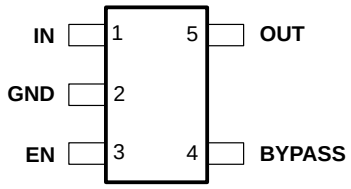
- **150-mA Low Noise, Low-Dropout Regulator**
- **Output Voltage: 2.5 V, 2.7 V, 2.8 V, 3.0 V, 3.3 V**
- **Output Noise Typically 50 μV**
- **Quiescent Current Typically 85 μA**
- **Dropout Voltage, Typically 300 mV at 150 mA**
- **Thermal Protection**
- **Over Current Limitation**
- **Less Than 2-μA Quiescent Current in Shutdown Mode**
- **–40°C to 125°C Operating Junction Temperature Range**
- **5-Pin SOT-23 (DBV) Package**

**DBV PACKAGE**
**(TOP VIEW)**




## description

The TPS764xx family of low-dropout (LDO) voltage regulators offers the benefits of a low noise, low-dropout voltage, low-power operation, and miniaturized package. Additionally, they feature low quiescent current when compared to conventional LDO regulators. Offered in 5-terminal small outline integrated-circuit SOT-23 package, the TPS764xx series devices are ideal for low-noise applications, cost-sensitive designs and applications where board space is at a premium.

A combination of new circuit design and process innovation has enabled the usual pnp pass transistor to be replaced by a PMOS pass element. Because the PMOS pass element behaves as a low-value resistor, the dropout voltage is very low—typically 300 mV at 150 mA of load current (TPS76433)—and is directly proportional to the load current. Since the PMOS pass element is a voltage-driven device, the quiescent current is very low (140 μA maximum) and is stable over the entire range of output load current (0 mA to 150 mA). Intended for use in portable systems such as laptops and cellular phones, the low-dropout voltage feature and low-power operation result in a significant increase in system battery operating life.

The TPS764xx also features a logic-enabled sleep mode to shut down the regulator, reducing quiescent current to 1 μA maximum at $T_J$ = 25°C.The TPS764xx is offered in 2.5-V, 2.7-V, 2.8-V, 3.0-V, and 3.3-V fixed-voltages.

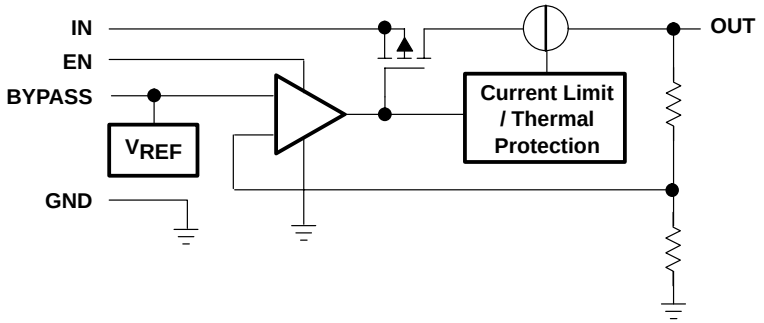
**AVAILABLE OPTIONS**

| $T_J$ | VOLTAGE | PACKAGE | PART NUMBER | | SYMBOL |
|---|---|---|---|---|---|
| –40°C to 125°C | 2.5 V | SOT-23 (DBV) | TPS76425DBVT† | TPS76425DBVR‡ | PBJI |
| | 2.7 V | | TPS76427DBVT† | TPS76427DBVR‡ | PBKI |
| | 2.8 V | | TPS76428DBVT† | TPS76428DBVR‡ | PCEI |
| | 3.0 V | | TPS76430DBVT† | TPS76430DBVR‡ | PBLI |
| | 3.3 V | | TPS76433DBVT† | TPS76433DBVR‡ | PBMI |

† The DBVT passive indicates tape and reel of 250 parts.
‡ The DBVR passive indicates tape and reel of 3000 parts.

## functional block diagram

**TPS76425/ 27/ 28/ 30/ 33**




## Terminal Functions

| TERMINAL NAME | I/O | DESCRIPTION |
|---|---|---|
| GND | | Ground |
| EN | I | Enable input |
| BYPASS | | Output bypass capacitor |
| IN | I | Input supply voltage |
| OUT | O | Regulated output voltage |

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

Input voltage range (see Note 1) . . . . . –0.3 V to 10 V
Voltage range at EN . . . . . –0.3 V to $V_I$ + 0.3 V
Voltage on OUT, . . . . . 7 V
Peak output current . . . . . Internally limited
ESD rating, HBM . . . . . 2 kV
Continuous total power dissipation . . . . . See dissipation rating tables
Operating virtual junction temperature range, $T_J$ . . . . . –40°C to 150°C
Storage temperature range, $T_{stg}$ . . . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to network ground terminal.

**DISSIPATION RATING TABLE**

| BOARD | PACKAGE | $R_{\theta JC}$ | $R_{\theta JA}$ | DERATING FACTOR ABOVE $T_A$ = 25°C | $T_A \le 25°C$ POWER RATING | $T_A$ = 70°C POWER RATING | $T_A$ = 85°C POWER RATING |
|---|---|---|---|---|---|---|---|
| Low K‡ | DBV | 65.8 °C/W | 259 °C/W | 3.9 mW/°C | 386 mW | 212 mW | 154 mW |
| High K§ | DBV | 65.8 °C/W | 180 °C/W | 5.6 mW/°C | 555 mW | 305 mW | 222 mW |

‡ The JEDEC Low K (1s) board design used to derive this data was a 3 inch x 3 inch, two layer board with 2 ounce copper traces on top of the board.
§ The JEDEC High K (2s2p) board design used to derive this data was a 3 inch x 3 inch, multilayer board with 1 ounce internal power and ground planes and 2 ounce copper traces on top and bottom of the board.

## recommended operating conditions

| | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|
| Input voltage, $V_I$ † | 2.7 | | 10 | V |
| Continuous output current, $I_O$ | 0 | | 150 | mA |
| Operating junction temperature, $T_J$ | –40 | | 125 | °C |

† To calculate the minimum input voltage for your maximum output current, use the following equation: $V_{I(min)} = V_{O(max)} + V_{DO(max\ load)}$

## electrical characteristics over recommended operating free-air temperature range, $V_I = V_{O(typ)} + 1$ V, $I_O$= 1 mA, EN = IN, $C_o$ = 4.7 μF (unless otherwise noted)

| PARAMETER | | | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| $V_O$ | Output voltage | TPS76425 | $I_O$ = 1 mA to 100 mA, | $T_J$ = 25°C | 2.45 | 2.5 | 2.55 | V |
| | | | $I_O$ = 1 mA to 100 mA | | 2.425 | 2.5 | 2.575 | |
| | | | $I_O$ = 1 mA to 150 mA, | $T_J$ = 25°C | 2.438 | 2.5 | 2.562 | |
| | | | $I_O$ = 1 mA to 150 mA | | 2.407 | 2.5 | 2.593 | |
| | | TPS76427 | $I_O$ = 1 mA to 100 mA, | $T_J$ = 25°C | 2.646 | 2.7 | 2.754 | V |
| | | | $I_O$ = 1 mA to 100 mA | | 2.619 | 2.7 | 2.781 | |
| | | | $I_O$ = 1 mA to 150 mA, | $T_J$ = 25°C | 2.632 | 2.7 | 2.768 | |
| | | | $I_O$ = 1 mA to 150 mA | | 2.598 | 2.7 | 2.8013 | |
| | | TPS76428 | $I_O$ = 1 mA to 100 mA | $T_J$ = 25°C | 2.744 | 2.8 | 2.856 | V |
| | | | $I_O$ = 1 mA to 150 mA, | | 2.73 | 2.8 | 2.870 | |
| | | | $I_O$ = 1 mA to 150 mA, | $T_J$ = 25°C | 2.716 | 2.8 | 2.884 | |
| | | | $I_O$ = 1 mA to 150 mA | | 2.695 | 2.8 | 2.905 | |
| | | TPS76430 | $I_O$ = 1 mA to 100 mA, | $T_J$ = 25°C | 2.94 | 3.0 | 3.06 | V |
| | | | $I_O$ = 1 mA to 100 mA | | 2.925 | 3.0 | 3.075 | |
| | | | $I_O$ = 1 mA to 150 mA, | $T_J$ = 25°C | 2.91 | 3.0 | 3.090 | |
| | | | $I_O$ = 1 mA to 150 mA | | 2.887 | 3.0 | 3.112 | |
| | | TPS76433 | $I_O$ = 1 mA to 100 mA, | $T_J$ = 25°C | 3.234 | 3.3 | 3.366 | V |
| | | | $I_O$ = 1 mA to 100 mA | | 3.201 | 3.3 | 3.399 | |
| | | | $I_O$ = 1 mA to 150 mA, | $T_J$ = 25°C | 3.218 | 3.3 | 3.382 | |
| | | | $I_O$ = 1 mA to 150 mA | | 3.177 | 3.3 | 3.423 | |
| $I_{(Q)}$ | Quiescent current (GND terminal current) | | $I_O$ = 0 to 150 mA, See Note 2 | $T_J$ = 25°C, | | 85 | 100 | μA |
| | | | $I_O$ = 0 to 150 mA, | See Note 2 | | | 140 | |
| | Standby current | | EN < 0.5 V, | $T_J$ = 25°C | | 0.5 | 1 | |
| | | | EN < 0.5 V | | | | 2 | |
| $V_n$ | Output noise voltage | | BW = 300 Hz to 50 kHz, $T_J$ = 25°C, | $C_o$ = 10 μF, See Note 2 | | 50 | | μV |
| | Bypass voltage | | $T_J$ = 25°C | | | 1.192 | | V |
| PSRR | Ripple rejection | | f = 1 kHz, $C_o$ = 10 μF, | $T_J$ = 25°C, See Note 2 | | 60 | | dB |
| | Current limit | | $T_J$ = 25°C | See Note 3 | | 0.8 | 1.5 | A |

NOTES: 2. Minimum IN operating voltage is 2.7 V or $V_{O(typ)}$ + 1 V, whichever is greater.
3. Test condition includes, output voltage $V_O$=0 V and pulse duration = 10 mS.

## electrical characteristics over recommended operating free-air temperature range, $V_I = V_{O(typ)} + 1$ V, $I_O$= 1 mA, EN = IN, $C_o$ = 4.7 μF (unless otherwise noted) (continued)

| PARAMETER | | | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| | Output voltage line regulation ($\Delta V_O/V_O$) (see Note 4) | | $V_O + 1$ V < $V_I \le 10$ V, | $V_I \ge 3.5$ V, $T_J$ = 25°C | | 0.04 | 0.07 | %/V |
| | | | $V_O + 1$ V < $V_I \le 10$ V, | $V_I \ge 3.5$ V | | | 0.1 | |
| $V_{IH}$ | EN high level input | | See Note 2 | | | 1.4 | 2 | V |
| $V_{IL}$ | EN low level input | | See Note 2 | | 0.5 | 1.2 | | V |
| $I_I$ | EN input current | | EN = 0 V | | | –0.01 | –0.5 | μA |
| | | | EN = IN | | | –0.01 | –0.5 | |
| $V_{DO}$ | Dropout voltage (see Note 5) | TPS76425 | $I_O$ = 0 mA, | $T_J$ = 25°C | | 0.2 | | mV |
| | | | $I_O$ = 1 mA, | $T_J$ = 25°C | | 3 | | |
| | | | $I_O$ = 50 mA, | $T_J$ = 25°C | | 120 | 150 | |
| | | | $I_O$ = 50 mA | | | | 200 | |
| | | | $I_O$ = 75 mA, | $T_J$ = 25°C | | 180 | 225 | |
| | | | $I_O$ = 75 mA | | | | 300 | |
| | | | $I_O$ = 100 mA, | $T_J$ = 25°C | | 240 | 300 | |
| | | | $I_O$ = 100 mA | | | | 400 | |
| | | | $I_O$ = 150 mA, | $T_J$ = 25°C | | 360 | 450 | |
| | | | $I_O$ = 150 mA | | | | 600 | |
| | | TPS76433 | $I_O$ = 0 mA, | $T_J$ = 25°C | | 0.2 | | mV |
| | | | $I_O$ = 1 mA, | $T_J$ = 25°C | | 3 | | |
| | | | $I_O$ = 50 mA, | $T_J$ = 25°C | | 100 | 125 | |
| | | | $I_O$ = 50 mA | | | | 166 | |
| | | | $I_O$ = 75 mA, | $T_J$ = 25°C | | 150 | 188 | |
| | | | $I_O$ = 75 mA | | | | 250 | |
| | | | $I_O$ = 100 mA, | $T_J$ = 25°C | | 200 | 250 | |
| | | | $I_O$ = 100 mA | | | | 333 | |
| | | | $I_O$ = 150 mA, | $T_J$ = 25°C | | 300 | 375 | |
| | | | $I_O$ = 150 mA | | | | 500 | |

NOTES: 2. Minimum IN operating voltage is 2.7 V or $V_{O(typ)}$ + 1 V, whichever is greater.

4. If $V_O$ < 2.5 V and $V_{Imax}$ = 10 V, $V_{Imin}$ = 3.5 V:

$$\text{Line Reg. (mV)} = (\%/V) \times \frac{V_O\left(V_{Imax} - 3.5\ V\right)}{100} \times 1000$$

If $V_O$ > 2.5 V and $V_{Imax}$ = 10 V, $V_{Imin} = V_O + 1$ V:

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

5. Dropout voltage is defined as the differential voltage between $V_O$ and $V_I$ when $V_O$ drops 100 mV below the value measured with $V_I = V_O + 1.0$ V.

## TYPICAL CHARACTERISTICS

### Table of Graphs

| | | | FIGURE |
|---|---|---|---|
| $V_O$ | Output voltage | vs Output current | 1 |
| | | vs Free-air temperature | 2, 3, 4 |
| $V_n$ | Output noise | vs Frequency | 5 |
| $V_n$ | Output noise voltage | vs Bypass capacitance | 6 |
| | | vs Load current | 7 |
| $Z_o$ | Output impedance | vs Frequency | 8 |
| $V_{DO}$ | Dropout voltage | vs Free-air temperature | 9 |
| | Ripple rejection | vs Frequency | 10 |
| | Line transient response | | 11, 13 |
| | Load transient response | | 12, 14 |
| | Compensation series resistance (CSR) | vs Output current | 15, 17 |
| | | vs Added ceramic capacitance | 16, 18 |

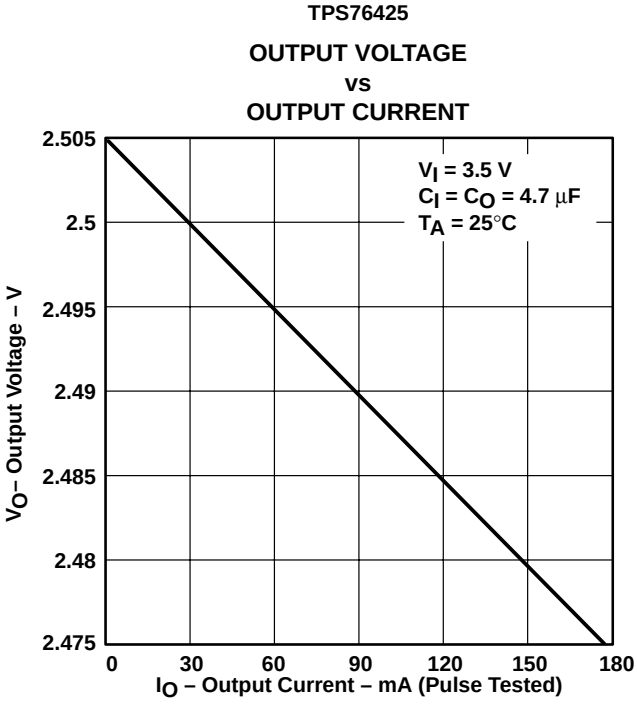



Figure 1

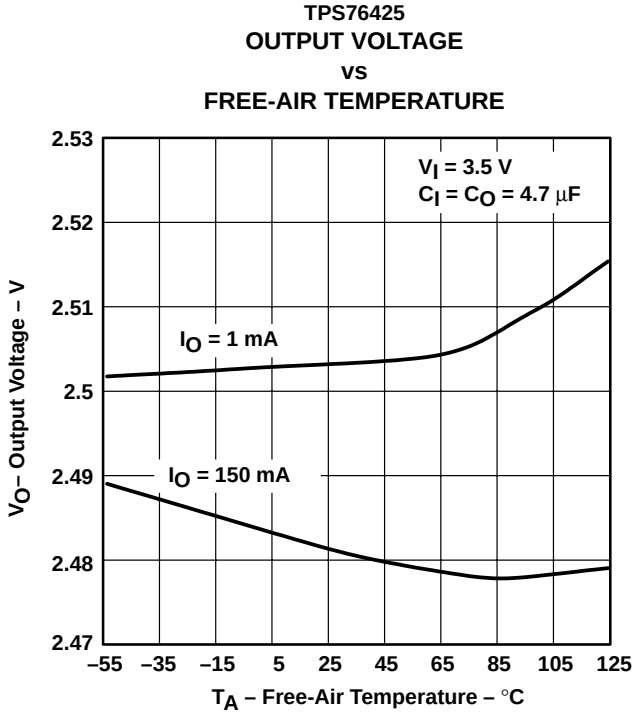



Figure 2

## TYPICAL CHARACTERISTICS

**TPS76425**
**GROUND CURRENT**
**vs**
**FREE-AIR TEMPERATURE**

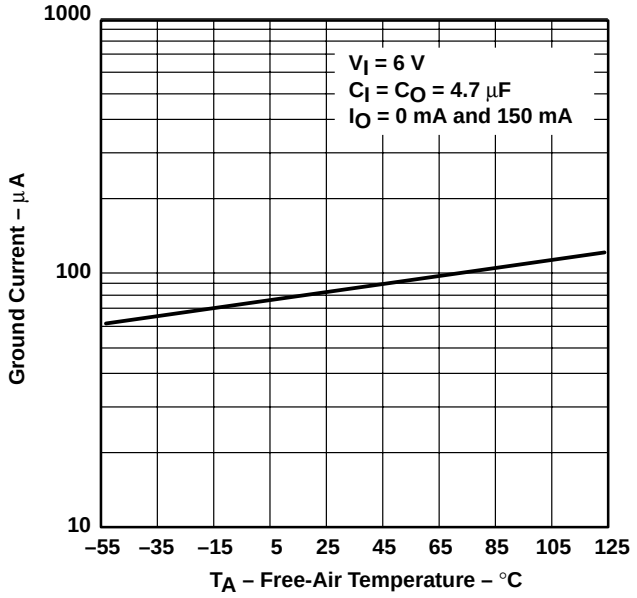



**Figure 3**

**TPS76433**
**OUTPUT VOLTAGE**
**vs**
**FREE-AIR TEMPERATURE**

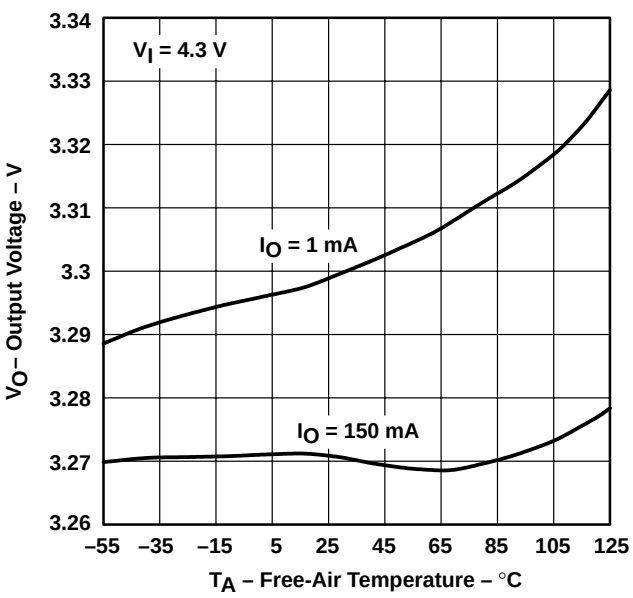



**Figure 4**

**OUTPUT NOISE**
**vs**
**FREQUENCY**

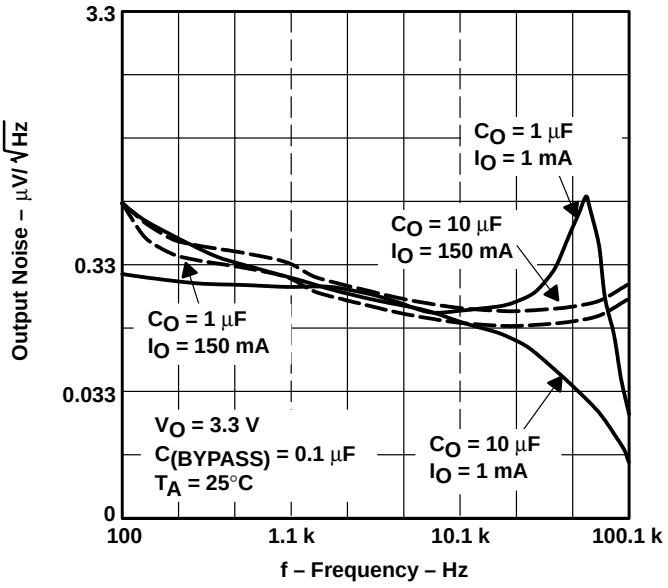



**Figure 5**

**OUTPUT NOISE VOLTAGE**
**vs**
**BYPASS CAPACITANCE**

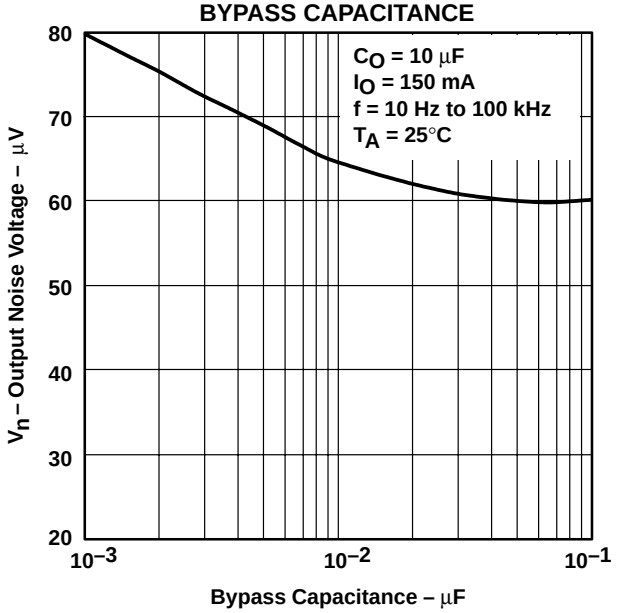



**Figure 6**

## TYPICAL CHARACTERISTICS

**OUTPUT NOISE VOLTAGE vs LOAD CURRENT**

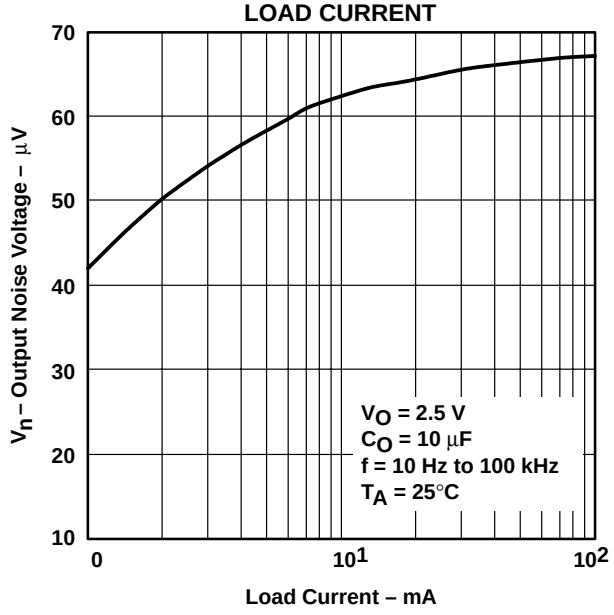



**Figure 7**

**OUTPUT IMPEDANCE vs FREQUENCY**

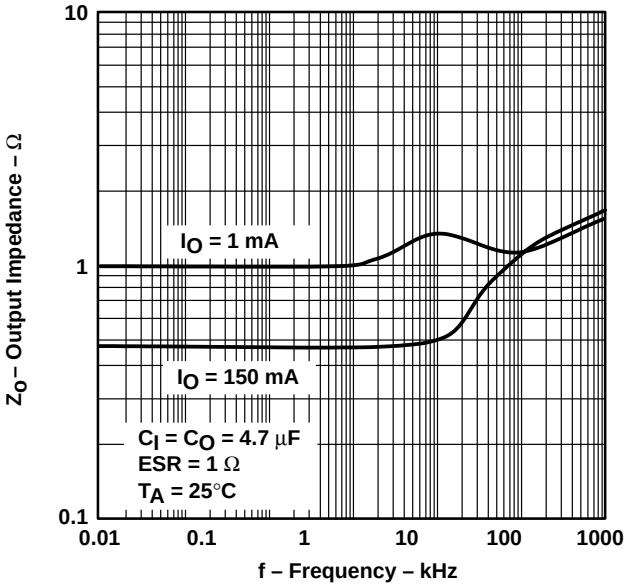



**Figure 8**

**TPS76425**
**DROPOUT VOLTAGE vs FREE-AIR TEMPERATURE**

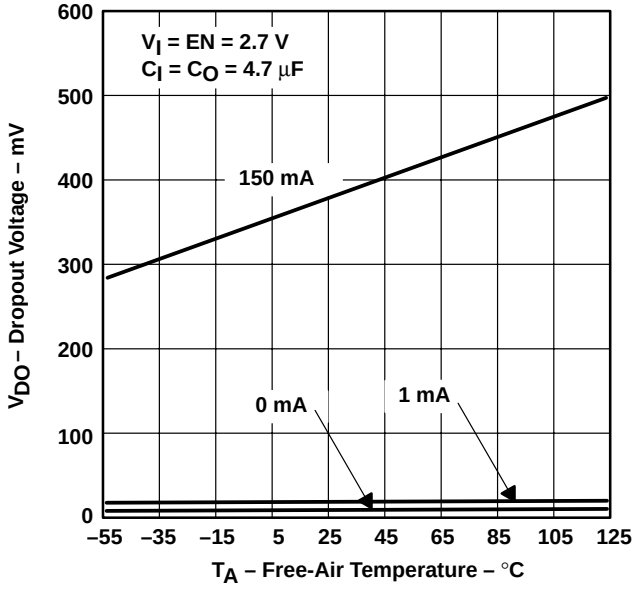



**Figure 9**

**TPS76425**
**RIPPLE REJECTION vs FREQUENCY**

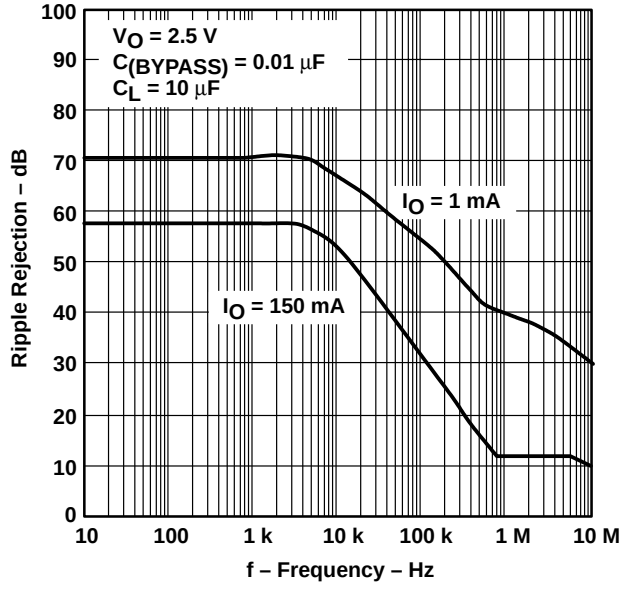



**Figure 10**

## TYPICAL CHARACTERISTICS

**TPS76425**
**LINE TRANSIENT RESPONSE**

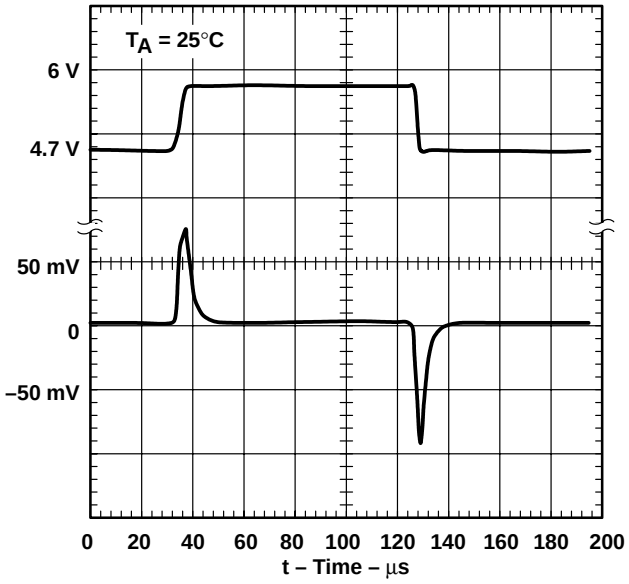



**Figure 11**

**TPS76425**
**LOAD TRANSIENT RESPONSE**

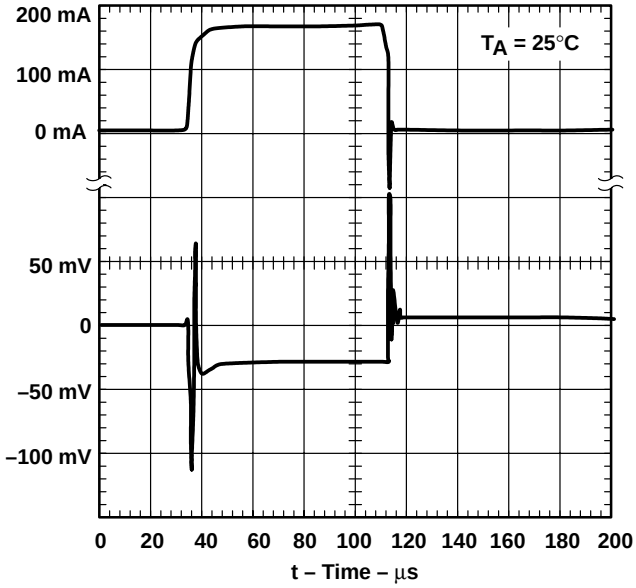



**Figure 12**

**TPS76433**
**LINE TRANSIENT RESPONSE**

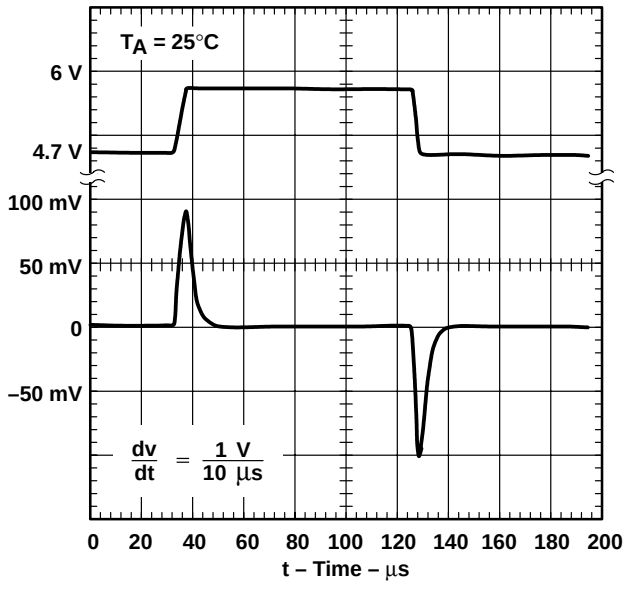



**Figure 13**

**TPS76433**
**LOAD TRANSIENT RESPONSE**

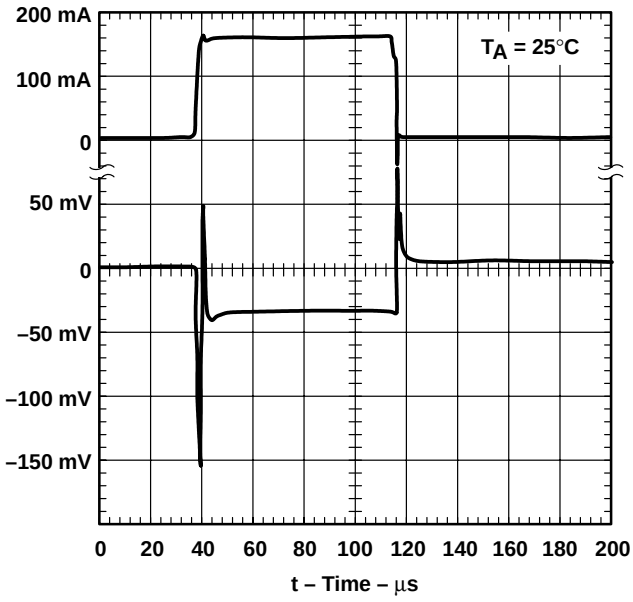



**Figure 14**

## TYPICAL CHARACTERISTICS

TYPICAL REGIONS OF STABILITY
COMPENSATION SERIES RESISTANCE (CSR)†
vs
OUTPUT CURRENT

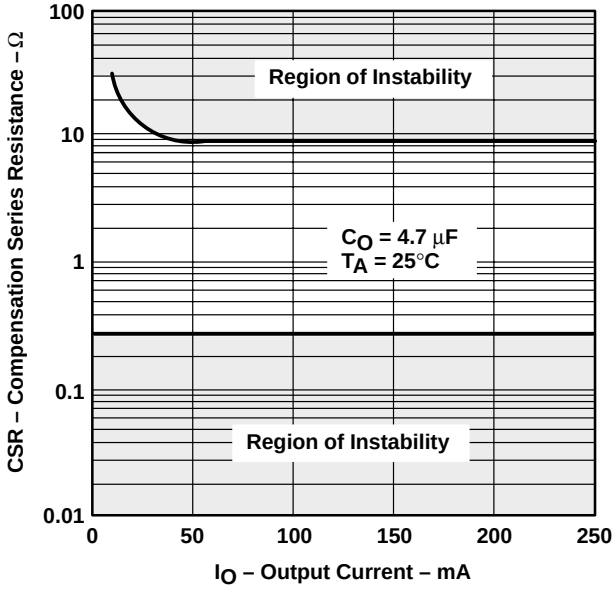



Figure 15

TYPICAL REGIONS OF STABILITY
COMPENSATION SERIES RESISTANCE (CSR)†
vs
ADDED CERAMIC CAPACITANCE

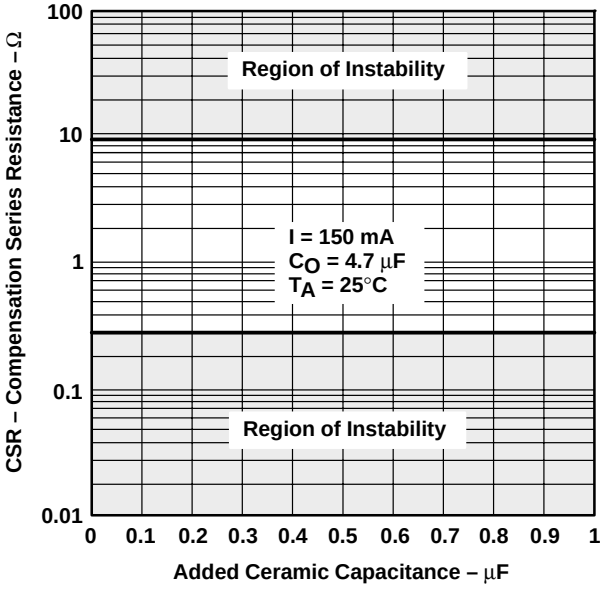



Figure 16

TYPICAL REGIONS OF STABILITY
COMPENSATION SERIES RESISTANCE (CSR)†
vs
OUTPUT CURRENT

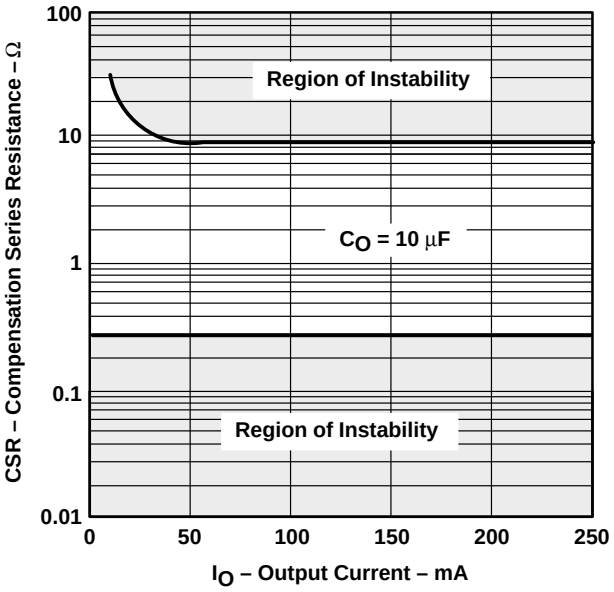



Figure 17

TYPICAL REGIONS OF STABILITY
COMPENSATION SERIES RESISTANCE (CSR)†
vs
ADDED CERAMIC CAPACITANCE

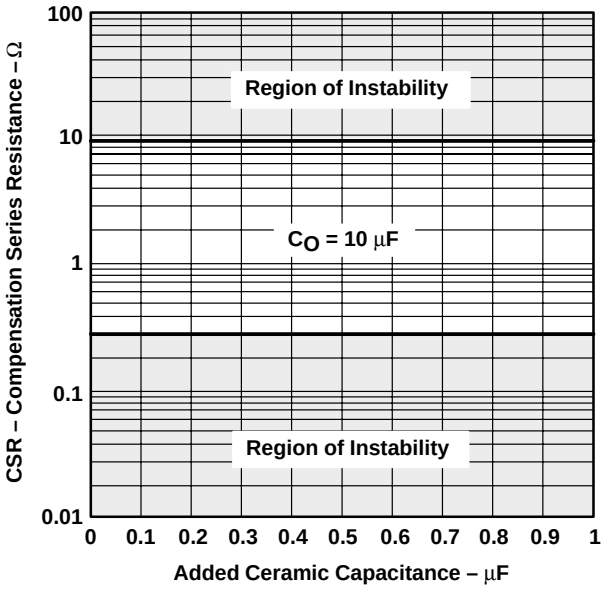



Figure 18

† CSR 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 TPS764xx family of low-noise and low-dropout (LDO) regulators are optimized for use in battery-operated equipment. They feature extremely low noise (50 μV), low dropout voltages, low quiescent current (140 μA), and an enable input to reduce supply current to less than 2 μA when the regulator is turned off.

### device operation

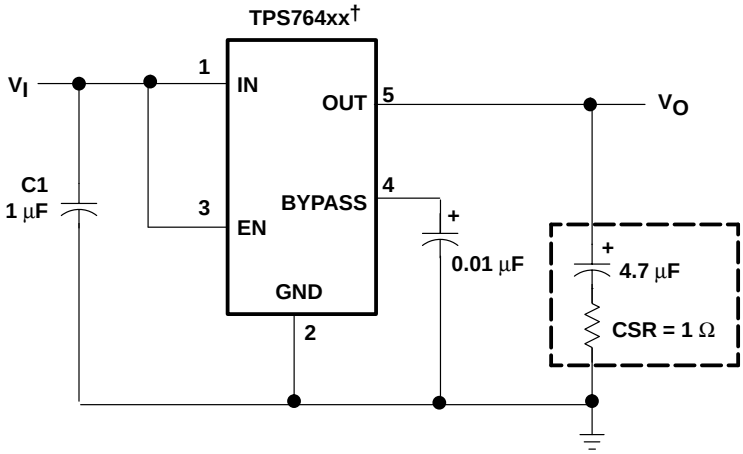
The TPS764xx uses a PMOS pass element to dramatically reduce both dropout voltage and supply current over more conventional PNP-pass-element LDO designs. The PMOS pass element is a voltage-controlled device which, unlike a PNP transistor, does not require increased drive current as output current increases. Supply current in the TPS764xx is essentially constant from no-load to maximum load.

Current limiting and thermal protection prevent damage by excessive output current and/or power dissipation. The device switches into a constant-current mode at approximately 1 A; further load reduces the output voltage instead of increasing the output current. The thermal protection shuts the regulator off if the junction temperature rises above 165°C. Recovery is automatic when the junction temperature drops approximately 25°C below the high temperature trip point. The PMOS pass element includes a back diode that safely conducts reverse current when the input voltage level drops below the output voltage level.

An internal resistor, in conjunction with external 0.01-μF bypass capacitor, creates a low-pass filter to further reduce the noise. The TPS764xx exhibits only 50 μV of output voltage noise using 0.01 μF bypass and 4.7-μF output capacitors.

A logic low on the enable input, EN, shuts off the output and reduces the supply current to less than 2 μA. EN should be tied high in applications where the shutdown feature is not used.

A typical application circuit is shown in Figure 19.




† TPS76425, TPS76427 TPS76430, TPS76433.

**Figure 19. Typical Application Circuit**

## APPLICATION INFORMATION

### external capacitor requirements

Although not required, a 0.047-μF or larger ceramic bypass input capacitor, connected between IN and GND and located close to the TPS764xx, is recommended to improve transient response and noise rejection. A higher-value electrolytic input capacitor may be necessary if large, fast-rise-time load transients are anticipated and the device is located several inches from the power source.

Like all low dropout regulators, the TPS764xx requires an output capacitor connected between OUT and GND to stabilize the internal loop control. The minimum recommended capacitance value is 4.7 μF and the ESR (equivalent series resistance) must be between 0.2 Ω and 10 Ω. Capacitor values 4.7 μF or larger are acceptable, provided the ESR is less than 10 Ω. Solid tantalum electrolytic, aluminum electrolytic, and multilayer ceramic capacitors are all suitable, provided they meet the requirements described above. Most of the commercially available 4.7 μF surface-mount solid tantalum capacitors, including devices from Sprague, Kemet, and Nichico, meet the ESR requirements previously stated. Multilayer ceramic capacitors should have minimum values of 1 μF over the full operating temperature range of the equipment.

**CAPACITOR SELECTION**

| PART NO. | MFR. | VALUE | MAX ESR† | SIZE (H × L × W)† |
|---|---|---|---|---|
| T494B475K016AS | KEMET | 4.7 μF | 1.5 Ω | 1.9 × 3.5 × 2.8 |
| 195D106x0016x2T | SPRAGUE | 10 μF | 1.5 Ω | 1.3 × 7.0 × 2.7 |
| 695D106x003562T | SPRAGUE | 10 μF | 1.3 Ω | 2.5 × 7.6 × 2.5 |
| TPSC475K035R0600 | AVX | 4.7 μF | 0.6 Ω | 2.6 × 6.0 × 3.2 |

† Size is in mm. ESR is maximum resistance in ohms at 100 kHz and $T_A$ = 25°C. Listings are sorted by height.

## APPLICATION INFORMATION

### power dissipation and junction temperature

Specified regulator operation is assured to a junction temperature of 125°C; the maximum junction temperature allowable without damaging the device is 150°C. 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:

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

Where:

$T_J max$ is the maximum allowable junction temperature

$R_{\theta JA}$ is the thermal resistance junction-to-ambient for the package, see the dissipation rating table.

$T_A$ is the ambient temperature.

The regulator dissipation is calculated using:

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

Power dissipation resulting from quiescent current is negligible.

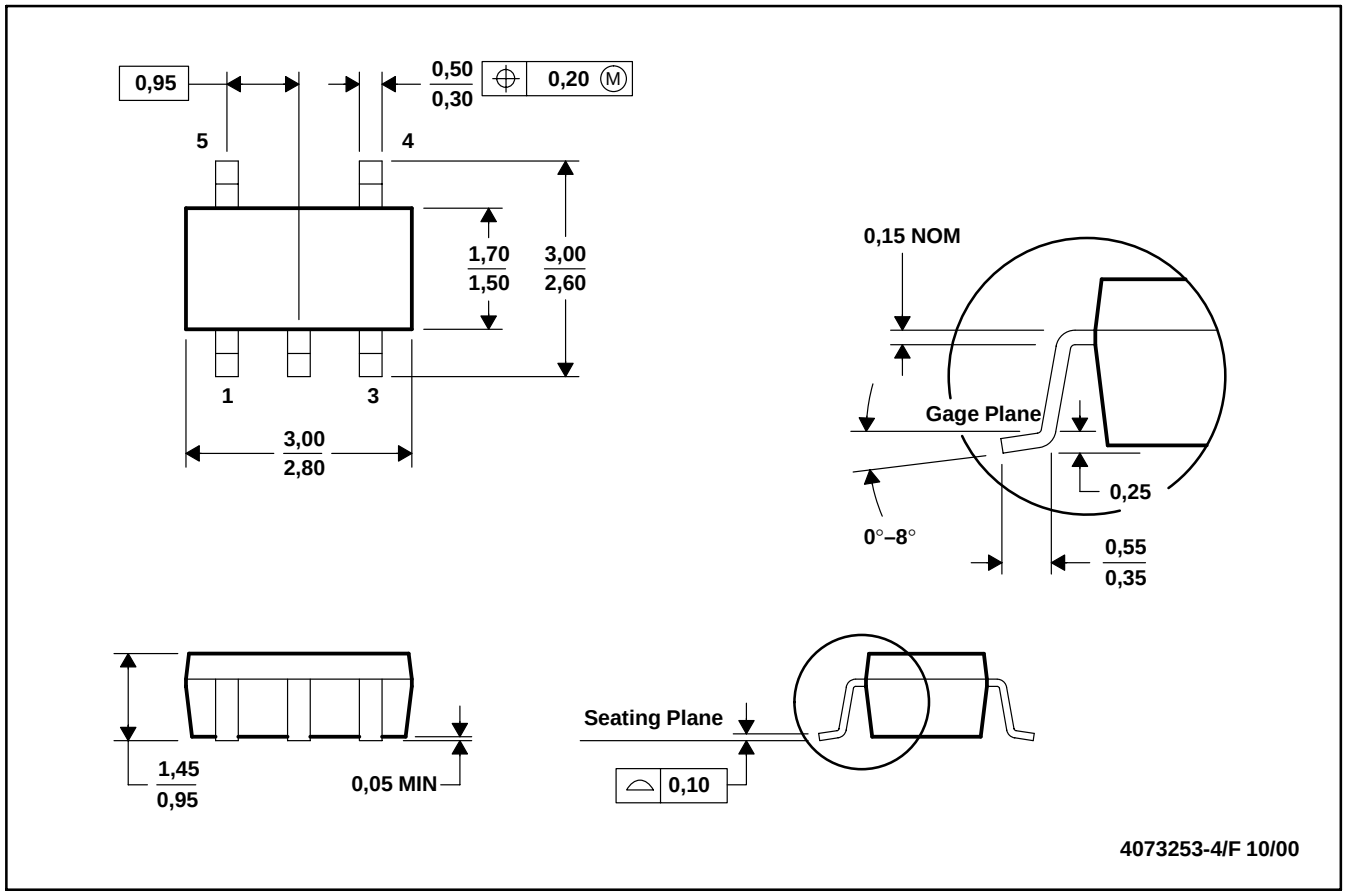
### regulator protection

The TPS764xx pass element has a built-in back diode that safely conducts reverse current 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. If extended reverse voltage is anticipated, external limiting might be appropriate.

The TPS764xx also features internal current limiting and thermal protection. During normal operation, the TPS764xx limits output current to approximately 800 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 165°C, thermal-protection circuitry shuts it down. Once the device has cooled down to below 140°C, regulator operation resumes.

## MECHANICAL DATA

**DBV (R-PDSO-G5)** **PLASTIC SMALL-OUTLINE**




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.
D. Falls within JEDEC MO-178

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) |
|---|---|---|---|---|---|---|---|---|
| TPS76425DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76425DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76425DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76425DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76427DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76427DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76427DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76427DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76428DBV | OBSOLETE | SOT-23 | DBV | 5 | | TBD | Call TI | Call TI |
| TPS76428DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76428DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76428DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76428DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76430DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76430DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76430DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76430DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76433DBVR | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76433DBVRG4 | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76433DBVT | ACTIVE | SOT-23 | DBV | 5 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| TPS76433DBVTG4 | ACTIVE | SOT-23 | DBV | 5 | 250 | 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.

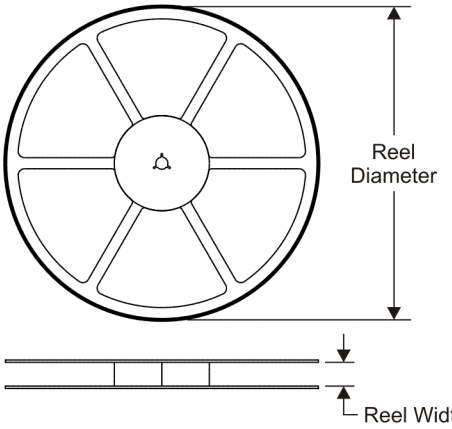
(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check

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)

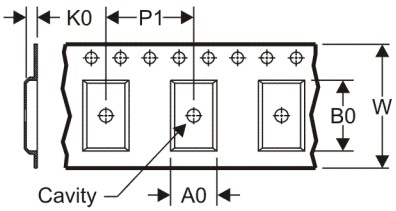
**(3)** MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

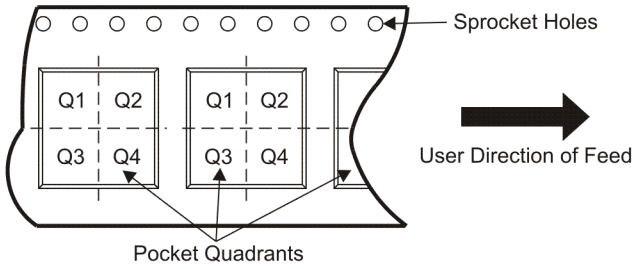



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

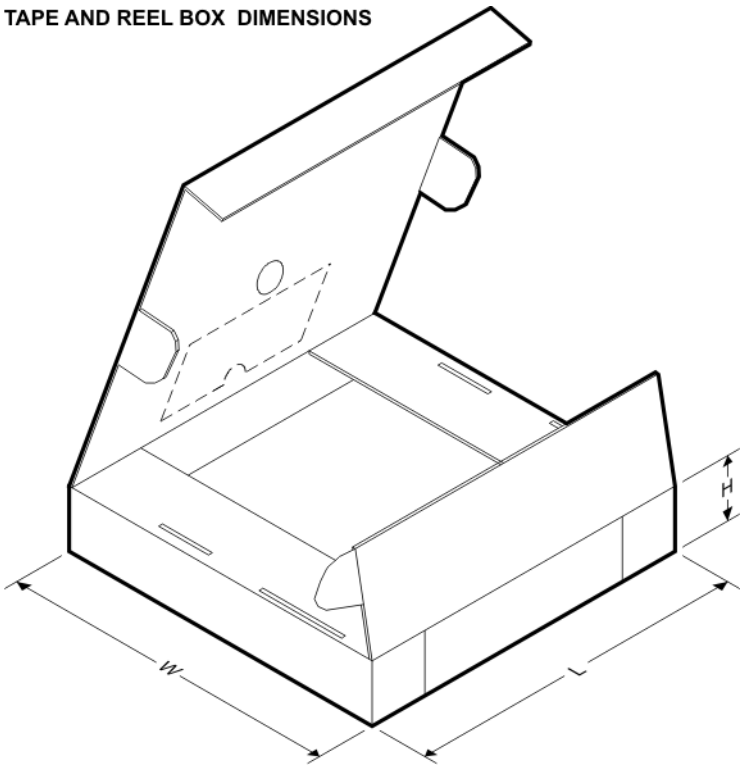
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS76425DBVR | SOT-23 | DBV | 5 | 3000 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76425DBVT | SOT-23 | DBV | 5 | 250 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76427DBVR | SOT-23 | DBV | 5 | 3000 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76427DBVT | SOT-23 | DBV | 5 | 250 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76428DBVR | SOT-23 | DBV | 5 | 3000 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76428DBVT | SOT-23 | DBV | 5 | 250 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76430DBVR | SOT-23 | DBV | 5 | 3000 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76430DBVT | SOT-23 | DBV | 5 | 250 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76433DBVR | SOT-23 | DBV | 5 | 3000 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| TPS76433DBVT | SOT-23 | DBV | 5 | 250 | 180.0 | 9.0 | 3.15 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |

**TAPE AND REEL BOX DIMENSIONS**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| TPS76425DBVR | SOT-23 | DBV | 5 | 3000 | 182.0 | 182.0 | 20.0 |
| TPS76425DBVT | SOT-23 | DBV | 5 | 250 | 182.0 | 182.0 | 20.0 |
| TPS76427DBVR | SOT-23 | DBV | 5 | 3000 | 182.0 | 182.0 | 20.0 |
| TPS76427DBVT | SOT-23 | DBV | 5 | 250 | 182.0 | 182.0 | 20.0 |
| TPS76428DBVR | SOT-23 | DBV | 5 | 3000 | 182.0 | 182.0 | 20.0 |
| TPS76428DBVT | SOT-23 | DBV | 5 | 250 | 182.0 | 182.0 | 20.0 |
| TPS76430DBVR | SOT-23 | DBV | 5 | 3000 | 182.0 | 182.0 | 20.0 |
| TPS76430DBVT | SOT-23 | DBV | 5 | 250 | 182.0 | 182.0 | 20.0 |
| TPS76433DBVR | SOT-23 | DBV | 5 | 3000 | 182.0 | 182.0 | 20.0 |
| TPS76433DBVT | SOT-23 | DBV | 5 | 250 | 182.0 | 182.0 | 20.0 |

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