

## 3-V TO 5.5-V MULTICHANNEL RS-232 1-MBit/s LINE DRIVER/RECEIVER

Check for Samples: [MAX3237E](#)

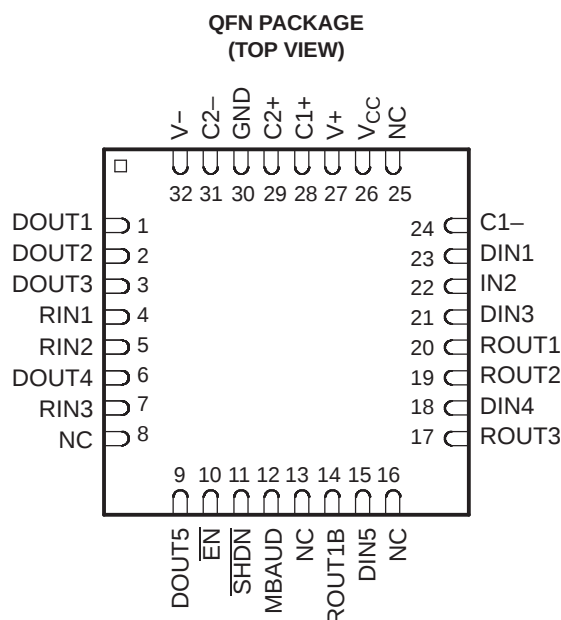
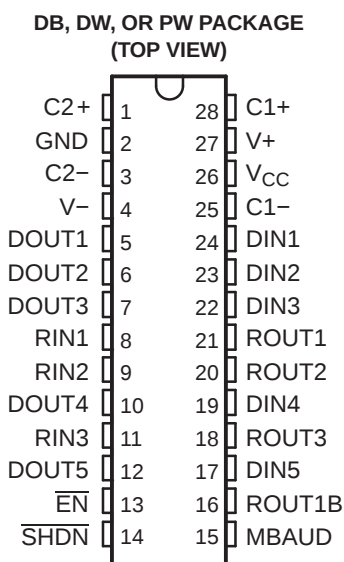
### FEATURES

- Meets or Exceeds the Requirements of TIA/EIA-232-F and ITU v.28 Standards
- Operates With 3-V to 5.5-V  $V_{CC}$  Supply
- Operates From 250 kbits/s to 1 Mbit/s
- Low Standby Current . . . 1  $\mu$ A Typical
- External Capacitors . . .  $4 \times 0.1 \mu$ F
- Accepts 5-V Logic Input With 3.3-V Supply
- Designed to Be Interchangeable With Maxim MAX3237E
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

- ESD Protection for RS-232 I/O Pins
  - $\pm 15$  kV – Human-Body Model (HBM)
  - $\pm 8$  kV – IEC61000-4-2, Contact Discharge
  - $\pm 15$  kV – IEC61000-4-2, Air-Gap Discharge

### APPLICATIONS

- Battery-Powered, Hand-Held, and Portable Equipment
- PDAs and Palmtop PCs
- Notebooks, Sub-Notebooks, and Laptops
- Digital Cameras
- Mobile Phones and Wireless Devices



### DESCRIPTION

The MAX3237E consists of five line drivers, three line receivers, and a dual charge-pump circuit with  $\pm 15$ -kV ESD protection pin to pin (serial-port connection pins, including GND). The device meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector. The charge pump and four small external capacitors allow operation from a single 3-V to 5.5-V supply. This device operates at data signaling rates of 250 kbit/s in normal operating mode ( $MBAUD = GND$ ) and 1Mbit/s when  $MBAUD = V_{CC}$ . The driver output slew rate is a maximum of 30 V/ $\mu$ s.



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.

The MAX3237E transmitters are disabled and the outputs are forced into high-impedance state when the device is in shutdown mode ( $\overline{\text{SHDN}} = \text{GND}$ ) and the supply current falls to less than 1  $\mu\text{A}$ . Also, during shutdown, the onboard charge pump is disabled;  $V_+$  is lowered to  $V_{\text{CC}}$ , and  $V_-$  is raised toward GND. Receiver outputs also can be placed in the high-impedance state by setting enable ( $\overline{\text{EN}}$ ) high. ROUT1B remains active all the time, regardless of the  $\overline{\text{EN}}$  and  $\overline{\text{SHDN}}$  condition.

The MAX3237EC is characterized for operation from 0°C to 70°C. The MAX3237EI is characterized for operation from –40°C to 85°C.

#### AVAILABLE OPTIONS<sup>(1)</sup>

| $T_A$         | PACKAGED DEVICES <sup>(2)</sup> |
|---------------|---------------------------------|
| 0°C to 70°C   | MAX3237ECDBR                    |
|               | MAX3237ECPWR                    |
|               | MAX3237ECRHBR (QFN package)     |
|               | MAX3237ECDWR                    |
| –40°C to 85°C | MAX3237EIDBR                    |
|               | MAX3237EIPWR                    |
|               | MAX3237EIRHBR (QFN package)     |
|               | MAX3237EIDWR                    |

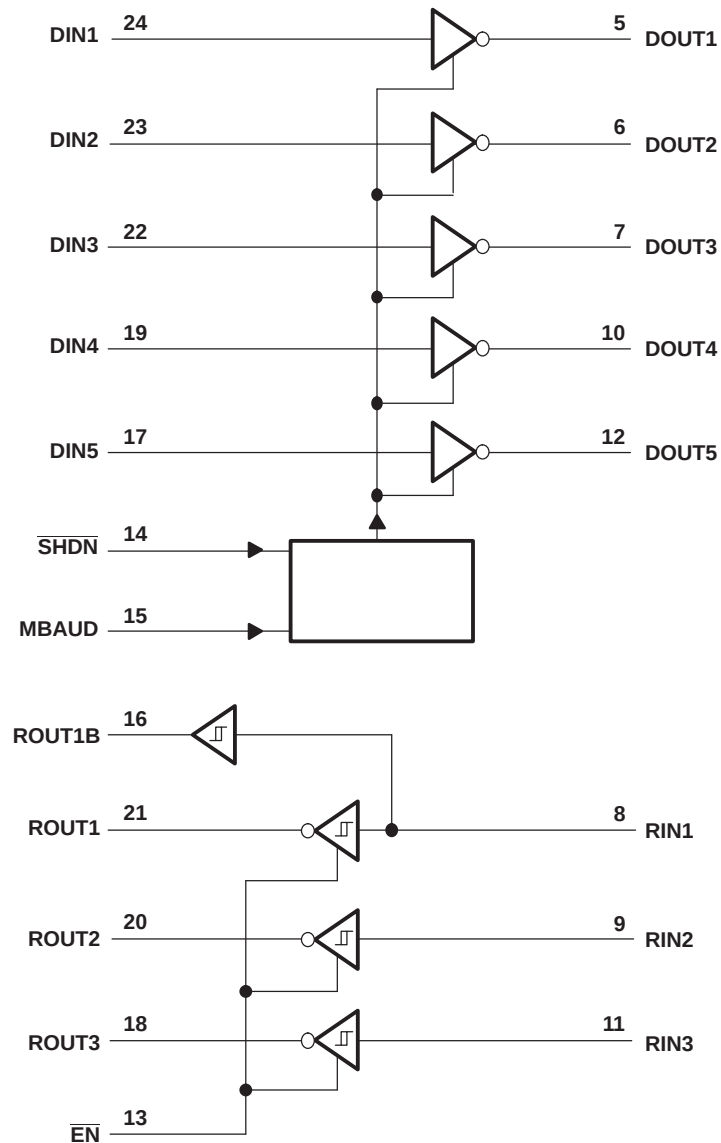
- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).
- (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

**Table 1. FUNCTION TABLE**

| INPUTS                   |                        | OUTPUTS          |                  |        |
|--------------------------|------------------------|------------------|------------------|--------|
| $\overline{\text{SHDN}}$ | $\overline{\text{EN}}$ | DOUT             | ROUT             | ROUT1B |
| 0                        | 0                      | Z <sup>(1)</sup> | Active           | Active |
| 0                        | 1                      | Z <sup>(1)</sup> | Z <sup>(1)</sup> | Active |
| 1                        | 0                      | Active           | Active           | Active |
| 1                        | 1                      | Active           | Z <sup>(1)</sup> | Active |

- (1) Z = high impedance (off)

**LOGIC DIAGRAM (POSITIVE LOGIC)**



**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

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

|                  |                                                     |                                                                     | MIN   | MAX                   | UNIT |
|------------------|-----------------------------------------------------|---------------------------------------------------------------------|-------|-----------------------|------|
| V <sub>CC</sub>  | Supply voltage range <sup>(2)</sup>                 |                                                                     | –0.3  | 6                     | V    |
| V+               | Positive-output supply voltage range <sup>(2)</sup> |                                                                     | –0.3  | 7                     | V    |
| V–               | Negative-output supply voltage range <sup>(2)</sup> |                                                                     | 0.3   | –7                    | V    |
| V+ – V–          | Supply voltage difference <sup>(2)</sup>            |                                                                     |       | 13                    | V    |
| V <sub>I</sub>   | Input voltage range                                 | Driver ( $\overline{\text{SHDN}}$ , MBAUD, $\overline{\text{EN}}$ ) | –0.3  | 6                     | V    |
|                  |                                                     | Receiver                                                            | –25   | 25                    |      |
| V <sub>O</sub>   | Output voltage range                                | Driver                                                              | –13.2 | 13.2                  | V    |
|                  |                                                     | Receiver                                                            | –0.3  | V <sub>CC</sub> + 0.3 |      |
|                  | Short-circuit duration                              | DOUT to GND                                                         |       | Unlimited             |      |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(3)</sup>            |                                                                     |       | 62                    | °C/W |
| T <sub>stg</sub> | Storage temperature range                           |                                                                     | –65   | 150                   | °C   |

- (1) 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.
- (2) All voltages are with respect to network GND.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.

**RECOMMENDED OPERATING CONDITIONS<sup>(1)</sup>**See [Figure 5](#)

|                 |                                             |                                                               | MIN                     | NOM | MAX | UNIT |
|-----------------|---------------------------------------------|---------------------------------------------------------------|-------------------------|-----|-----|------|
| Supply voltage  |                                             | V <sub>CC</sub> = 3.3 V                                       | 3                       | 3.3 | 3.6 | V    |
|                 |                                             | V <sub>CC</sub> = 5 V                                         | 4.5                     | 5   | 5.5 |      |
| V <sub>IH</sub> | Driver and control high-level input voltage | DIN, $\overline{\text{SHDN}}$ , MBAUD, $\overline{\text{EN}}$ | V <sub>CC</sub> = 3.3 V | 2   | 5.5 | V    |
|                 |                                             |                                                               | V <sub>CC</sub> = 5 V   | 2.4 | 5.5 |      |
| V <sub>IL</sub> | Driver and control low-level input voltage  | DIN, $\overline{\text{SHDN}}$ , MBAUD, $\overline{\text{EN}}$ | 0                       |     | 0.8 | V    |
| V <sub>I</sub>  | Receiver input voltage                      |                                                               | –25                     |     | 25  | V    |
| T <sub>A</sub>  | Operating free-air temperature              | MAX3237EC                                                     | 0                       |     | 70  | °C   |
|                 |                                             | MAX3237EI                                                     | –40                     |     | 85  |      |

- (1) Test conditions are C1–C4 = 0.1 μF at V<sub>CC</sub> = 3 V to 5 V.

**ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 5](#))

| PARAMETER       |                                           | TEST CONDITIONS                                                                                  | MIN | TYP <sup>(2)</sup> | MAX | UNIT |
|-----------------|-------------------------------------------|--------------------------------------------------------------------------------------------------|-----|--------------------|-----|------|
| I <sub>I</sub>  | Input leakage current                     | DIN, $\overline{\text{SHDN}}$ , MBAUD, $\overline{\text{EN}}$                                    |     | 9                  | 18  | μA   |
| I <sub>CC</sub> | Supply current<br>(T <sub>A</sub> = 25°C) | No load, $\overline{\text{SHDN}}$ = V <sub>CC</sub>                                              |     | 0.5                | 2   | mA   |
|                 |                                           | $\overline{\text{SHDN}}$ = GND                                                                   |     | 1                  | 10  | μA   |
|                 |                                           | Shutdown supply current<br>$\overline{\text{SHDN}}$ = RIN = GND,<br>DIN = GND or V <sub>CC</sub> |     | 10                 | 300 | nA   |

- (1) Test conditions are C1–C4 = 0.1 μF at V<sub>CC</sub> = 3 V to 5 V.
- (2) All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

## DRIVER SECTION ELECTRICAL CHARACTERISTICS<sup>(1)</sup>

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 5](#))

| PARAMETER                                                   | TEST CONDITIONS                                                                    | MIN | TYP <sup>(2)</sup> | MAX | UNIT |
|-------------------------------------------------------------|------------------------------------------------------------------------------------|-----|--------------------|-----|------|
| V <sub>OH</sub> High-level output voltage                   | DOUT at R <sub>L</sub> = 3 kΩ to GND, DIN = GND                                    | 5   | 5.4                |     | V    |
| V <sub>OL</sub> Low-level output voltage                    | DOUT at R <sub>L</sub> = 3 kΩ to GND, DIN = V <sub>CC</sub>                        | –5  | –5.4               |     | V    |
| I <sub>IH</sub> High-level input current                    | V <sub>I</sub> = V <sub>CC</sub>                                                   |     | ±0.01              | ±1  | μA   |
| I <sub>IL</sub> Low-level input current                     | V <sub>I</sub> at GND                                                              |     | ±0.01              | ±1  | μA   |
| I <sub>OS</sub> Short-circuit output current <sup>(3)</sup> | V <sub>CC</sub> = 3.6 V or 3.3 V, V <sub>O</sub> = 0 V                             |     |                    | ±60 | mA   |
| r <sub>o</sub> Output resistance                            | V <sub>CC</sub> , V <sub>+</sub> , and V <sub>–</sub> = 0 V, V <sub>O</sub> = ±2 V | 300 | 50k                |     | Ω    |

(1) Test conditions are C1–C4 = 0.1 μF at V<sub>CC</sub> = 3 V to 5 V.

(2) All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

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

## DRIVER SECTION SWITCHING CHARACTERISTICS<sup>(1)</sup>

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 5](#))

| PARAMETER          |                                                                                           | TEST CONDITIONS                                                                                                                    |                                     | MIN                     | TYP <sup>(2)</sup> | MAX | UNIT   |
|--------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------|--------------------|-----|--------|
| Maximum data rate  | C <sub>L</sub> = 1000 pF,<br>MBAUD = GND                                                  | R <sub>L</sub> = 3 kΩ, 1 DIN switching,<br>See <a href="#">Figure 1</a>                                                            |                                     | 250                     |                    |     | kbit/s |
|                    | C <sub>L</sub> = 1000 pF,<br>V <sub>CC</sub> = 4.5 V to 5.5 V,<br>MBAUD = V <sub>CC</sub> |                                                                                                                                    |                                     | 1000                    |                    |     |        |
|                    | C <sub>L</sub> = 250 pF,<br>V <sub>CC</sub> = 3 V to 4.5 V,<br>MBAUD = V <sub>CC</sub>    |                                                                                                                                    |                                     | 1000                    |                    |     |        |
| t <sub>sk(p)</sub> | Pulse skew <sup>(3)</sup>                                                                 | C <sub>L</sub> = 150 pF to 2500 pF, R <sub>L</sub> = 3 kΩ to 7 kΩ,<br>MBAUD = V <sub>CC</sub> or GND, See <a href="#">Figure 2</a> |                                     |                         | 100                |     | ns     |
| SR(tr)             | Slew rate,<br>transition region<br>(see <a href="#">Figure 1</a> )                        | V <sub>CC</sub> = 3.3 V,<br>R <sub>L</sub> = 3 kΩ to 7 kΩ,<br>T <sub>A</sub> = 25°C                                                | C <sub>L</sub> = 150 pF to 1000 pF  | MBAUD = GND             | 6                  | 30  | V/μs   |
|                    |                                                                                           |                                                                                                                                    |                                     | MBAUD = V <sub>CC</sub> | 24                 | 150 |        |
|                    |                                                                                           |                                                                                                                                    | C <sub>L</sub> = 150 pF to 2500 pF, | MBAUD = GND             | 4                  | 30  |        |

(1) Test conditions are C1–C4 = 0.1 μF at V<sub>CC</sub> = 3 V to 5 V.

(2) All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

(3) Pulse skew is defined as |t<sub>PLH</sub> – t<sub>PHL</sub>| of each channel of the same device.

## RECEIVER SECTION ELECTRICAL CHARACTERISTICS<sup>(1)</sup>

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 5](#))

| PARAMETER                                                                | TEST CONDITIONS                 | MIN                   | TYP <sup>(2)</sup>    | MAX | UNIT |
|--------------------------------------------------------------------------|---------------------------------|-----------------------|-----------------------|-----|------|
| V <sub>OH</sub> High-level output voltage                                | I <sub>OH</sub> = –1 mA         | V <sub>CC</sub> – 0.6 | V <sub>CC</sub> – 0.1 |     | V    |
| V <sub>OL</sub> Low-level output voltage                                 | I <sub>OL</sub> = 1 mA          |                       |                       | 0.4 | V    |
| V <sub>IT+</sub> Positive-going input threshold voltage                  | V <sub>CC</sub> = 3.3 V         |                       | 1.5                   | 2.4 | V    |
|                                                                          | V <sub>CC</sub> = 5 V           |                       | 2                     | 2.4 |      |
| V <sub>IT–</sub> Negative-going input threshold voltage                  | V <sub>CC</sub> = 3.3 V         | 0.6                   | 1.1                   |     | V    |
|                                                                          | V <sub>CC</sub> = 5 V           | 0.8                   | 1.5                   |     |      |
| V <sub>hys</sub> Input hysteresis (V <sub>IT+</sub> – V <sub>IT–</sub> ) |                                 |                       | 0.5                   |     | V    |
| I <sub>oz</sub> Output leakage current                                   | $\overline{\text{EN}} = V_{CC}$ |                       | ±0.05                 | ±10 | μA   |
| r <sub>i</sub> Input resistance                                          | V <sub>I</sub> = ±3 V to ±25 V  | 3                     | 5                     | 7   | kΩ   |

(1) Test conditions are C1–C4 = 0.1 mF at V<sub>CC</sub> = 3 V to 5 V.

(2) All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

## RECEIVER SECTION SWITCHING CHARACTERISTICS<sup>(1)</sup>

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

| PARAMETER                                                          | TEST CONDITIONS                                                              | TYP <sup>(2)</sup> | UNIT |
|--------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------|------|
| t <sub>PLH</sub> Propagation delay time, low- to high-level output | C <sub>L</sub> = 150 pF, See <a href="#">Figure 3</a>                        | 150                | ns   |
| t <sub>PHL</sub> Propagation delay time, high- to low-level output | C <sub>L</sub> = 150 pF, See <a href="#">Figure 3</a>                        | 150                | ns   |
| t <sub>en</sub> Output enable time                                 | C <sub>L</sub> = 150 pF, R <sub>L</sub> = 3 kΩ, See <a href="#">Figure 4</a> | 2.6                | μs   |
| t <sub>dis</sub> Output disable time                               | C <sub>L</sub> = 150 pF, R <sub>L</sub> = 3 kΩ, See <a href="#">Figure 4</a> | 2.4                | μs   |
| t <sub>sk(p)</sub> Pulse skew <sup>(3)</sup>                       | See <a href="#">Figure 3</a>                                                 | 50                 | ns   |

(1) Test conditions are C1–C4 = 0.1 μF at V<sub>CC</sub> = 3 V to 5 V.

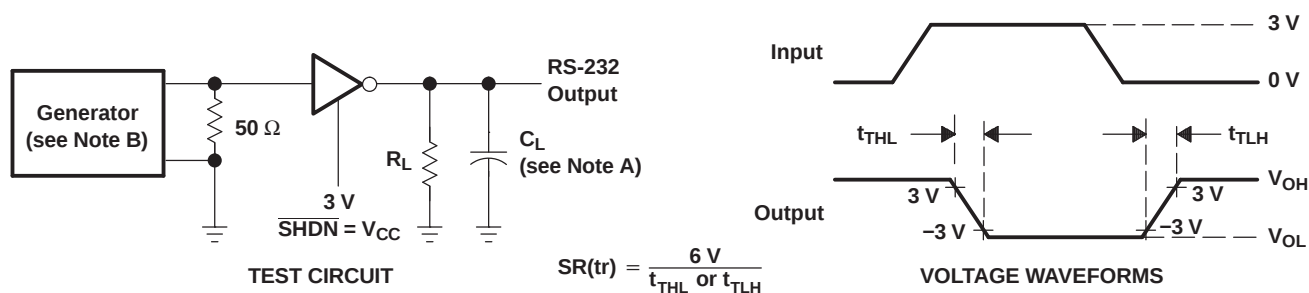
(2) All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

(3) Pulse skew is defined as |t<sub>PLH</sub> – t<sub>PHL</sub>| of each channel of the same device.

## ESD PROTECTION

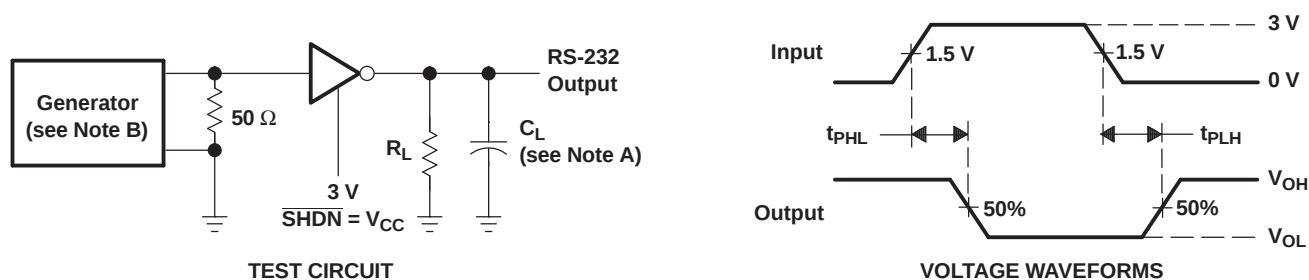
| PIN       | TEST CONDITIONS                 | TYP | UNIT |
|-----------|---------------------------------|-----|------|
| DOUT, RIN | HBM                             | ±15 | kV   |
|           | IEC61000-4-2, Contact Discharge | ±8  |      |
|           | IEC61000-4-2, Air-Gap Discharge | ±15 |      |

## PARAMETER MEASUREMENT INFORMATION



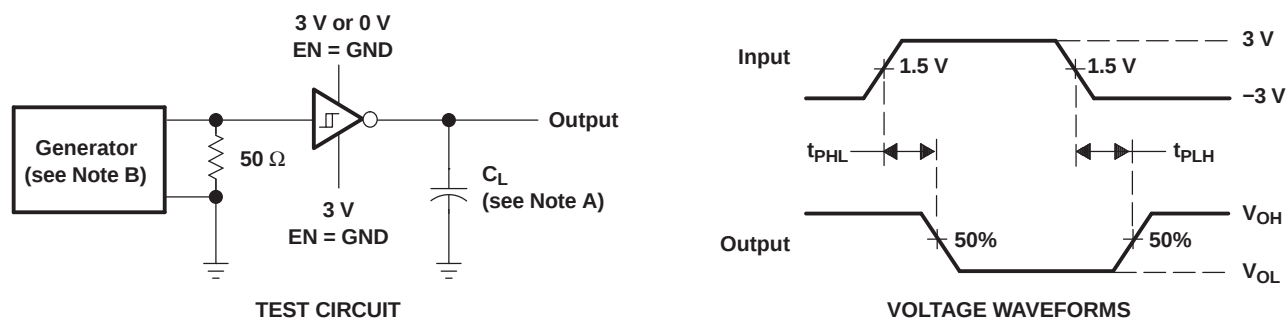
- NOTES: A. C<sub>L</sub> includes probe and jig capacitance.  
B. The pulse generator has the following characteristics: PRR = 250 kbit/s, Z<sub>O</sub> = 50 Ω, 50% duty cycle, t<sub>r</sub> ≤ 10 ns, t<sub>f</sub> ≤ 10 ns.

Figure 1. Driver Slew Rate



- NOTES: A. C<sub>L</sub> includes probe and jig capacitance.  
B. The pulse generator has the following characteristics: PRR = 250 kbit/s, Z<sub>O</sub> = 50 Ω, 50% duty cycle, t<sub>r</sub> ≤ 10 ns, t<sub>f</sub> ≤ 10 ns.

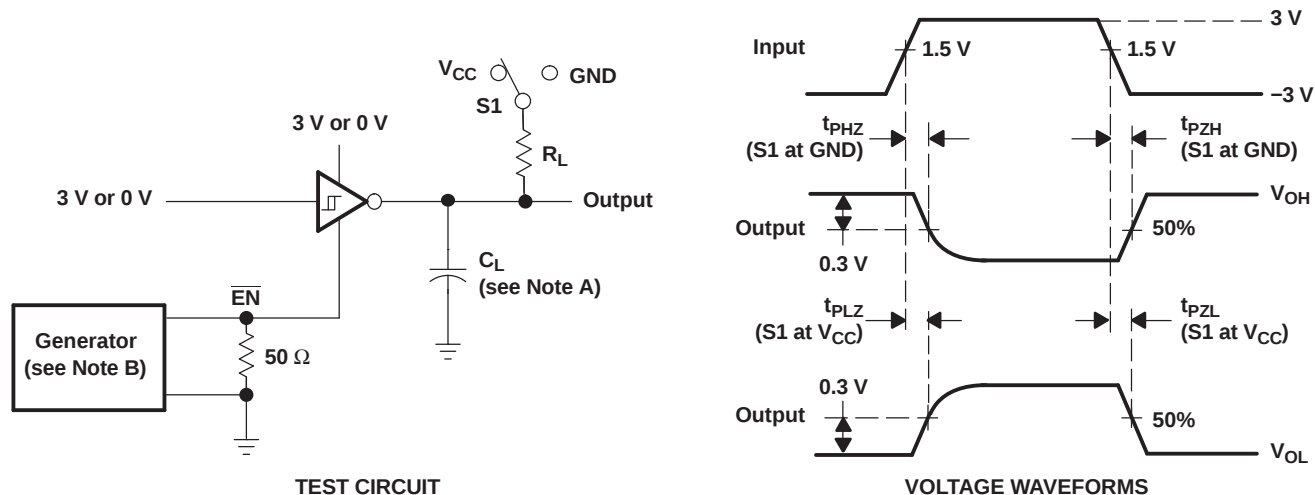
Figure 2. Driver Pulse Skew



- NOTES: A. C<sub>L</sub> includes probe and jig capacitance.  
B. The pulse generator has the following characteristics: Z<sub>O</sub> = 50 Ω, 50% duty cycle, t<sub>r</sub> ≤ 10 ns, t<sub>f</sub> ≤ 10 ns.

Figure 3. Receiver Propagation Delay Times

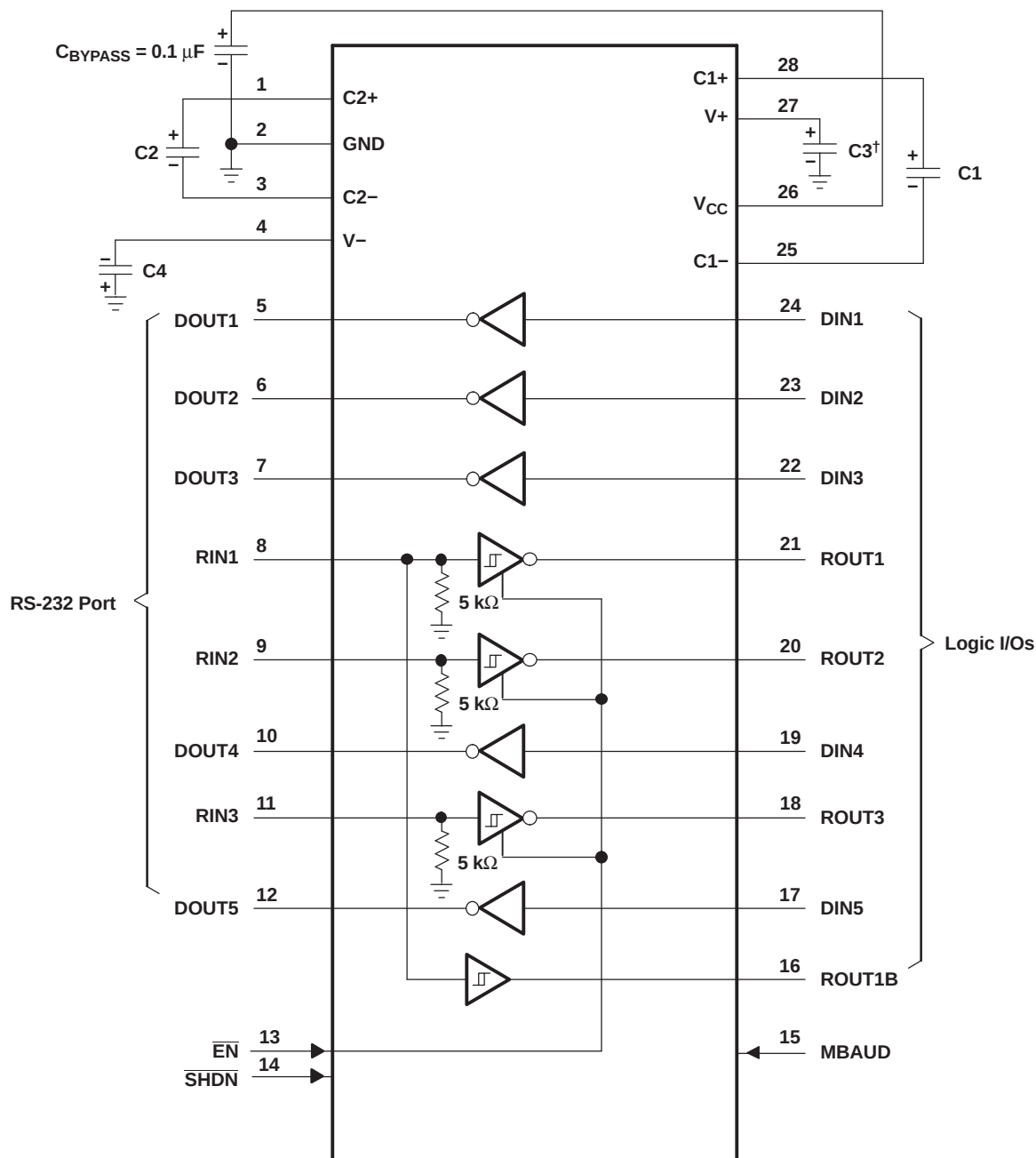
## PARAMETER MEASUREMENT INFORMATION (continued)



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. The pulse generator has the following characteristics:  $Z_O = 50\ \Omega$ , 50% duty cycle,  $t_r \leq 10\ \text{ns}$ ,  $t_f \leq 10\ \text{ns}$ .
  - C.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - D.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .

**Figure 4. Receiver Enable and Disable Times**

## APPLICATION INFORMATION



† C3 can be connected to V<sub>CC</sub> or GND.

NOTES: A. Resistor values shown are nominal.

B. Nonpolarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used, they should be connected as shown.

### V<sub>CC</sub> vs CAPACITOR VALUES

| V <sub>CC</sub> | C1       | C2, C3, and C4 |
|-----------------|----------|----------------|
| 3.3 V ± 0.15 V  | 0.1 μF   | 0.1 μF         |
| 3.3 V ± 0.3 V   | 0.22 μF  | 0.22 μF        |
| 5 V ± 0.5 V     | 0.047 μF | 0.33 μF        |
| 3 V to 5.5 V    | 0.22 μF  | 1 μF           |

Figure 5. Typical Operating Circuit and Capacitor Values

## PACKAGING INFORMATION

| Orderable part number        | Status<br>(1) | Material type<br>(2) | Package   Pins  | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|------------------------------|---------------|----------------------|-----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">MAX3237ECDB</a>  | Obsolete      | Production           | SSOP (DB)   28  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | MAX3237EC           |
| <a href="#">MAX3237ECDBR</a> | Active        | Production           | SSOP (DB)   28  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | MAX3237EC           |
| <a href="#">MAX3237ECDW</a>  | Active        | Production           | SOIC (DW)   28  | 20   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | MAX3237EC           |
| <a href="#">MAX3237ECDWR</a> | Active        | Production           | SOIC (DW)   28  | 1000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | MAX3237EC           |
| <a href="#">MAX3237ECPW</a>  | Obsolete      | Production           | TSSOP (PW)   28 | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | MP237EC             |
| <a href="#">MAX3237ECPWR</a> | Obsolete      | Production           | TSSOP (PW)   28 | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | MP237EC             |
| <a href="#">MAX3237EIDB</a>  | Obsolete      | Production           | SSOP (DB)   28  | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | MAX3237EI           |
| <a href="#">MAX3237EIDBR</a> | Active        | Production           | SSOP (DB)   28  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | MAX3237EI           |
| <a href="#">MAX3237EIDW</a>  | Active        | Production           | SOIC (DW)   28  | 20   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | MAX3237EI           |
| <a href="#">MAX3237EIPW</a>  | Obsolete      | Production           | TSSOP (PW)   28 | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | MP237EI             |
| <a href="#">MAX3237EIPWR</a> | Active        | Production           | TSSOP (PW)   28 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | MP237EI             |

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

<sup>(2)</sup> **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.

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

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| MAX3237ECDBR | SSOP         | DB              | 28   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| MAX3237ECDWR | SOIC         | DW              | 28   | 1000 | 330.0              | 32.4               | 11.35   | 18.67   | 3.1     | 16.0    | 32.0   | Q1            |
| MAX3237EIDBR | SSOP         | DB              | 28   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| MAX3237EIPWR | TSSOP        | PW              | 28   | 2000 | 330.0              | 16.4               | 6.9     | 10.2    | 1.8     | 12.0    | 16.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

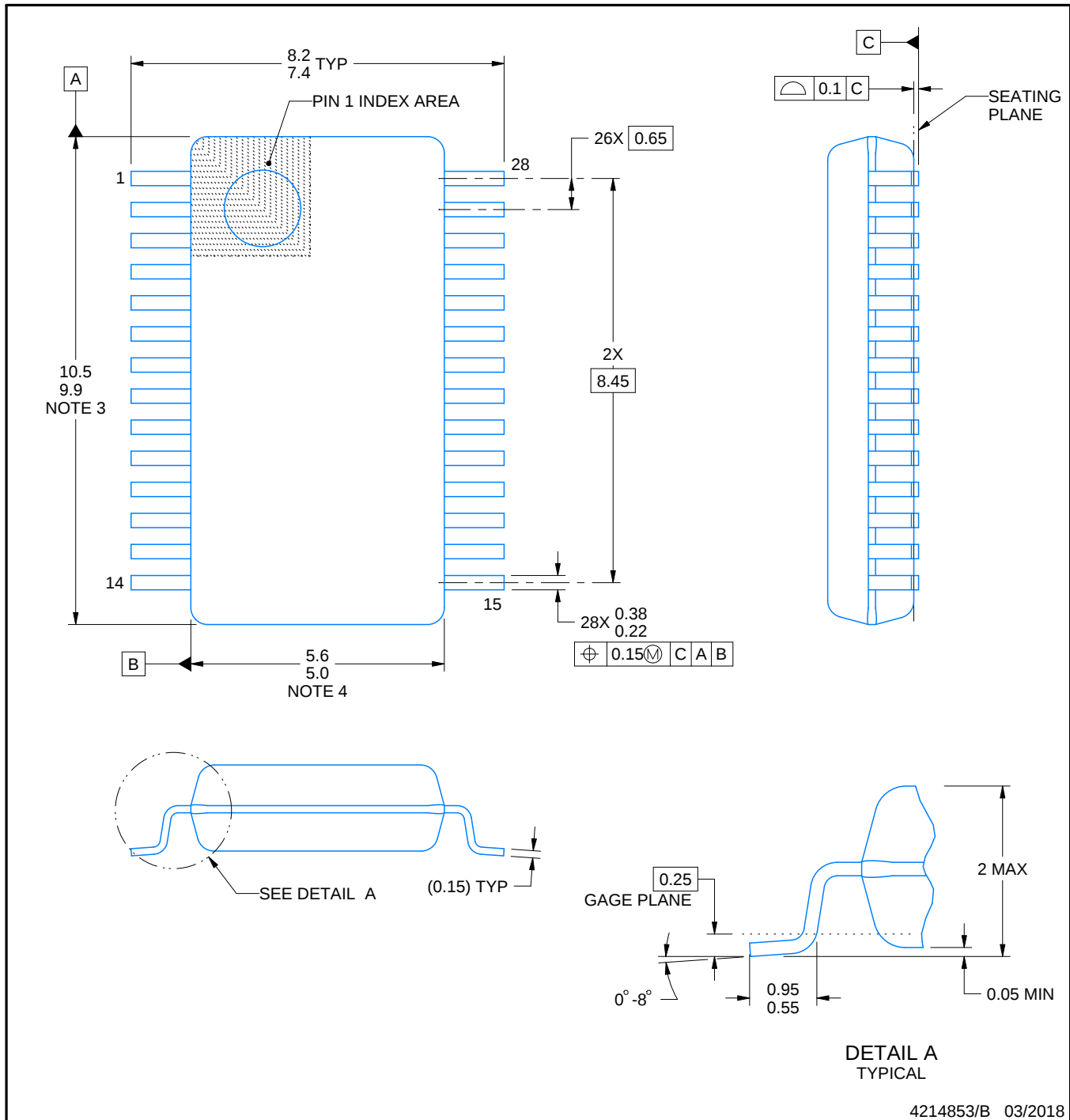
| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| MAX3237ECDBR | SSOP         | DB              | 28   | 2000 | 356.0       | 356.0      | 35.0        |
| MAX3237ECDWR | SOIC         | DW              | 28   | 1000 | 350.0       | 350.0      | 66.0        |
| MAX3237EIDBR | SSOP         | DB              | 28   | 2000 | 356.0       | 356.0      | 35.0        |
| MAX3237EIPWR | TSSOP        | PW              | 28   | 2000 | 356.0       | 356.0      | 35.0        |

## TUBE



\*All dimensions are nominal

| Device        | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|---------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| MAX3237ECDW   | DW           | SOIC         | 28   | 20  | 506.98 | 12.7   | 4826   | 6.6    |
| MAX3237ECDWG4 | DW           | SOIC         | 28   | 20  | 506.98 | 12.7   | 4826   | 6.6    |
| MAX3237EIDW   | DW           | SOIC         | 28   | 20  | 506.98 | 12.7   | 4826   | 6.6    |



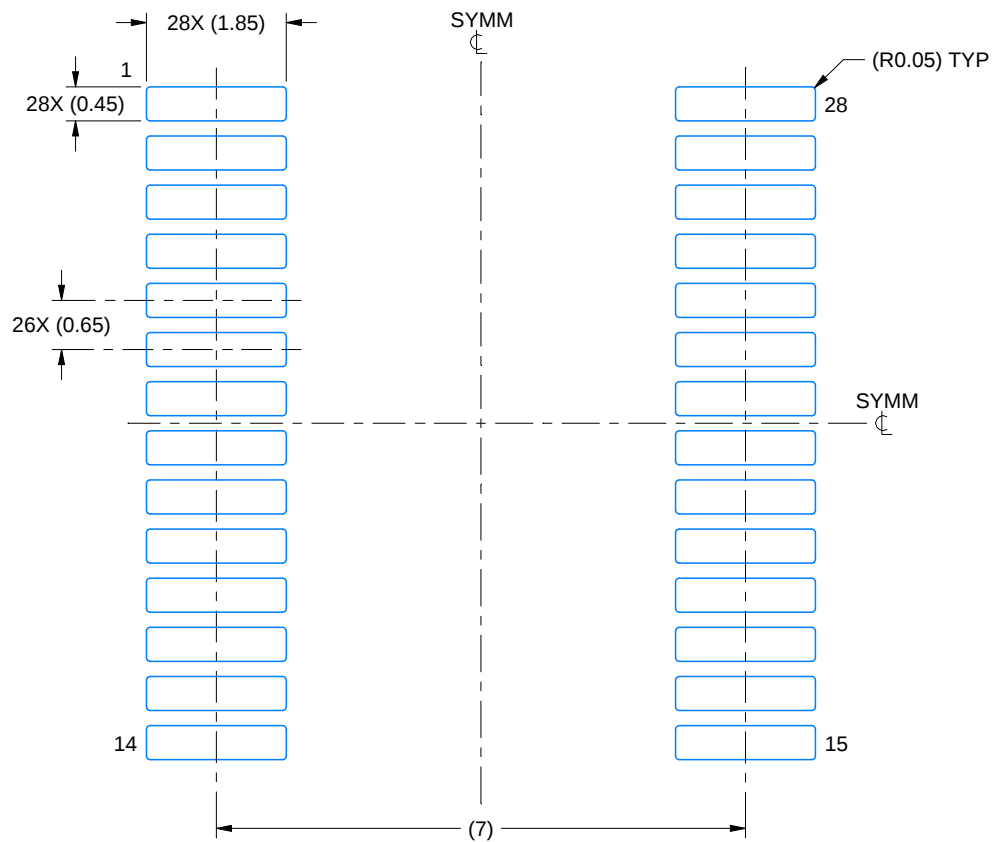
## NOTES:

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.

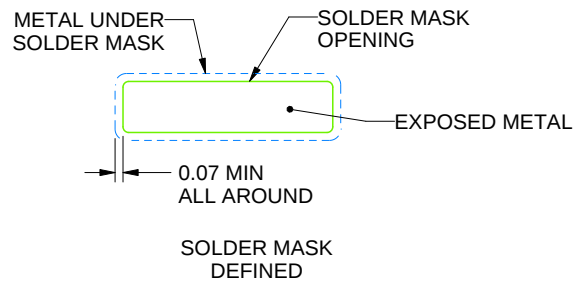
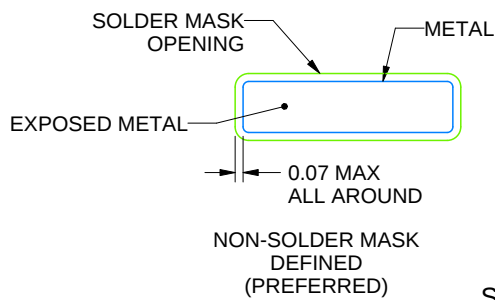
**DB0028A**

**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)

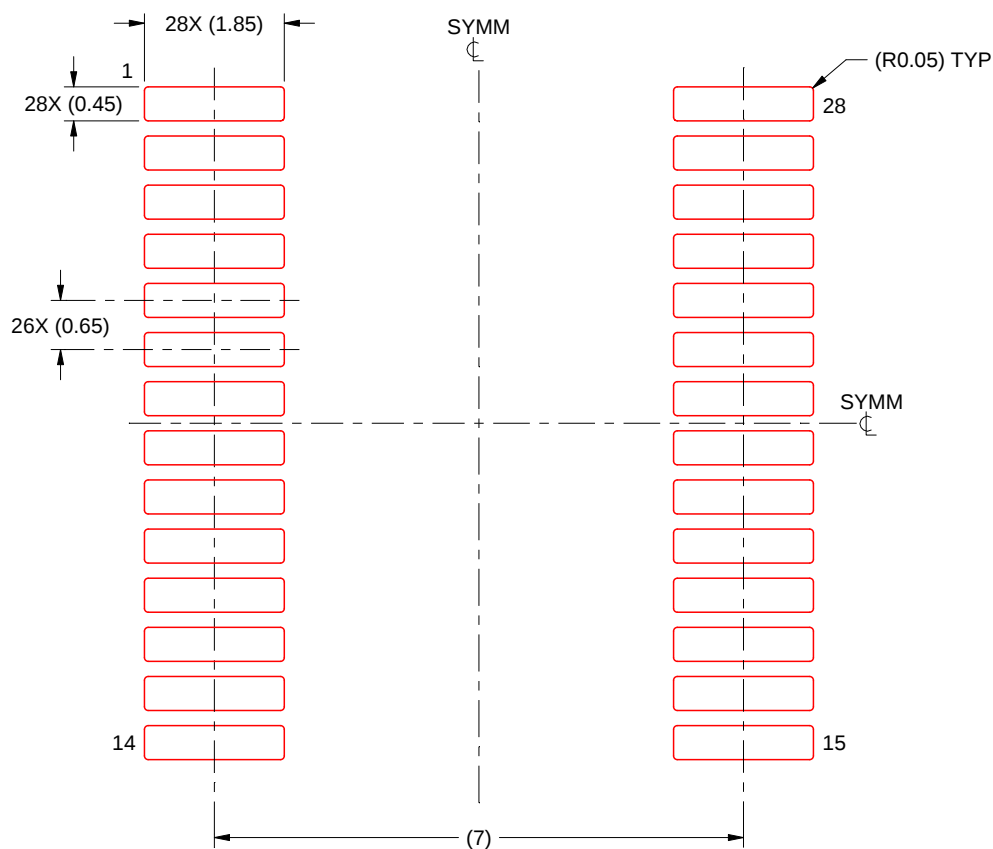
6. Publication IPC-7351 may have alternate designs.  
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DB0028A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

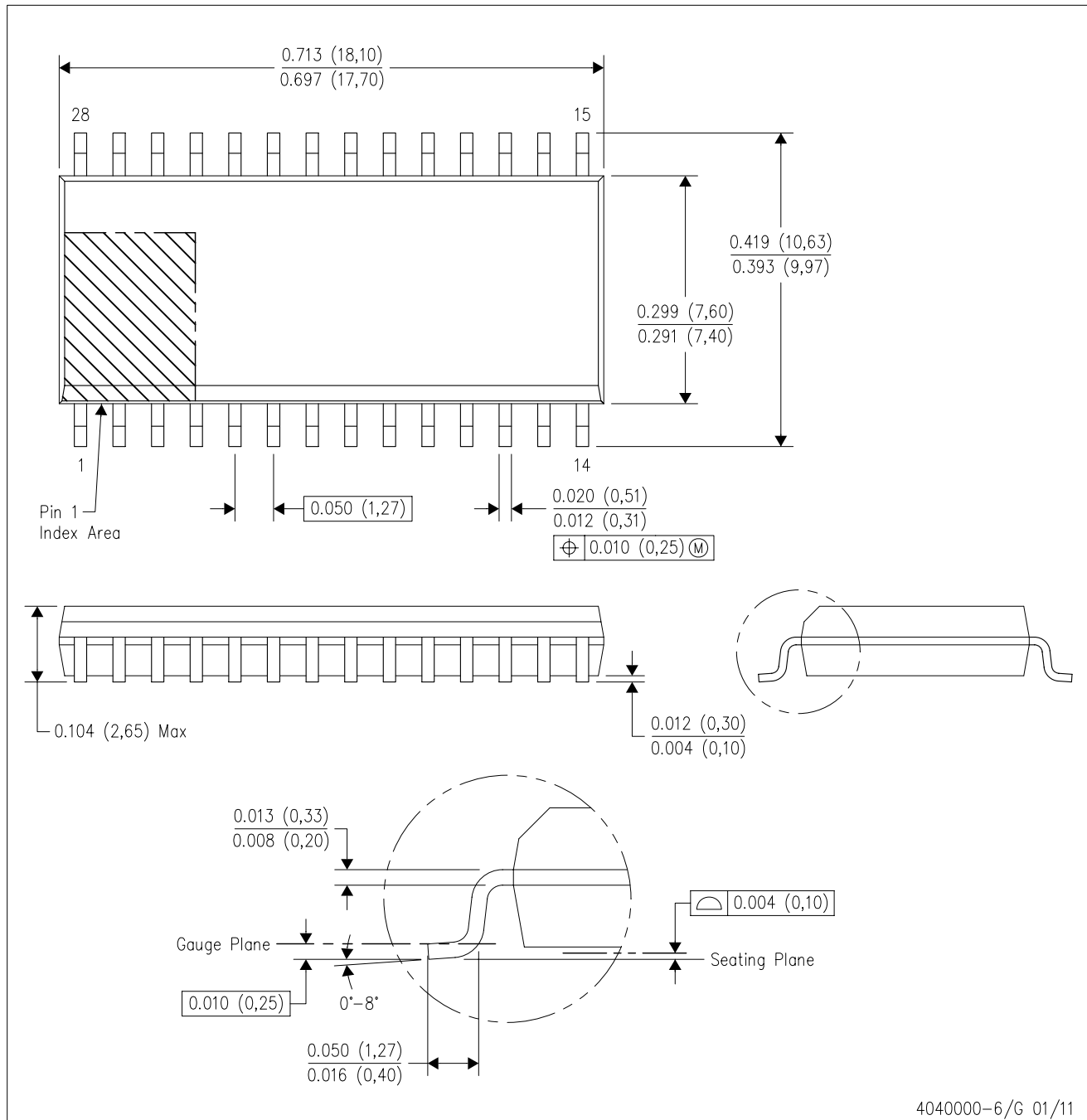
4214853/B 03/2018

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.

DW (R-PDSO-G28)

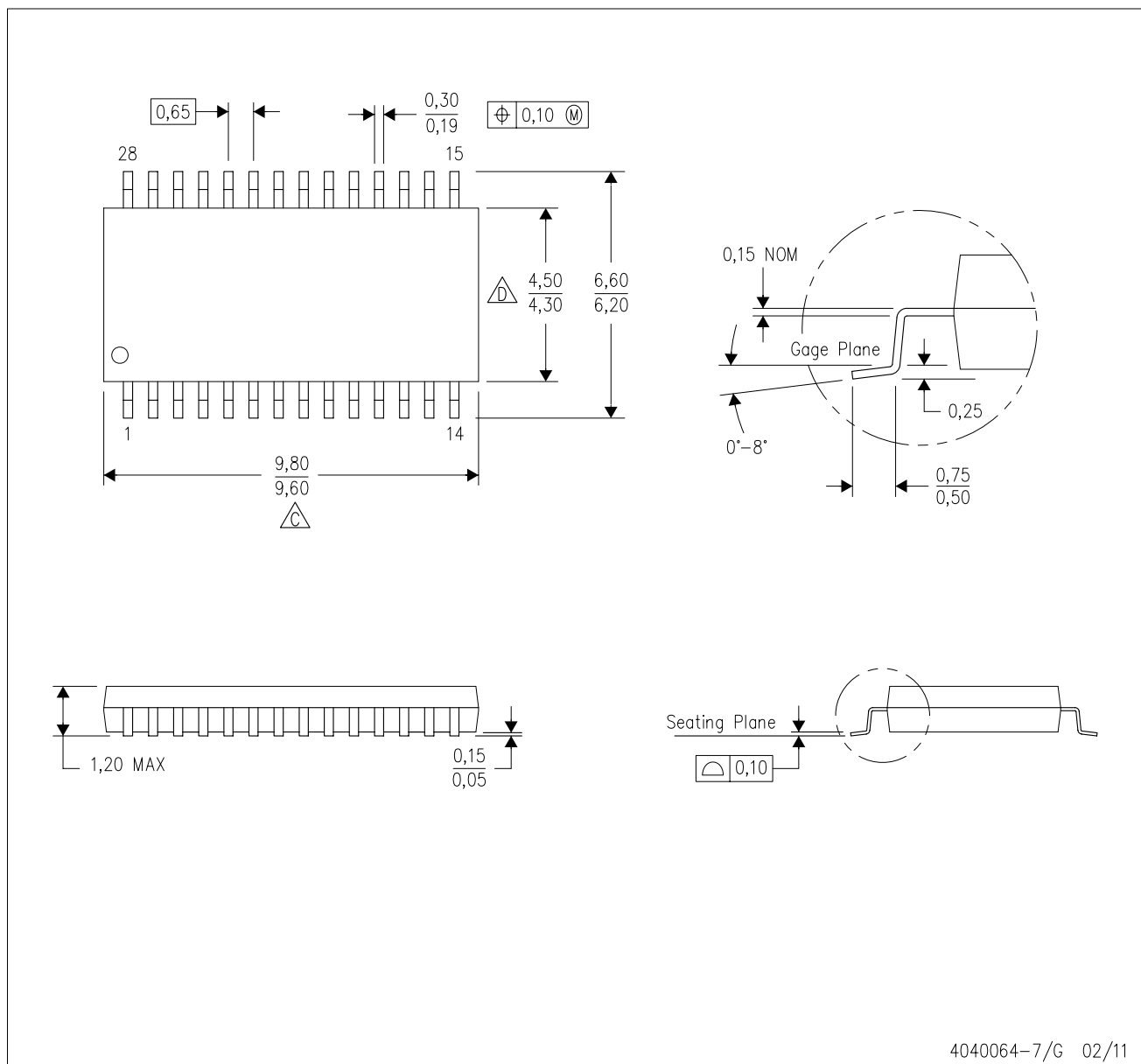
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AE.

PW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

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