

FEATURES

- Operates With 3-V to 5.5-V V_{CC} Supply
- Operates up to 1 Mbit/s
- Low Supply Current . . . 300 μ A Typ
- External Capacitors . . . $4 \times 0.1 \mu$ F
- Accepts 5-V Logic Input With 3.3-V Supply
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- RS-232 Bus-Pin ESD Protection Exceeds ± 15 kV Using Human-Body Model (HBM)

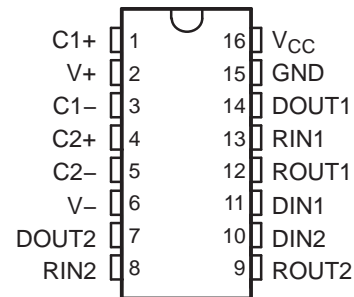
APPLICATIONS

- Battery-Powered Systems
- PDAs
- Notebooks
- Laptops
- Palmtop PCs
- Hand-Held Equipment

DESCRIPTION/ORDERING INFORMATION

The TRSF3232 consists of two line drivers, two line receivers, and a dual charge-pump circuit with ± 15 -kV ESD protection pin-to-pin (serial-port connection pins, including GND). This device 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. The TRSF3232 operates at typical data signaling rates up to 1 Mbit/s and a driver output slew rate of 24 V/ μ s to 150 V/ μ s.

D, DB, DW, OR PW PACKAGE
(TOP VIEW)



NC – No internal connection

ORDERING INFORMATION

| T_A | PACKAGE ⁽¹⁾⁽²⁾ | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---------------|---------------------------|--------------|-----------------------|------------------|
| 0°C to 70°C | SOIC – D | Tube of 40 | TRSF3232CD | TRSF3232C |
| | | Reel of 2500 | TRSF3232CDR | |
| | SOIC – DW | Tube of 25 | TRSF3232CDW | TRSF3232C |
| | | Reel of 2000 | TRSF3232CDWR | |
| | SSOP – DB | Tube of 70 | TRSF3232CDB | RT22C |
| | | Reel of 2000 | TRSF3232CDBR | |
| | TSSOP – PW | Tube of 70 | TRSF3232CPW | RT22C |
| | | Reel of 2000 | TRSF3232CPWR | |
| –40°C to 85°C | SOIC – D | Tube of 40 | TRSF3232ID | TRSF3232I |
| | SOIC – DW | Reel of 2000 | TRSF3232IDR | |
| | SOIC – DW | Tube of 25 | TRSF3232IDW | TRSF3232I |
| | | Reel of 2000 | TRSF3232IDWR | |
| | SSOP – DB | Tube of 70 | TRSF3232IDB | RT22I |
| | | Reel of 2000 | TRSF3232IDBR | |
| | TSSOP – PW | Tube of 70 | TRSF3232IPW | RT22I |
| | | Reel of 2000 | TRSF3232IPWR | |

(1) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

(2) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.



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.

FUNCTION TABLES

Each Driver⁽¹⁾

| INPUT DIN | OUTPUT DOUT |
|--------------|----------------|
| L | H |
| H | L |

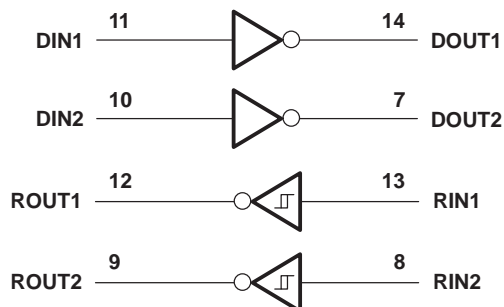
(1) H = high level, L = low level

Each Receiver⁽¹⁾

| INPUT RIN | OUTPUT ROUT |
|--------------|----------------|
| L | H |
| H | L |
| Open | H |

(1) H = high level, L = low level
 Open = input disconnected or
 connected driver off

LOGIC DIAGRAM (POSITIVE LOGIC)



Absolute Maximum Ratings⁽¹⁾

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

| | | MIN | MAX | UNIT | |
|------------------|---|------------|-------|-----------------------|------|
| V _{CC} | Supply voltage range ⁽²⁾ | –0.3 | 6 | V | |
| V+ | Positive-output supply voltage range ⁽²⁾ | –0.3 | 7 | V | |
| V– | Negative-output supply voltage range ⁽²⁾ | 0.3 | –7 | V | |
| V+ – V– | Supply voltage difference ⁽²⁾ | | 13 | V | |
| V _I | Input voltage range | Drivers | –0.3 | 6 | V |
| | | Receivers | –25 | 25 | |
| V _O | Output voltage range | Drivers | –13.2 | 13.2 | V |
| | | Receivers | –0.3 | V _{CC} + 0.3 | |
| θ _{JA} | Package thermal impedance ⁽³⁾⁽⁴⁾ | D package | | 82 | °C/W |
| | | DB package | | 46 | |
| | | DW package | | 57 | |
| | | PW package | | 108 | |
| T _J | Operating virtual junction temperature | | 150 | °C | |
| T _{stg} | Storage temperature range | –65 | 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.
- All voltages are with respect to network GND.
- 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)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can affect reliability.
- The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions⁽¹⁾

See [Figure 4](#)

| | | MIN | NOM | MAX | UNIT |
|---|-------------------------|-------------------------|-----|-----|------|
| Supply voltage | V _{CC} = 3.3 V | 3 | 3.3 | 3.6 | V |
| | V _{CC} = 5 V | 4.5 | 5 | 5.5 | |
| V _{IH} Driver high-level input voltage | DIN | V _{CC} = 3.3 V | 2 | | V |
| | | V _{CC} = 5 V | 2.4 | | |
| V _{IL} Driver low-level input voltage | DIN | | | 0.8 | V |
| V _I | Driver input voltage | | 0 | 5.5 | V |
| | Receiver input voltage | –25 | | 25 | |
| T _A Operating free-air temperature | TRSF3232C | 0 | | 70 | °C |
| | TRSF3232I | –40 | | 85 | |

- Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

Electrical Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 4](#))

| PARAMETER | TEST CONDITIONS | MIN | TYP ⁽²⁾ | MAX | UNIT |
|--------------------------------|---|-----|--------------------|-----|------|
| I _{CC} Supply current | No load, V _{CC} = 3.3 V or 5 V | | 0.3 | 1 | mA |

- Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.
- All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

TRSF3232

3-V TO 5.5-V MULTICHANNEL RS-232 COMPATIBLE LINE DRIVER/RECEIVER

SLLS858–AUGUST 2007

DRIVER SECTION

Electrical Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 4](#))

| PARAMETER | | TEST CONDITIONS | | MIN | TYP ⁽²⁾ | MAX | UNIT |
|-----------------|---|---------------------------------------|-------------------------|-----|--------------------|-----|------|
| V _{OH} | High-level output voltage | DOUT at R _L = 3 kΩ to GND, | DIN = GND | 5 | 5.4 | | V |
| V _{OL} | Low-level output voltage | DOUT at R _L = 3 kΩ to GND, | DIN = V _{CC} | –5 | –5.4 | | V |
| I _{IH} | High-level input current | V _I = V _{CC} | | | ±0.01 | ±1 | μA |
| I _{IL} | Low-level input current | V _I at GND | | | ±0.01 | ±1 | μA |
| I _{OS} | Short-circuit output current ⁽³⁾ | V _O = 0 V | V _{CC} = 3.6 V | | ±35 | ±60 | mA |
| | | | V _{CC} = 5.5 V | | ±35 | ±90 | |
| r _o | Output resistance | V _{CC} , V+, and V– = 0 V, | V _O = ±2 V | 300 | 10M | | Ω |

(1) Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

(2) All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 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.

Switching Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 4](#))

| PARAMETER | | TEST CONDITIONS | | MIN | TYP ⁽²⁾ | MAX | UNIT |
|--|--|-------------------------------------|--|------|--------------------|--------|------|
| Maximum data rate (see Figure 1) | R _L = 3 kΩ, One DOUT switching | C _L = 1000 pF | | 250 | | kbit/s | |
| | | C _L = 250 pF, | V _{CC} = 3 V to 4.5 V | 1000 | | | |
| | | C _L = 1000 pF, | V _{CC} = 4.5 V to 5.5 V | 1000 | | | |
| t _{sk(p)} | Pulse skew ⁽³⁾ | C _L = 150 pF to 2500 pF, | R _L = 3 kΩ to 7 kΩ, See Figure 2 | 300 | | | ns |
| SR(tr) | Slew rate, transition region (see Figure 1) | R _L = 3 kΩ to 7 kΩ, | C _L = 150 pF to 1000 pF, V _{CC} = 3.3 V | 18 | | 150 | V/μs |

(1) Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

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

(3) Pulse skew is defined as |t_{PLH} – t_{PHL}| of each channel of the same device.

RECEIVER SECTION

Electrical Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 4](#))

| PARAMETER | | TEST CONDITIONS | MIN | TYP ⁽²⁾ | MAX | UNIT |
|------------------|---|--------------------------------|-----------------------|-----------------------|-----|------|
| V _{OH} | High-level output voltage | I _{OH} = -1 mA | V _{CC} - 0.6 | V _{CC} - 0.1 | | V |
| V _{OL} | Low-level output voltage | I _{OL} = 1.6 mA | | | 0.4 | V |
| V _{IT+} | Positive-going input threshold voltage | V _{CC} = 3.3 V | | 1.5 | 2.4 | V |
| | | V _{CC} = 5 V | | 1.8 | 2.4 | |
| V _{IT-} | Negative-going input threshold voltage | V _{CC} = 3.3 V | 0.6 | 1.2 | | V |
| | | V _{CC} = 5 V | 0.8 | 1.5 | | |
| V _{hys} | Input hysteresis (V _{IT+} - V _{IT-}) | | | 0.3 | | V |
| r _i | Input resistance | V _I = ±3 V to ±25 V | 3 | 5 | 7 | kΩ |

(1) Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

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

Switching Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 3](#))

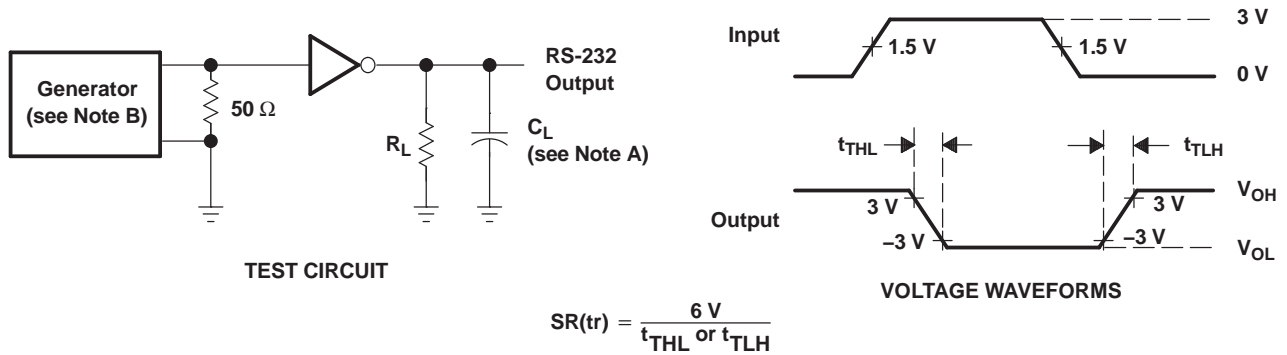
| PARAMETER | | TEST CONDITIONS | TYP ⁽²⁾ | UNIT |
|--------------------|---|-------------------------|--------------------|------|
| t _{PLH} | Propagation delay time, low- to high-level output | C _L = 150 pF | 300 | ns |
| t _{PHL} | Propagation delay time, high- to low-level output | C _L = 150 pF | 300 | ns |
| t _{sk(p)} | Pulse skew ⁽³⁾ | | 300 | ns |

(1) Test conditions are C1–C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2–C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

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

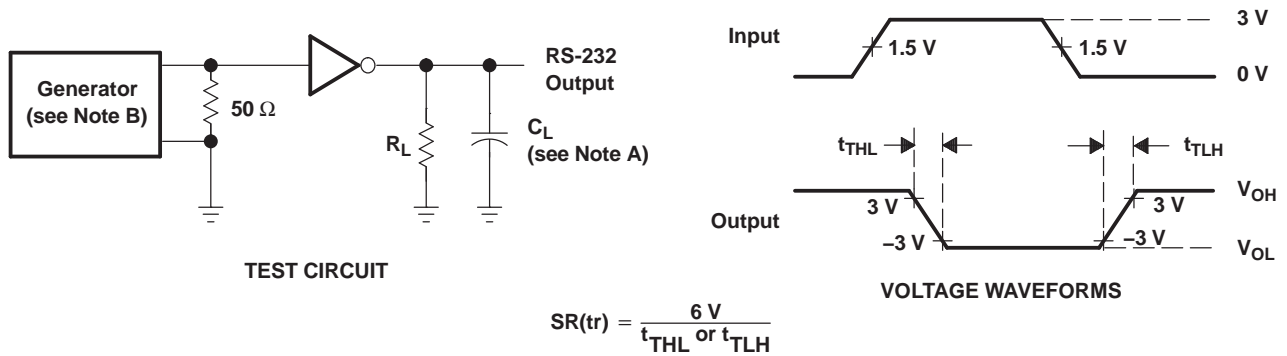
(3) Pulse skew is defined as |t_{PLH} - t_{PHL}| of each channel of the same device.

PARAMETER MEASUREMENT INFORMATION



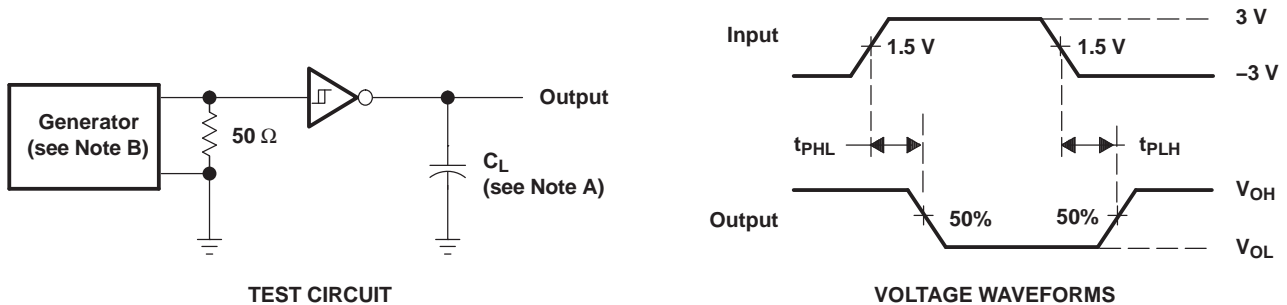
- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbit/s, $Z_O = 50\ \Omega$, 50% duty cycle, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

Figure 1. Driver Slew Rate



- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbit/s, $Z_O = 50\ \Omega$, 50% duty cycle, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

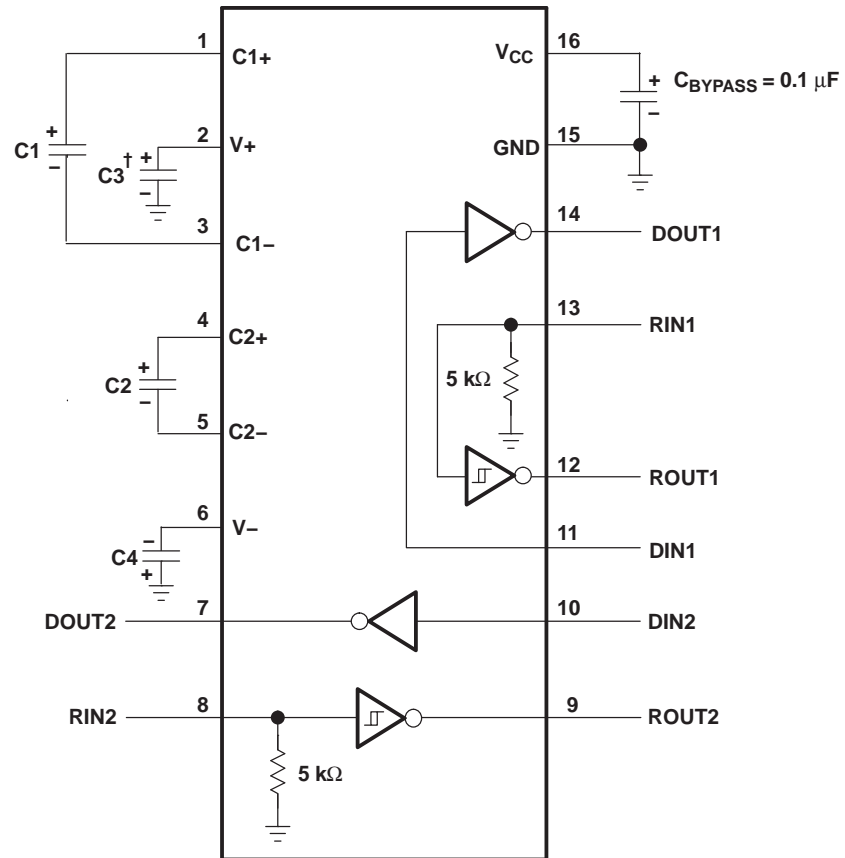
Figure 2. Driver Pulse Skew



- 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. Receiver Propagation Delay Times

APPLICATION INFORMATION



† C3 can be connected to V_{CC} or GND.

V_{CC} vs CAPACITOR VALUES

| V_{CC} | C1 | C2, C3, C4 |
|---------------|----------|------------|
| 3.3 V ± 0.3 V | 0.1 μF | 0.1 μF |
| 5 V ± 0.5 V | 0.047 μF | 0.33 μF |
| 3 V to 5.5 V | 0.1 μF | 0.47 μF |

Figure 4. Typical Operating Circuit and Capacitor Values

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| TRSF3232CD | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDB | ACTIVE | SSOP | DB | 16 | 80 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDBG4 | ACTIVE | SSOP | DB | 16 | 80 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDBR | ACTIVE | SSOP | DB | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDBRG4 | ACTIVE | SSOP | DB | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDG4 | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDR | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDRG4 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDW | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDWG4 | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDWR | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CDWRG4 | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CPW | ACTIVE | TSSOP | PW | 16 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CPWG4 | ACTIVE | TSSOP | PW | 16 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CPWR | ACTIVE | TSSOP | PW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232CPWRG4 | ACTIVE | TSSOP | PW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232ID | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDB | ACTIVE | SSOP | DB | 16 | 80 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDBG4 | ACTIVE | SSOP | DB | 16 | 80 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDBR | ACTIVE | SSOP | DB | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDBRG4 | ACTIVE | SSOP | DB | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDG4 | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDR | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDRG4 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDW | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| TRSF3232IDWG4 | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDWR | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IDWRG4 | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IPW | ACTIVE | TSSOP | PW | 16 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IPWG4 | ACTIVE | TSSOP | PW | 16 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IPWR | ACTIVE | TSSOP | PW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TRSF3232IPWRG4 | ACTIVE | TSSOP | PW | 16 | 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.

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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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TRSF3232CDBR | SSOP | DB | 16 | 2000 | 330.0 | 16.4 | 8.2 | 6.6 | 2.5 | 12.0 | 16.0 | Q1 |
| TRSF3232CDR | SOIC | D | 16 | 2500 | 330.0 | 16.4 | 6.5 | 10.3 | 2.1 | 8.0 | 16.0 | Q1 |
| TRSF3232CDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| TRSF3232CPWR | TSSOP | PW | 16 | 2000 | 330.0 | 12.4 | 7.0 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| TRSF3232IDBR | SSOP | DB | 16 | 2000 | 330.0 | 16.4 | 8.2 | 6.6 | 2.5 | 12.0 | 16.0 | Q1 |
| TRSF3232IDR | SOIC | D | 16 | 2500 | 330.0 | 16.4 | 6.5 | 10.3 | 2.1 | 8.0 | 16.0 | Q1 |
| TRSF3232IDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| TRSF3232IPWR | TSSOP | PW | 16 | 2000 | 330.0 | 12.4 | 7.0 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TRSF3232CDBR | SSOP | DB | 16 | 2000 | 346.0 | 346.0 | 33.0 |
| TRSF3232CDR | SOIC | D | 16 | 2500 | 333.2 | 345.9 | 28.6 |
| TRSF3232CDWR | SOIC | DW | 16 | 2000 | 346.0 | 346.0 | 33.0 |
| TRSF3232CPWR | TSSOP | PW | 16 | 2000 | 346.0 | 346.0 | 29.0 |
| TRSF3232IDBR | SSOP | DB | 16 | 2000 | 346.0 | 346.0 | 33.0 |
| TRSF3232IDR | SOIC | D | 16 | 2500 | 333.2 | 345.9 | 28.6 |
| TRSF3232IDWR | SOIC | DW | 16 | 2000 | 346.0 | 346.0 | 33.0 |
| TRSF3232IPWR | TSSOP | PW | 16 | 2000 | 346.0 | 346.0 | 29.0 |

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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-153

D (R-PDSO-G16)

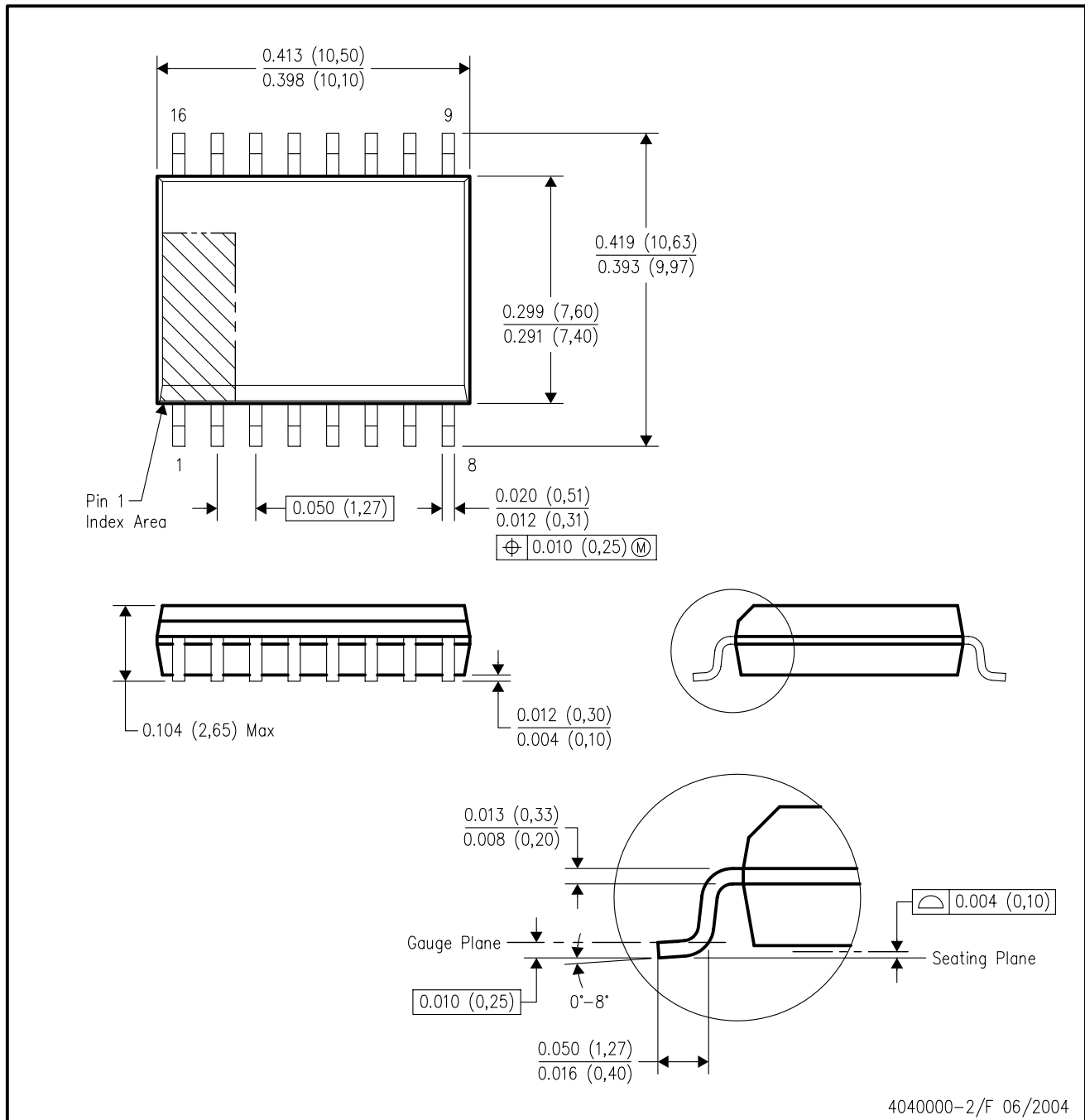
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - 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 .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AC.

DW (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



4040000-2/F 06/2004

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - 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 AA.

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