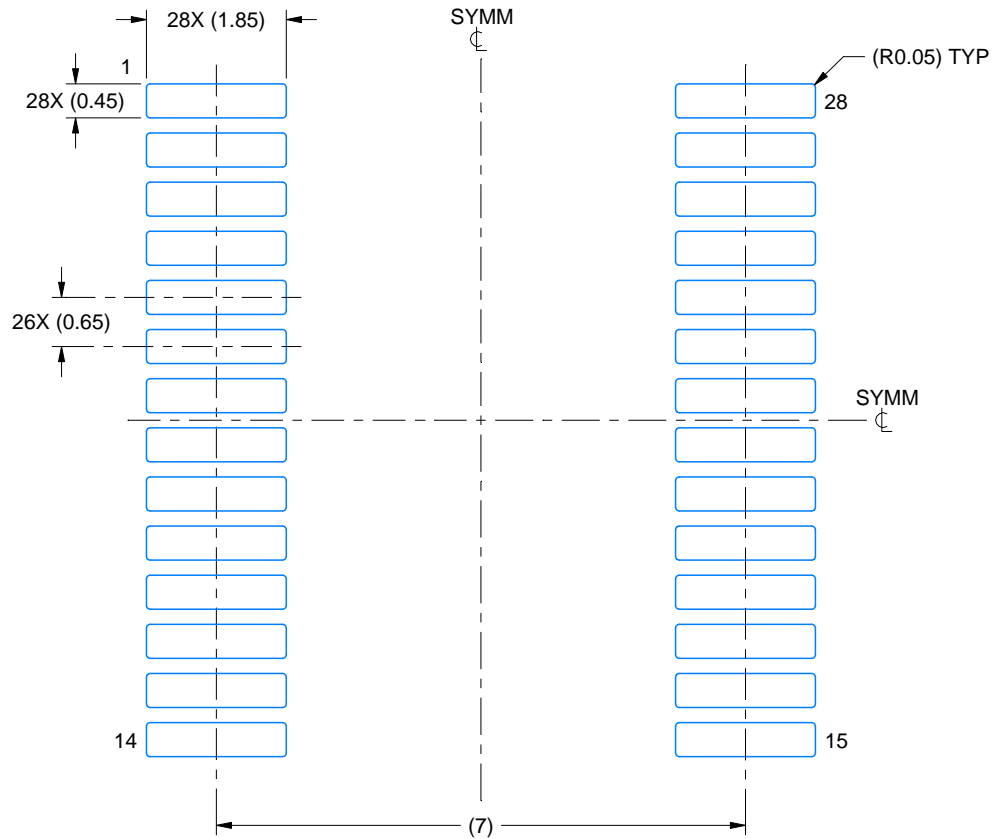
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

DB0028A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4214853/B 03/2018

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

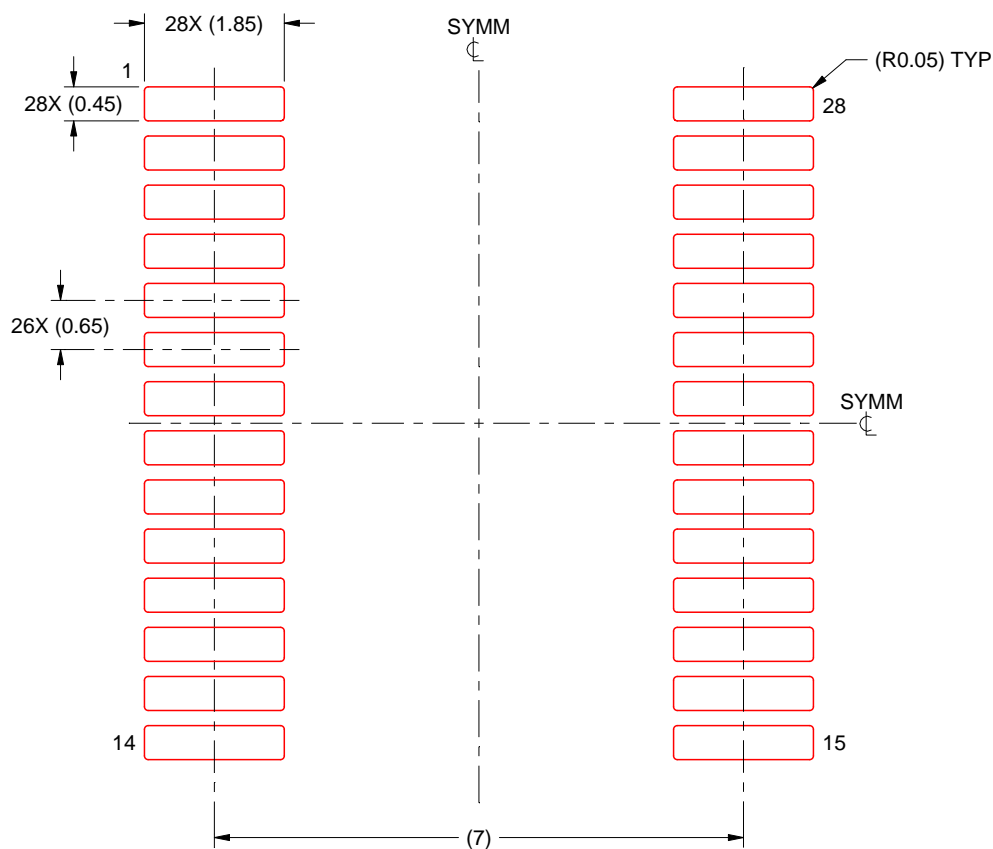
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0028A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214853/B 03/2018

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025