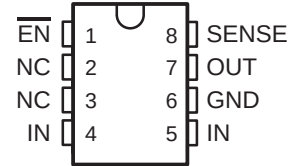


# TPS7415, TPS7418, TPS7425, TPS7430, TPS7433 FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR 200-mA LOW-DROPOUT VOLTAGE REGULATORS

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- Fast Transient Response Using Small Output Capacitor (10  $\mu$ F)
- 200-mA Low-Dropout Voltage Regulator
- Available in 1.5-V, 1.8-V, 2.5-V, 3-V and 3.3-V
- Dropout Voltage Down to 170 mV at 200 mA (TPS7433)
- 3% Tolerance Over Specified Conditions
- 8-Pin SOIC Package
- Thermal Shutdown Protection

D PACKAGE  
(TOP VIEW)



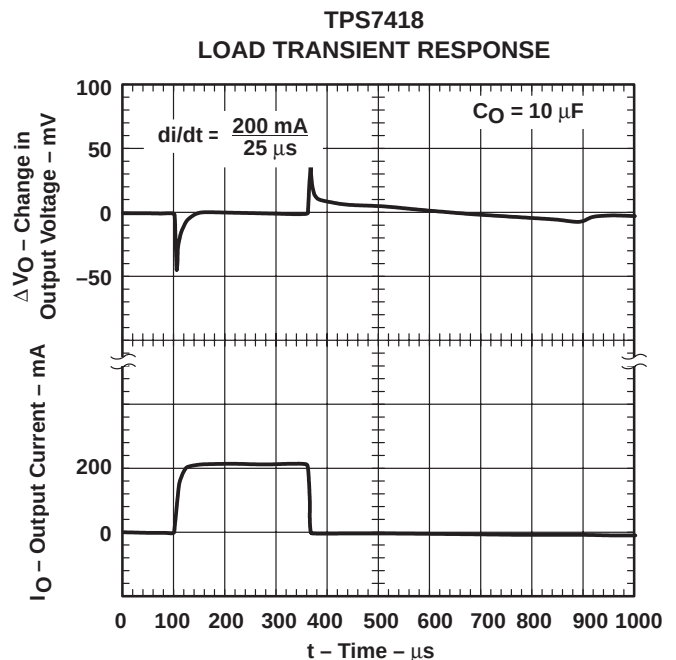
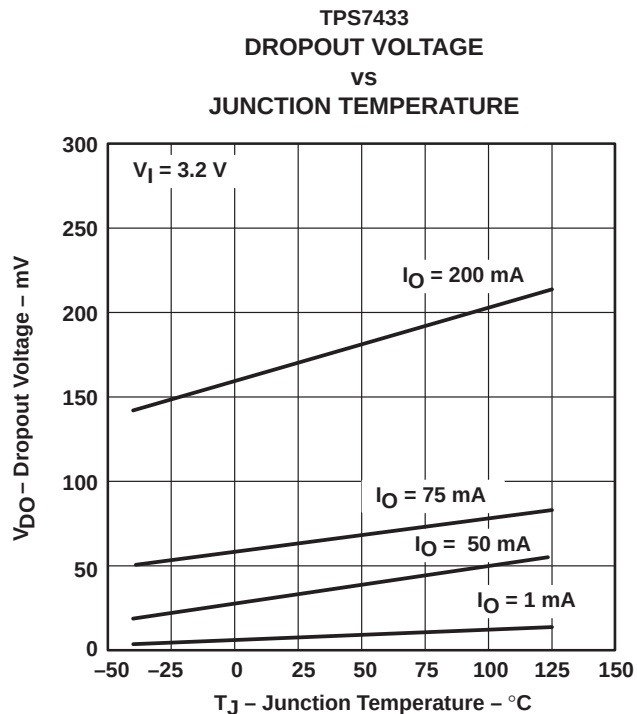
NC – No internal connection

## description

This device is designed to have a fast transient response and be stable with 1- $\mu$ F capacitors. This combination provides high performance at a reasonable cost.

Because the PMOS device behaves as a low-value resistor, the dropout voltage is very low (typically 170 mV at an output current of 200-mA for the TPS7433). This LDO family also features a sleep mode; applying a TTL high signal to  $\overline{\text{EN}}$  (enable) shuts down the regulator, reducing the quiescent current to less than 1  $\mu$ A at  $T_J = 25^\circ\text{C}$ .

The TPS74xx is offered in 1.5-V, 1.8-V, 2.5-V, 3-V, and 3.3-V. Output voltage tolerance is specified as a maximum of 3% over line, load, and temperature ranges. The TPS74xx family is available in 8 pin SOIC package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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TPS7415, TPS7418, TPS7425, TPS7430, TPS7433

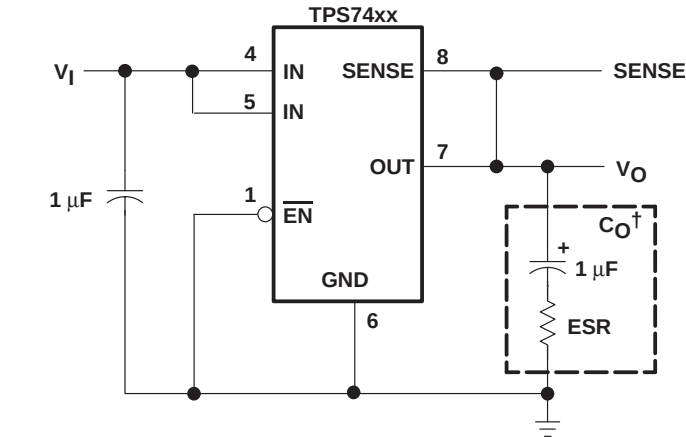
FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR

200-mA LOW-DROPOUT VOLTAGE REGULATORS

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| AVAILABLE OPTIONS |                    |                  |
|-------------------|--------------------|------------------|
| T <sub>J</sub>    | OUTPUT VOLTAGE (V) | PACKAGED DEVICES |
|                   | TYP                | SOIC (D)         |
| –40°C to 125°C    | 3.3                | TPS7433D         |
|                   | 3                  | TPS7430D         |
|                   | 2.5                | TPS7425D         |
|                   | 1.8                | TPS7418D         |
|                   | 1.5                | TPS7415D         |

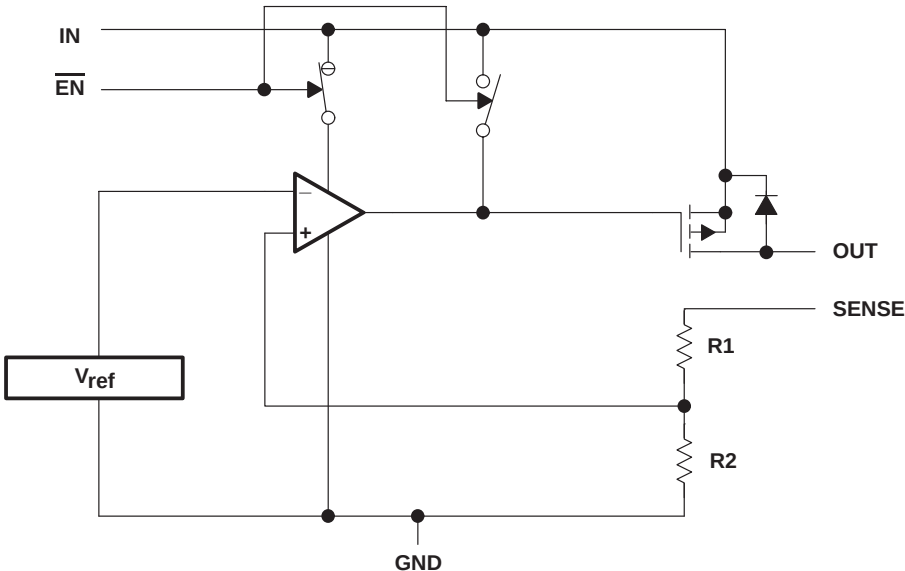
The D package is available taped and reeled. Add an R suffix to the device type (e.g., TPS7433DR).



† See application information section for capacitor selection details.

Figure 1. Typical Application Configuration

functional block diagram



**TPS7415, TPS7418, TPS7425, TPS7430, TPS7433**  
**FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR**  
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**Terminal Functions**

| TERMINAL<br>NAME       | NO.  | I/O | DESCRIPTION              |
|------------------------|------|-----|--------------------------|
| $\overline{\text{EN}}$ | 1    | I   | Enable input             |
| GND                    | 6    |     | Regulator ground         |
| IN                     | 4, 5 | I   | Input voltage            |
| NC                     | 2, 3 |     | Not connected            |
| OUT                    | 7    | O   | Regulated output voltage |
| SENSE                  | 8    | I   | Sense                    |

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>**

|                                                     |                               |
|-----------------------------------------------------|-------------------------------|
| Input voltage range <sup>‡</sup> , $V_I$            | –0.3 V to 8 V                 |
| Voltage range at $\overline{\text{EN}}$             | –0.3 V to $V_I + 0.3$ V       |
| Peak output current                                 | Internally limited            |
| Continuous total power dissipation                  | See dissipation rating tables |
| Operating virtual junction temperature range, $T_J$ | –40°C to 125°C                |
| Storage temperature range, $T_{\text{stg}}$         | –65°C to 150°C                |

<sup>†</sup> 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.

<sup>‡</sup> All voltage values are with respect to network terminal ground.

**DISSIPATION RATING TABLE 1 – FREE-AIR TEMPERATURES**

| PACKAGE | AIR FLOW<br>(CFM) | $T_A < 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING | $T_A = 85^\circ\text{C}$<br>POWER RATING |
|---------|-------------------|------------------------------------------|---------------------------------------------------|------------------------------------------|------------------------------------------|
| D       | 0                 | 568 mW                                   | 5.68 mW/°C                                        | 312 mW                                   | 227 mW                                   |
|         | 250               | 904 mW                                   | 9.04 mW/°C                                        | 497 mW                                   | 361 mW                                   |

**recommended operating conditions**

|                                                            | MIN | MAX | UNIT |
|------------------------------------------------------------|-----|-----|------|
| Input voltage, $V_I$ <sup>§</sup>                          | 2.5 | 7   | V    |
| Output current, $I_O$ (see Note 1)                         | 0   | 200 | mA   |
| Operating virtual junction temperature, $T_J$ (see Note 1) | –40 | 125 | °C   |

<sup>§</sup> To calculate the minimum input voltage for your maximum output current, use the following equation:  $V_{I(\text{min})} = V_{O(\text{max})} + V_{\text{DO}(\text{max load})}$ .

NOTE 1: Continuous current and operating junction temperature are limited by internal protection circuitry, but it is not recommended that the device operate under conditions beyond those specified in this table for extended periods of time.



**TPS7415, TPS7418, TPS7425, TPS7430, TPS7433**  
**FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR**  
**200-mA LOW-DROPOUT VOLTAGE REGULATORS**

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**electrical characteristics over recommended operating free-air temperature range,**  
 $V_i = V_{O(\text{typ})} + 1 \text{ V}$ ,  $I_O = 1 \text{ mA}$ ,  $\overline{\text{EN}} = 0 \text{ V}$ ,  $C_O = 1 \mu\text{F}$  (unless otherwise noted)

| PARAMETER                                                                                |                              | TEST CONDITIONS                                                     |                                 | TEST CONDITIONS                 | MIN     | TYP   | MAX | UNIT  |
|------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------|---------------------------------|---------------------------------|---------|-------|-----|-------|
| Output voltage (10 μA to 200 mA load)<br>(see Note 2)                                    | TPS7415                      | 2.5 V < V <sub>I</sub> < 7 V                                        |                                 | T <sub>J</sub> = 25°C           | 1.5     |       |     | V     |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 1.455   | 1.545 |     |       |
|                                                                                          | TPS7418                      | 2.8 V < V <sub>I</sub> < 7 V                                        |                                 | T <sub>J</sub> = 25°C           | 1.8     |       |     |       |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 1.746   | 1.854 |     |       |
|                                                                                          | TPS7425                      | 3.5 V < V <sub>I</sub> < 7 V                                        |                                 | T <sub>J</sub> = 25°C           | 2.5     |       |     |       |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 2.425   | 2.575 |     |       |
|                                                                                          | TPS7430                      | 4.0 V < V <sub>I</sub> < 7 V                                        |                                 | T <sub>J</sub> = 25°C           | 3.0     |       |     |       |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 2.910   | 3.090 |     |       |
| TPS7433                                                                                  | 4.3 V < V <sub>I</sub> < 7 V |                                                                     | T <sub>J</sub> = 25°C           | 3.3                             |         |       |     |       |
|                                                                                          |                              |                                                                     | T <sub>J</sub> = −40°C to 125°C | 3.201                           | 3.399   |       |     |       |
| Quiescent current (GND current) (See Note 2)                                             |                              | I <sub>O</sub> = 1 mA, EN = 0 V                                     |                                 | T <sub>J</sub> = 25°C           | 80      |       |     | μA    |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 115     |       |     |       |
|                                                                                          |                              | I <sub>O</sub> = 100 mA, EN = 0 V                                   |                                 | T <sub>J</sub> = 25°C           | 550     |       |     | μA    |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 850     |       |     |       |
|                                                                                          |                              | I <sub>O</sub> = 200 mA, EN = 0 V                                   |                                 | T <sub>J</sub> = 25°C           | 1300    |       |     | μA    |
|                                                                                          |                              |                                                                     |                                 | T <sub>J</sub> = −40°C to 125°C | 1500    |       |     |       |
| Output voltage line regulation (ΔV <sub>O</sub> /V <sub>O</sub> )<br>(see Notes 2 and 3) |                              | V <sub>O</sub> + 1 V < V <sub>I</sub> ≤ 7 V, T <sub>J</sub> = 25°C  |                                 |                                 | 0.06    |       |     | %/V   |
| Load regulation                                                                          |                              |                                                                     |                                 |                                 | 5       |       |     | mV    |
| Output noise voltage                                                                     |                              | BW = 300 Hz to 50 kHz, C <sub>O</sub> = 1 μF, T <sub>J</sub> = 25°C |                                 |                                 | 190     |       |     | μVrms |
| Output current Limit                                                                     |                              | V <sub>O</sub> = 0 V                                                |                                 |                                 | 500 750 |       |     | mA    |
| Thermal shutdown junction temperature                                                    |                              |                                                                     |                                 |                                 | 150     |       |     | °C    |
| Standby current                                                                          |                              | 2.5 V < V <sub>I</sub> < 7 V, T <sub>J</sub> = 25°C                 | EN = V <sub>I</sub>             |                                 | 1       |       |     | μA    |
|                                                                                          |                              |                                                                     |                                 |                                 |         |       |     |       |
|                                                                                          |                              | 2.5 V < V <sub>I</sub> < 7 V, T <sub>J</sub> = −40°C to 125°C       | EN = V <sub>I</sub>             |                                 | 3       |       |     | μA    |
| High level enable input voltage                                                          |                              |                                                                     |                                 |                                 | 2       |       |     | V     |
| Low level enable input voltage                                                           |                              |                                                                     |                                 |                                 | 0.7     |       |     | V     |
| Input current (EN)                                                                       |                              | EN = 0 V                                                            |                                 |                                 | −1 1    |       |     | μA    |
|                                                                                          |                              | EN = V <sub>I</sub>                                                 |                                 |                                 | −1 1    |       |     |       |
| Power supply ripple rejection (see Note 2)                                               |                              | f = 100 Hz, T <sub>J</sub> = 25°C C <sub>O</sub> = 1 μF,            |                                 |                                 | 55      |       |     | dB    |
| Dropout voltage (see Note 4)                                                             | TPS7430                      | I <sub>O</sub> = 200 mA,                                            | T <sub>J</sub> = 25°C           |                                 | 180     |       |     | mV    |
|                                                                                          |                              | I <sub>O</sub> = 200 mA,                                            | T <sub>J</sub> = −40°C to 125°C |                                 | 350     |       |     |       |
|                                                                                          | TPS7433                      | I <sub>O</sub> = 200 mA,                                            | T <sub>J</sub> = 25°C           |                                 | 170     |       |     |       |
|                                                                                          |                              | I <sub>O</sub> = 200 mA,                                            | T <sub>J</sub> = −40°C to 125°C |                                 | 315     |       |     |       |

NOTES: 2. Minimum  $I_N$  operating voltage is 2.5 V or  $V_{O(\text{typ})} + 1 \text{ V}$ , whichever is greater. Maximum  $I_N$  voltage 7 V.

3. If  $V_O = 1.5 \text{ V}$  then  $V_{\text{imax}} = 7 \text{ V}$ ,  $V_{\text{imin}} = 2.5 \text{ V}$ .

4.  $I_N$  voltage equals  $V_{O(\text{Typ})} - 100 \text{ mV}$ ; TPS7430 and TPS7433 dropout limited by input voltage range limitations (i.e., TPS7430 input voltage needs to drop to 2.9 V for purpose of this test).

$$\text{Line Reg. (mV)} = (\%/V) \times \frac{V_O(V_{\text{imax}} - 2.5 \text{ V})}{100} \times 1000$$

If  $V_O \geq 2.5 \text{ V}$  then  $V_{\text{imax}} = 7 \text{ V}$ ,  $V_{\text{imin}} = V_O + 1 \text{ V}$ :

$$\text{Line Reg. (mV)} = (\%/V) \times \frac{V_O(V_{\text{imax}} - (V_O + 1 \text{ V}))}{100} \times 1000$$

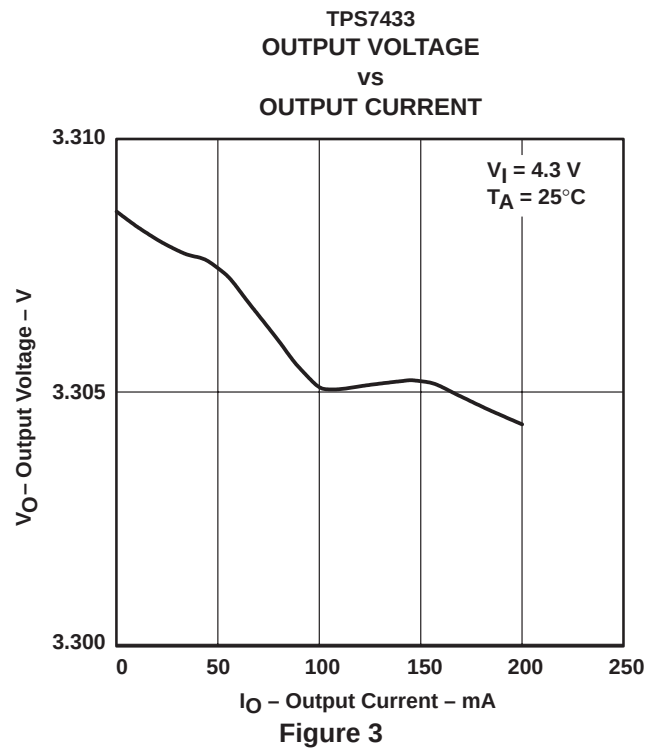
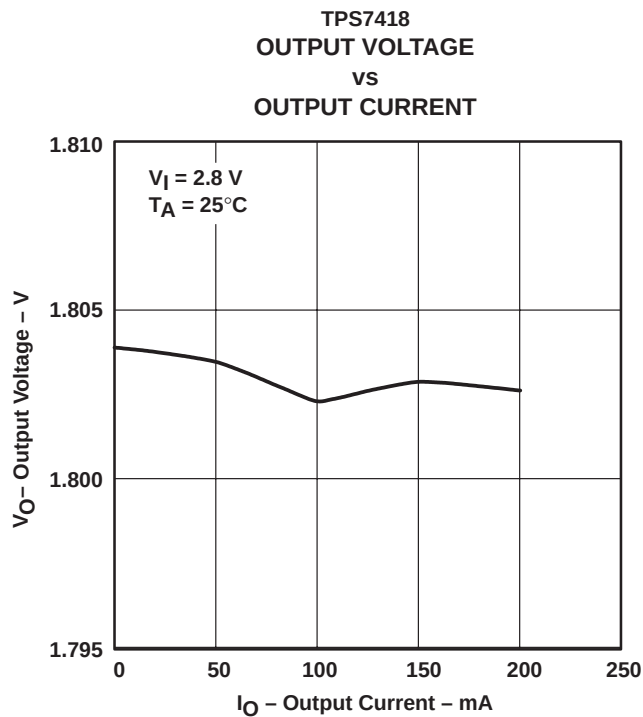


**TPS7415, TPS7418, TPS7425, TPS7430, TPS7433**  
**FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR**  
**200-mA LOW-DROPOUT VOLTAGE REGULATORS**  
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**Table of Graphs**

|          |                                                |                         | FIGURE  |
|----------|------------------------------------------------|-------------------------|---------|
| $V_O$    | Output voltage                                 | vs Output current       | 2, 3, 4 |
|          |                                                | vs Junction temperature | 5, 6    |
|          | Ground current                                 | vs Junction temperature | 7, 8    |
|          | Power supply ripple rejection                  | vs Frequency            | 12      |
|          | Output noise                                   | vs Frequency            | 9       |
| $Z_O$    | Output impedance                               | vs Frequency            | 10      |
| $V_{DO}$ | Dropout voltage                                | vs Junction temperature | 11      |
|          | Line transient response                        |                         | 13, 15  |
|          | Load transient response                        |                         | 14, 16  |
|          | Output voltage                                 | vs Time                 | 17      |
|          | (Stability) Equivalent series resistance (ESR) | vs Output current       | 19      |

**TYPICAL CHARACTERISTICS**



**TPS7415, TPS7418, TPS7425, TPS7430, TPS7433**  
**FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR**  
**200-mA LOW-DROPOUT VOLTAGE REGULATORS**

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**TYPICAL CHARACTERISTICS**

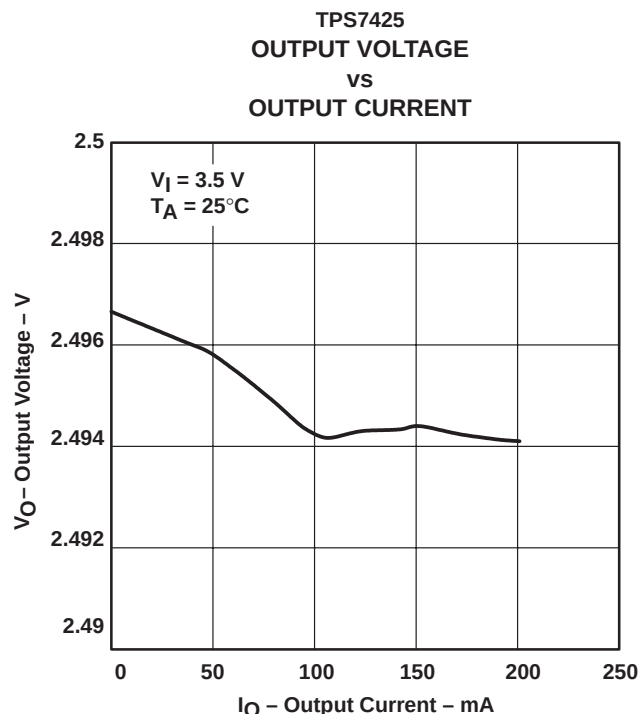


**Figure 4**

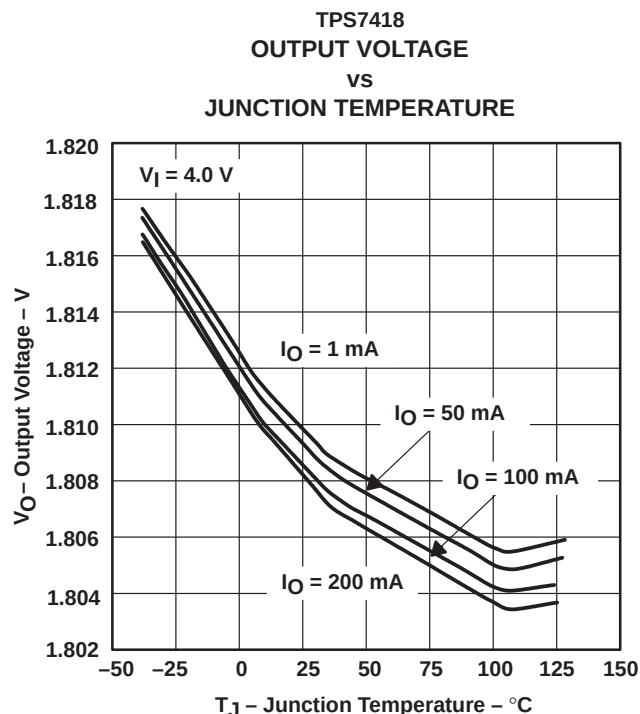


**Figure 5**

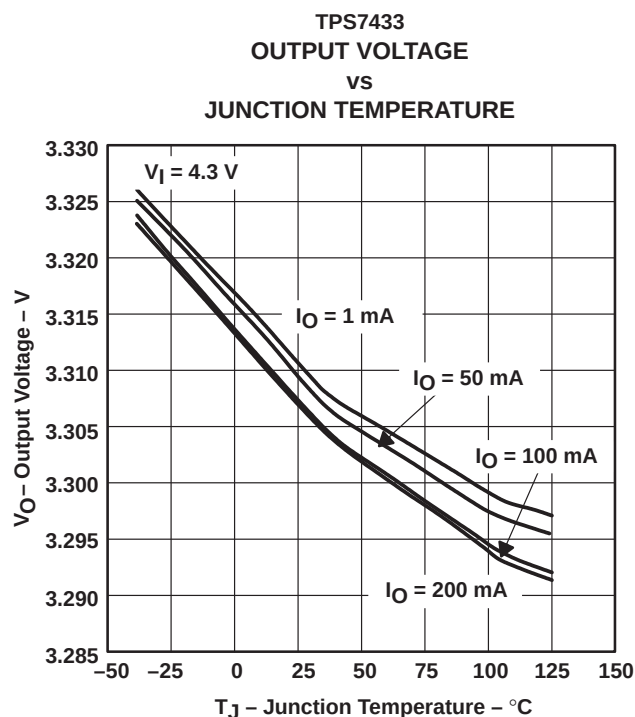


**Figure 6**

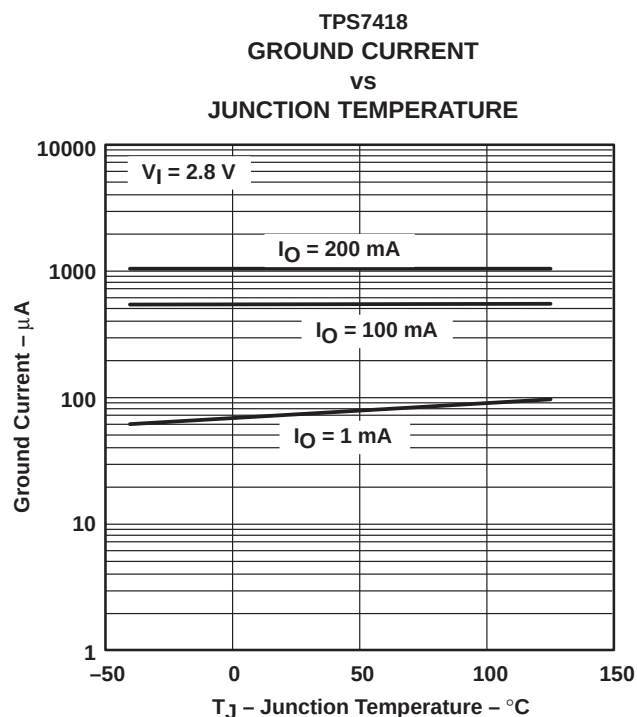


**Figure 7**

**TYPICAL CHARACTERISTICS**

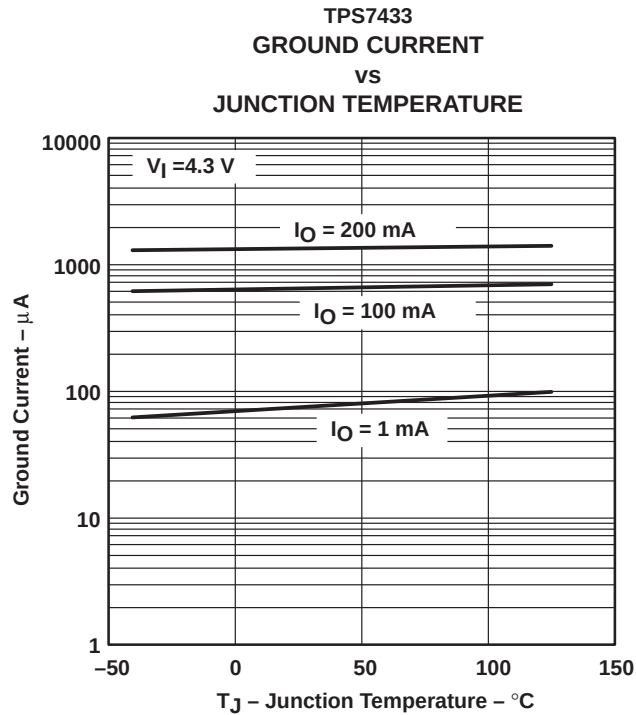


**Figure 8**

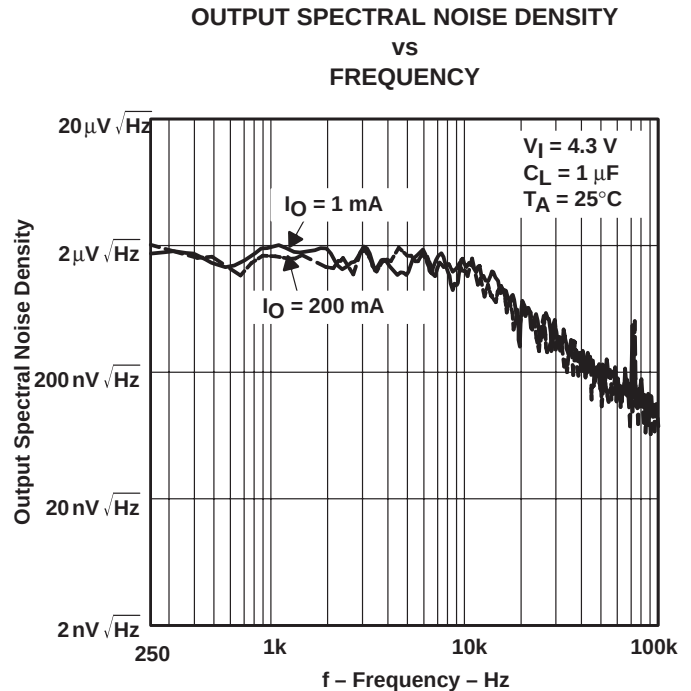


**Figure 9**

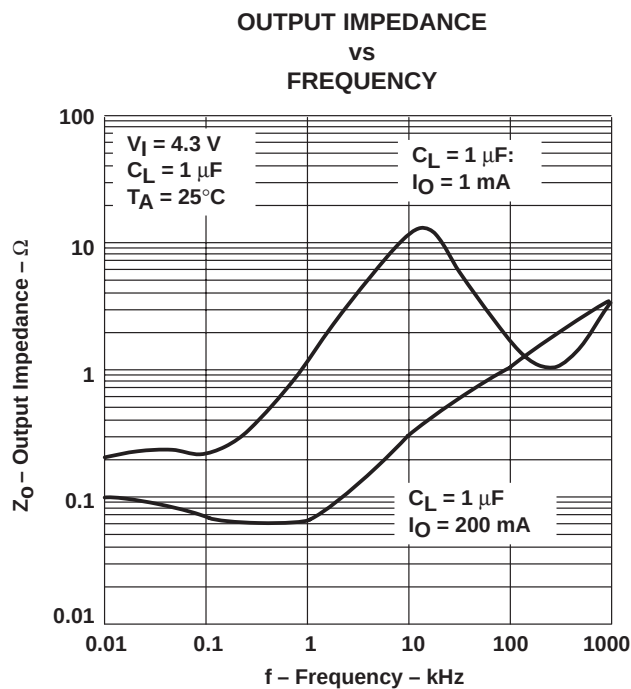


**Figure 10**

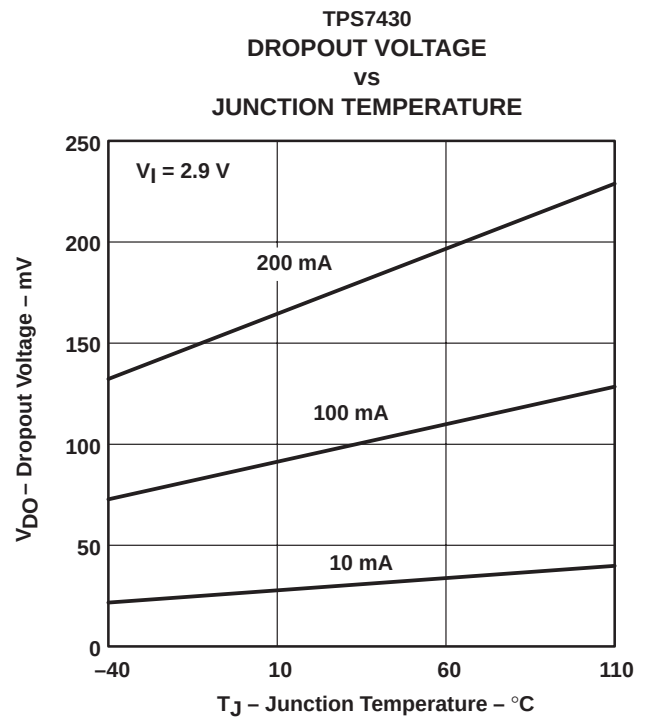


**Figure 11**

TPS7415, TPS7418, TPS7425, TPS7430, TPS7433  
FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR  
200-mA LOW-DROPOUT VOLTAGE REGULATORS

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TYPICAL CHARACTERISTICS

RIPPLE REJECTION  
VS  
FREQUENCY

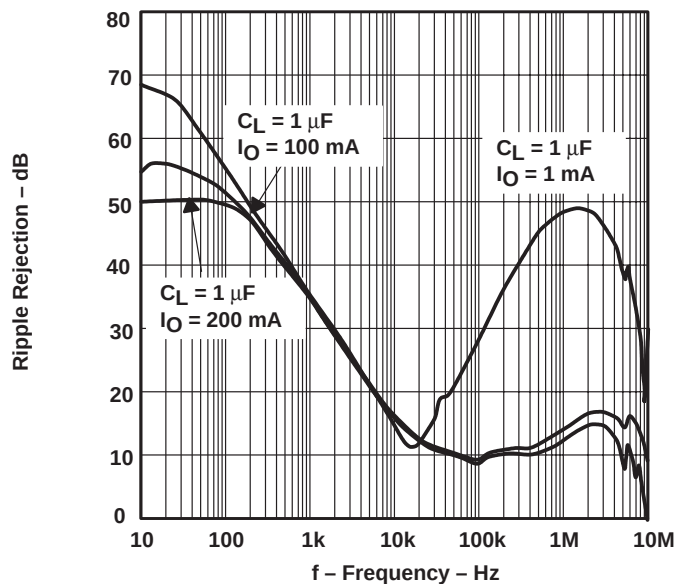


Figure 12

TPS7418  
LINE TRANSIENT RESPONSE

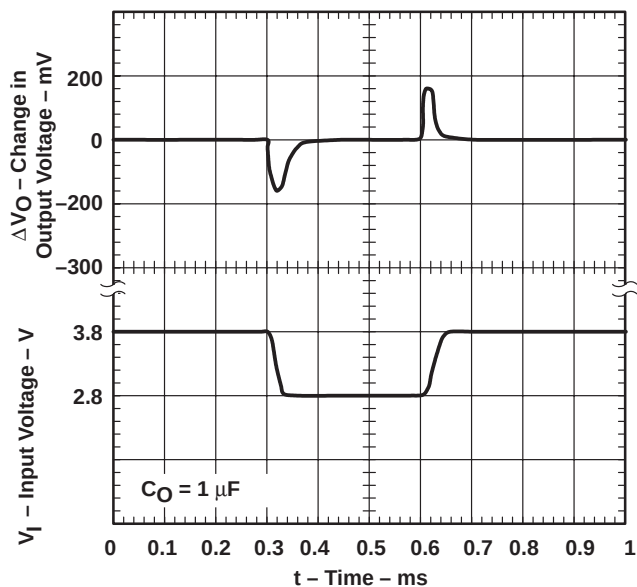


Figure 13

TPS7418  
LOAD TRANSIENT RESPONSE

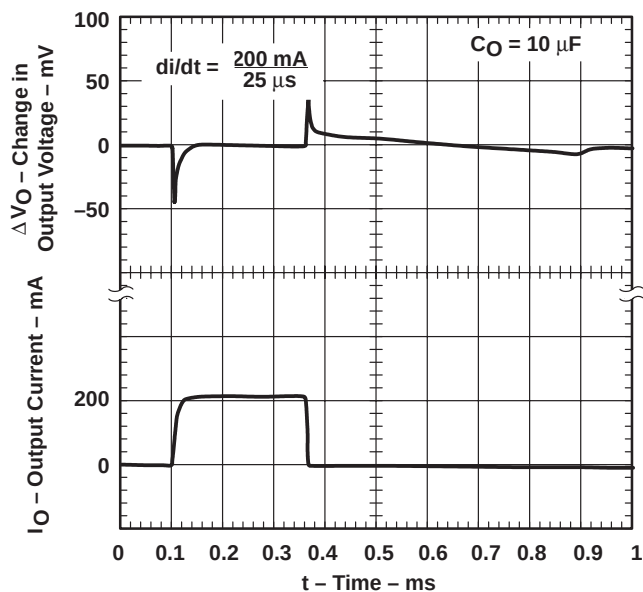


Figure 14

TYPICAL CHARACTERISTICS

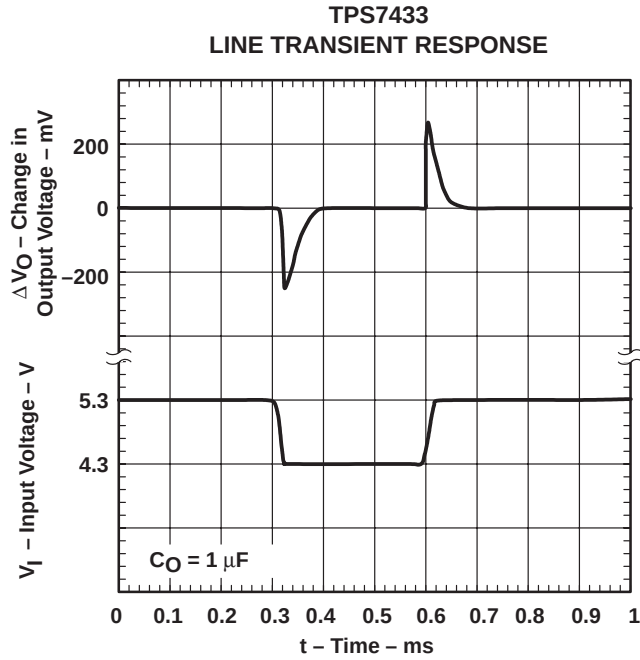


Figure 15

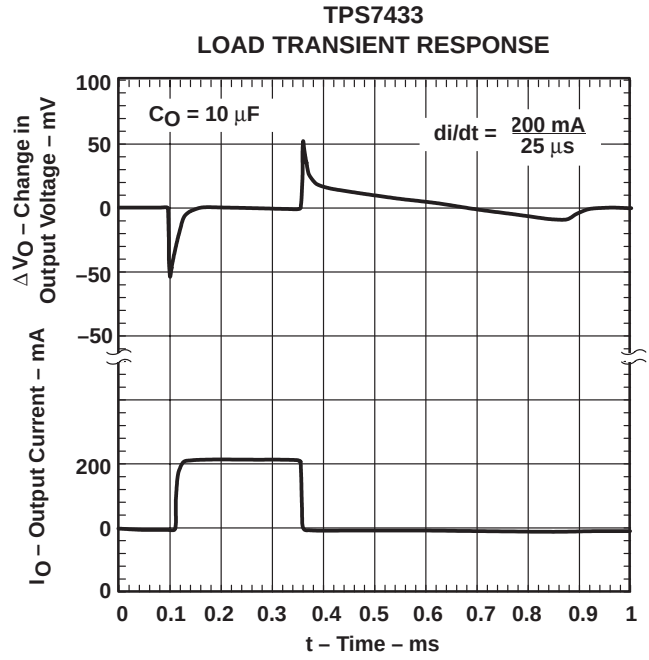


Figure 16

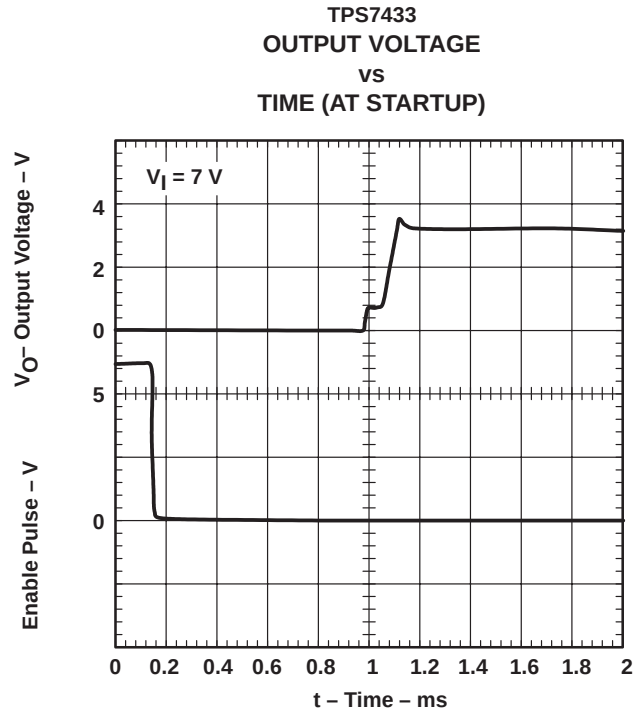


Figure 17

TPS7415, TPS7418, TPS7425, TPS7430, TPS7433  
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TYPICAL CHARACTERISTICS

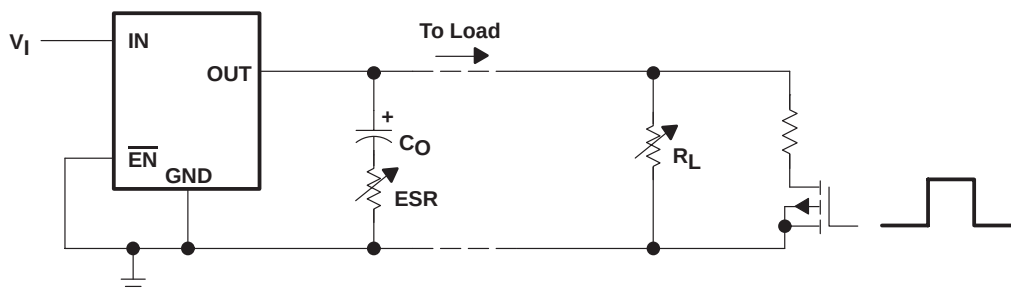


Figure 18. Test Circuit for Typical Regions of Stability (Figure 19)

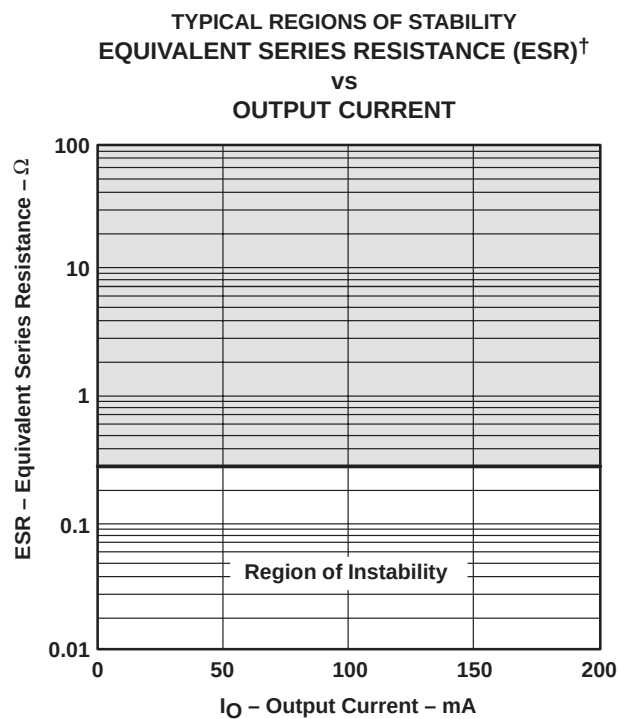


Figure 19

<sup>†</sup> ESR refers to the total series resistance, including the ESR of the capacitor, any series resistance added externally, and PWB trace resistance to  $C_O$ .

## APPLICATION INFORMATION

The TPS74xx family includes five voltage regulators (1.5 V, 1.8 V, 2.5 V, 3 V, and 3.3 V).

### minimum load requirements

The TPS74xx family is stable even at zero load; no minimum load is required for operation.

### SENSE terminal connection

The SENSE terminal must be connected to the regulator output for proper functioning of the regulator. Normally, this connection should be as short as possible; however, the connection can be made near a critical circuit (remote sense) to improve performance at that point. Internally, SENSE connects to a high-impedance wide-bandwidth amplifier through a resistor-divider network and noise pickup feeds through to the regulator output. Routing the SENSE connection to minimize/avoid noise pickup is essential. Adding an RC network between SENSE and OUT to filter noise is not recommended because it can cause the regulator to oscillate.

### external capacitor requirements

An input capacitor is not usually required; however, a ceramic bypass capacitor (1  $\mu\text{F}$  or larger) improves load transient response and noise rejection if the TPS74xx is located more than a few inches from the power supply. A higher-capacitance electrolytic capacitor may be necessary if large (hundreds of milliamps) load transients with fast rise times are anticipated.

Like all low dropout regulators, the TPS74xx requires an output capacitor connected between OUT and GND to stabilize the internal control loop. The minimum recommended capacitance value is 1  $\mu\text{F}$  and the ESR (equivalent series resistance) must be at least 300 m $\Omega$ . Solid tantalum electrolytic and aluminum electrolytic are all suitable, provided they meet the requirements described previously.

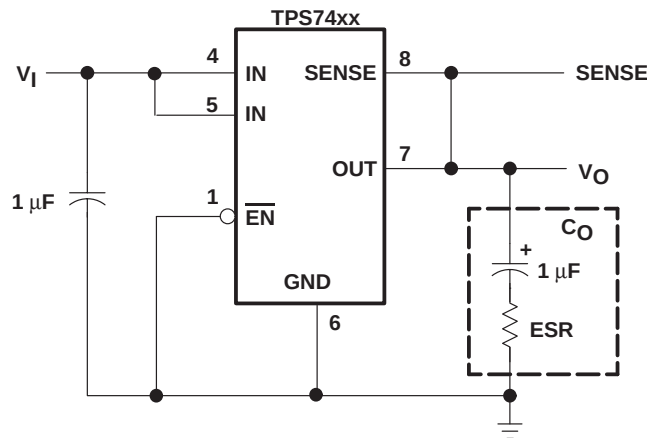


**Figure 20. Typical Application Circuit**

### regulator protection

The TPS74xx PMOS-pass transistor has a built-in back diode that conducts reverse currents when the input voltage drops below the output voltage (e.g., during power down). Current is conducted from the output to the input and is not internally limited. When extended reverse voltage is anticipated, external limiting may be appropriate.

# TPS7415, TPS7418, TPS7425, TPS7430, TPS7433 FAST-TRANSIENT-RESPONSE USING SMALL OUTPUT CAPACITOR 200-mA LOW-DROPOUT VOLTAGE REGULATORS

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## APPLICATION INFORMATION

### regulator protection (continued)

The TPS74xx also features internal current limiting and thermal protection. During normal operation, the TPS74xx limits output current to approximately 500 mA. When current limiting engages, the output voltage scales back linearly until the overcurrent condition ends. While current limiting is designed to prevent gross device failure, care should be taken not to exceed the power dissipation ratings of the package. If the temperature of the device exceeds 150°C(typ), thermal-protection circuitry shuts it down. Once the device has cooled below 130°C (typ), regulator operation resumes.

### power dissipation and junction temperature

Specified regulator operation is assured to a junction temperature of 125°C; the maximum junction temperature should be restricted to 125°C under normal operating conditions. This restriction limits the power dissipation the regulator can handle in any given application. To ensure the junction temperature is within acceptable limits, calculate the maximum allowable dissipation,  $P_{D(max)}$ , and the actual dissipation,  $P_D$ , which must be less than or equal to  $P_{D(max)}$ .

The maximum-power-dissipation limit is determined using the following equation:

$$P_{D(max)} = \frac{T_{Jmax} - T_A}{R_{\theta JA}}$$

Where

$T_{Jmax}$  is the maximum allowable junction temperature.

$R_{\theta JA}$  is the thermal resistance junction-to-ambient for the package, i.e., 172°C/W for the 8-terminal SOIC.

$T_A$  is the ambient temperature.

The regulator dissipation is calculated using:

$$P_D = (V_I - V_O) \times I_O$$

Power dissipation resulting from quiescent current is negligible. Excessive power dissipation will trigger the thermal protection circuit.

## 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="#">TPS7415D</a>  | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7415                |
| TPS7415D.A                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7415                |
| <a href="#">TPS7418D</a>  | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7418                |
| TPS7418D.A                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7418                |
| TPS7418DG4                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7418                |
| <a href="#">TPS7425D</a>  | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7425                |
| TPS7425D.A                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7425                |
| <a href="#">TPS7430D</a>  | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7430                |
| TPS7430D.A                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7430                |
| <a href="#">TPS7433D</a>  | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7433                |
| TPS7433D.A                | Active        | Production           | SOIC (D)   8   | 75   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7433                |
| <a href="#">TPS7433DR</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7433                |
| TPS7433DR.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 7433                |

<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.

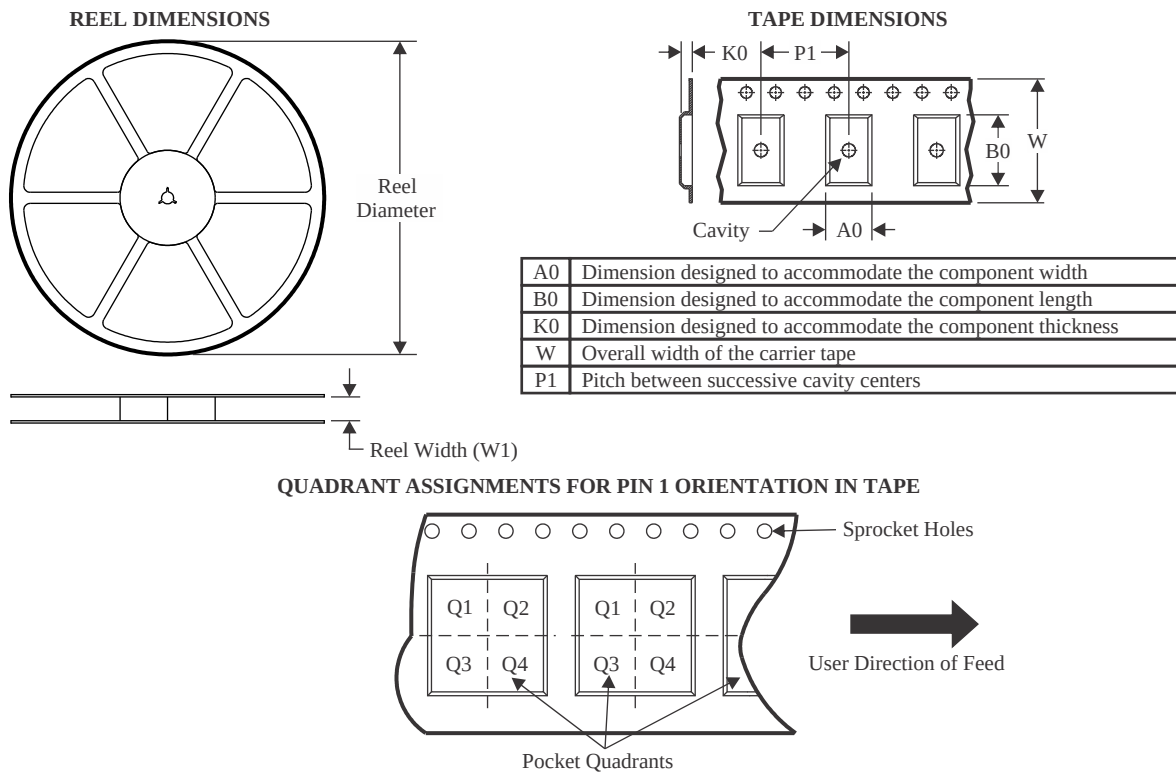
<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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.

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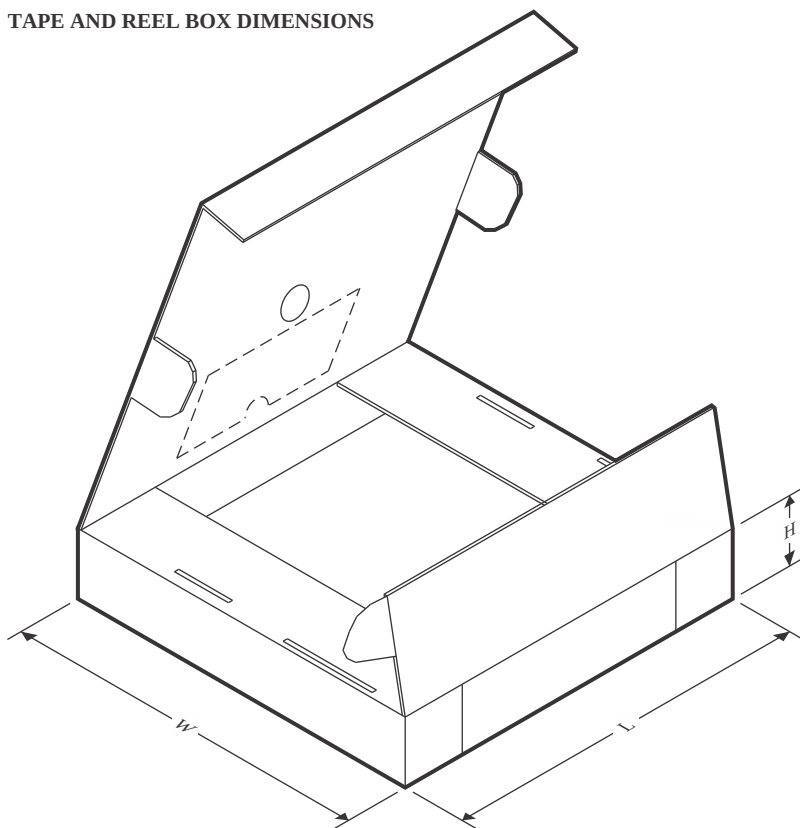
## TAPE AND REEL INFORMATION



\*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 |
|-----------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TPS7433DR | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

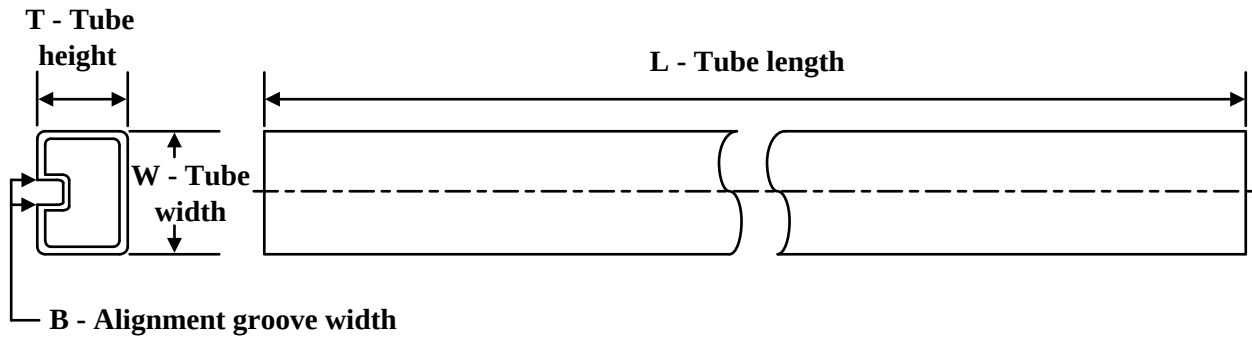
## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device    | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------|--------------|-----------------|------|------|-------------|------------|-------------|
| TPS7433DR | SOIC         | D               | 8    | 2500 | 350.0       | 350.0      | 43.0        |

## TUBE



\*All dimensions are nominal

| Device     | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| TPS7415D   | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7415D.A | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7418D   | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7418D.A | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7418DG4 | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7425D   | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7425D.A | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7430D   | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7430D.A | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7433D   | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |
| TPS7433D.A | D            | SOIC         | 8    | 75  | 505.46 | 6.76   | 3810   | 4      |



## PACKAGE OUTLINE

**SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



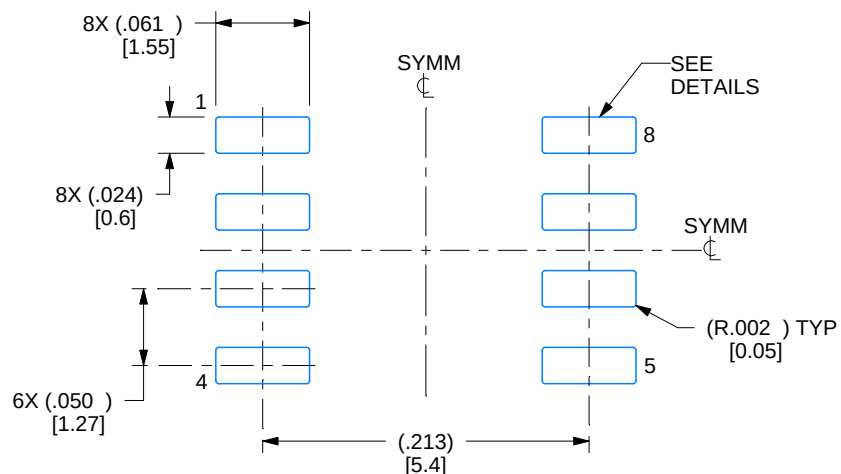
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

# EXAMPLE BOARD LAYOUT

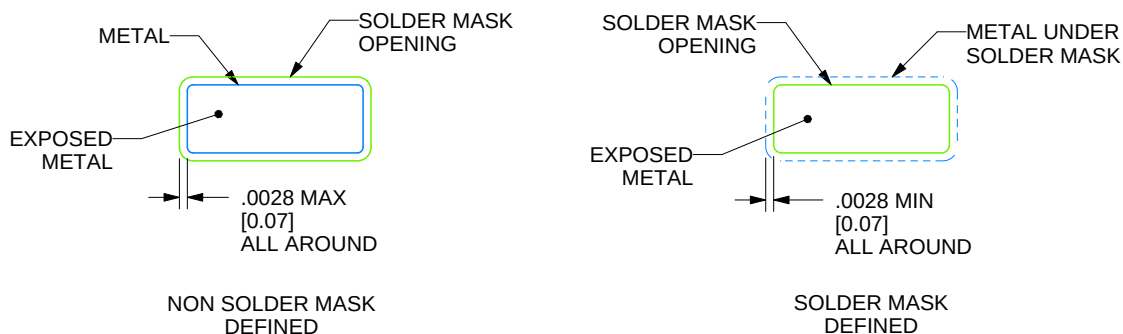
D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:8X



SOLDER MASK DETAILS

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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

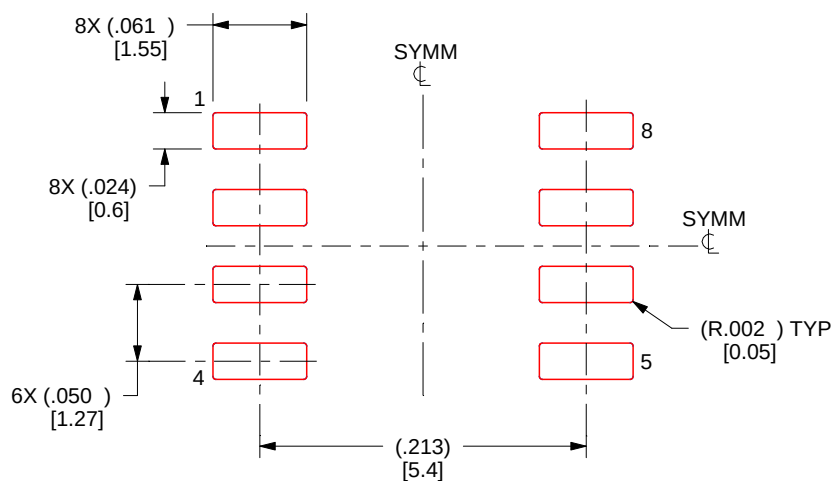
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON .005 INCH [0.125 MM] THICK STENCIL  
SCALE:8X

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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.

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