



**THE DATASHEET OF  
TLV1117-25CDRJR**

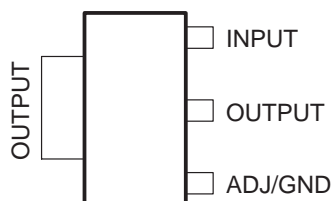


# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

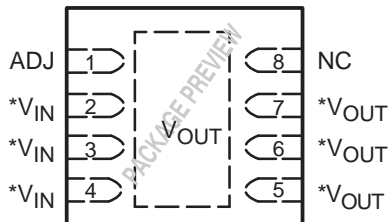
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- 1.5 V, 1.8 V, 2.5 V, 2.85 V, 3.3 V, 5 V, and Adjustable Output Voltage Options
- Output Current of 800 mA
- Operates Down to 1.1-V Dropout
- Specified Dropout Voltage at Multiple Current Levels
- 0.2% Line Regulation Maximum
- 0.4% Load Regulation Maximum
- Max  $V_{IN}$  of 15 V

DCY (SOT-223) PACKAGE  
(TOP VIEW)

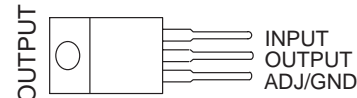


DRJ (QFN) PACKAGE  
(TOP VIEW)

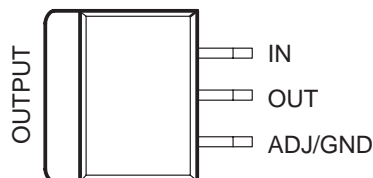


\* $V_{IN}$  pins (2, 3, 4) must be connected together;  
 $V_{OUT}$  pins (5, 6, 7) must be connected together.

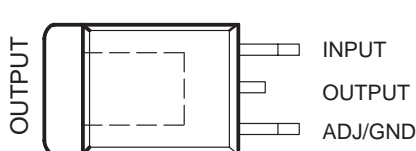
KCS (TO-220) PACKAGE  
(TOP VIEW)



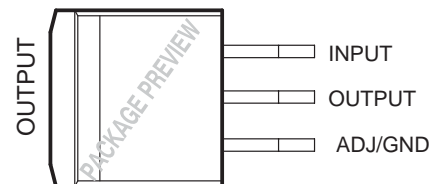
KTE (PowerFLEX™) PACKAGE  
(TOP VIEW)



KTP (PowerFLEX™/TO-252) PACKAGE  
(TOP VIEW)



KTT (TO-263) PACKAGE  
(TOP VIEW)



## description/ordering information

The TLV1117 is a positive low-dropout voltage regulator, designed to provide up to 800 mA of output current. The device is available in 1.5 V, 1.8 V, 2.5 V, 2.85 V, 3.3 V, 5 V, and adjustable output voltage options. All internal circuitry is designed to operate down to 1 V input-to-output differential. Dropout voltage is specified at a maximum of 1.3 V at 800 mA, decreasing at lower load currents.

The low-profile surface-mount KTP package allows the device to be used in applications where space is limited. The TLV1117 requires a minimum of 10  $\mu$ F of output capacitance for stability. Output capacitors of this size or larger normally are included in most regulator designs.

Unlike pnp-type regulators, where up to 10% of the output current is wasted as quiescent current, the quiescent current of the TLV1117 flows into the load, increasing efficiency.

The TLV1117C device is characterized for operation over the virtual junction temperature range of 0°C to 125°C, and the TLV1117I device is characterized for operation over the virtual junction temperature range of -40°C to 125°C.



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# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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## description/ordering information (continued)

### TLV1117C ORDERING INFORMATION

| T <sub>J</sub> | V <sub>O</sub> TYP (V)  | PACKAGE†                |                  | ORDERABLE PART NUMBER | TOP-SIDE MARKING   |
|----------------|-------------------------|-------------------------|------------------|-----------------------|--|
| 0°C to 125°C   | 1.5 V                   | PowerFLEX (KTE)         | Reel of 2000     | TLV1117-15CKTER       |  |
|                |                         | PowerFLEX/TO-252* (KTP) | Reel of 2000     | TLV1117-15CKTPR       |  |
|                |                         | QFN (DRJ)               | Reel of 1000     | TLV1117-15CDRJR       |  |
|                |                         | SOT-223 (DCY)           | Tube of 80       | TLV1117-15CDCY        |  |
|                |                         |                         | Reel of 2500     | TLV1117-15CDCYR       |  |
|                |                         | TO-220 (KCS)            | Tube of 50       | TLV1117-15CKCS        |  |
|                | TO-263 (KTT)            | Tube of                 | TLV1117-15CKTT   |                       |  |
|                |                         | Reel of                 | TLV1117-15CKTTR  |                       |  |
|                | 1.8 V                   | PowerFLEX (KTE)         | Reel of 2000     | TLV1117-18CKTER       |  |
|                |                         | PowerFLEX/TO-252* (KTP) | Reel of 2000     | TLV1117-18CKTPR       |  |
|                |                         | QFN (DRJ)               | Reel of 1000     | TLV1117-18CDRJR       |  |
|                |                         | SOT-223 (DCY)           | Tube of 80       | TLV1117-18CDCY        |  |
|                |                         |                         | Reel of 2500     | TLV1117-18CDCYR       |  |
|                |                         | TO-220 (KCS)            | Tube of 50       | TLV1117-18CKCS        |  |
|                | TO-263 (KTT)            | Tube of                 | TLV1117-18CKTT   |                       |  |
|                |                         | Reel of                 | TLV1117-18CKTTR  |                       |  |
|                | 2.5 V                   | PowerFLEX (KTE)         | Reel of 2000     | TLV1117-25CKTER       |  |
|                |                         | PowerFLEX/TO-252* (KTP) | Reel of 2000     | TLV1117-25CKTPR       |  |
|                |                         | QFN (DRJ)               | Reel of 1000     | TLV1117-25CDRJR       |  |
|                |                         | SOT-223 (DCY)           | Tube of 80       | TLV1117-25CDCY        |  |
|                |                         |                         | Reel of 2500     | TLV1117-25CDCYR       |  |
|                |                         | TO-220 (KCS)            | Tube of 50       | TLV1117-25CKCS        |  |
|                | TO-263 (KTT)            | Tube of                 | TLV1117-25CKTT   |                       |  |
|                |                         | Reel of                 | TLV1117-25CKTTR  |                       |  |
| 2.85 V         | PowerFLEX (KTE)         | Reel of 2000            | TLV1117-285CKTER |                       |  |
|                | PowerFLEX/TO-252* (KTP) | Reel of 2000            | TLV1117-285CKTPR |                       |  |
|                | QFN (DRJ)               | Reel of 1000            | TLV1117-285CDRJR |                       |  |
|                | SOT-223 (DCY)           | Tube of 80              | TLV1117-285CDCY  |                       |  |
|                |                         | Reel of 2500            | TLV1117-285CDCYR |                       |  |
|                | TO-220 (KCS)            | Tube of 50              | TLV1117-285CKCS  |                       |  |
| TO-263 (KTT)   | Tube of                 | TLV1117-285CKTT         |                  |                       |  |
|                | Reel of                 | TLV1117-285CKTTR        |                  |                       |  |
| 3.3 V          | PowerFLEX (KTE)         | Reel of 2000            | TLV1117-33CKTER  |                       |  |
|                | PowerFLEX/TO-252* (KTP) | Reel of 2000            | TLV1117-33CKTPR  |                       |  |
|                | QFN (DRJ)               | Reel of 1000            | TLV1117-33CDRJR  |                       |  |
|                | SOT-223 (DCY)           | Tube of 80              | TLV1117-33CDCY   |                       |  |
|                |                         | Reel of 2500            | TLV1117-33CDCYR  |                       |  |
|                | TO-220 (KCS)            | Tube of 50              | TLV1117-33CKCS   |                       |  |
| TO-263 (KTT)   | Tube of                 | TLV1117-33CKTT          |                  |                       |  |
|                | Reel of                 | TLV1117-33CKTTR         |                  |                       |  |

\*Complies with TO-252, variation AC.

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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### TLV1117C ORDERING INFORMATION (continued)

| T <sub>J</sub> | V <sub>O</sub> TYP (V) | PACKAGE†                |                 | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------------------|-------------------------|-----------------|-----------------------|------------------|
| 0°C to 125°C   | 5 V                    | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-50CKTER       | PREVIEW          |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-50CKTPR       | PREVIEW          |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-50CDRJR       | PREVIEW          |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-50CDCY        | PREVIEW          |
|                |                        |                         | Reel of 2500    | TLV1117-50CDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-50CKCS        | PREVIEW          |
|                | TO-263 (KTT)           | Tube of                 | TLV1117-50CKTT  | PREVIEW               |                  |
|                |                        | Reel of                 | TLV1117-50CKTTR |                       |                  |
|                | ADJ                    | PowerFLEX (KTE)         | Reel of 2000    | TLV1117CKTER          | TLV1117C         |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117CKTPR          | TV1117           |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117CDRJR          | PREVIEW          |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117CDCY           | V4               |
|                |                        |                         | Reel of 2500    | TLV1117CDCYR          |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117CKCS           | TLV1117C         |
| TO-263 (KTT)   | Tube of                | TLV1117CKTT             | PREVIEW         |                       |                  |
|                | Reel of                | TLV1117CKTTR            |                 |                       |                  |

\*Complies with TO-252, variation AC.

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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## TLV1117I ORDERING INFORMATION

| T <sub>J</sub> | V <sub>O</sub> TYP (V) | PACKAGE†                |                 | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------------------|-------------------------|-----------------|-----------------------|------------------|
| -40°C to 125°C | 1.5 V                  | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-15IKTER       |                  |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-15IKTPR       |                  |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-15IDRJR       |                  |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-15IDCY        |                  |
|                |                        |                         | Reel of 2500    | TLV1117-15IDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-15IKCS        |                  |
|                | TO-263 (KTT)           | Tube of                 | TLV1117-15IKTT  |                       |                  |
|                |                        | Reel of                 | TLV1117-15IKTTR |                       |                  |
|                | 1.8 V                  | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-18IKTER       |                  |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-18IKTPR       |                  |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-18IDRJR       |                  |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-18IDCY        |                  |
|                |                        |                         | Reel of 2500    | TLV1117-18IDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-18IKCS        |                  |
|                | TO-263 (KTT)           | Tube of                 | TLV1117-18IKTT  |                       |                  |
|                |                        | Reel of                 | TLV1117-18IKTTR |                       |                  |
|                | 2.5 V                  | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-25IKTER       |                  |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-25IKTPR       |                  |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-25IDRJR       |                  |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-25IDCY        |                  |
|                |                        |                         | Reel of 2500    | TLV1117-25IDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-25IKCS        |                  |
|                | TO-263 (KTT)           | Tube of                 | TLV1117-25IKTT  |                       |                  |
|                |                        | Reel of                 | TLV1117-25IKTTR |                       |                  |
| -40°C to 125°C | 2.85 V                 | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-285IKTER      |                  |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-285IKTPR      |                  |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-285IDRJR      |                  |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-285IDCY       |                  |
|                |                        |                         | Reel of 2500    | TLV1117-285IDCYR      |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-285IKCS       |                  |
| TO-263 (KTT)   | Tube of                | TLV1117-285IKTT         |                 |                       |                  |
|                | Reel of                | TLV1117-285IKTTR        |                 |                       |                  |
| -40°C to 125°C | 3.3 V                  | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-33IKTER       |                  |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-33IKTPR       |                  |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-33IDRJR       |                  |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-33IDCY        |                  |
|                |                        | SOT-223 (DCY)           | Reel of 2500    | TLV1117-33IDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-33IKCS        |                  |
| TO-263 (KTT)   | Tube of                | TLV1117-33IKTT          |                 |                       |                  |
|                | Reel of                | TLV1117-33IKTTR         |                 |                       |                  |

\*Complies with TO-252, variation AC.

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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### description/ordering information (continued)

#### TLV1117I ORDERING INFORMATION (continued)

| T <sub>J</sub> | V <sub>O</sub> TYP (V) | PACKAGE†                |                 | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------------------|-------------------------|-----------------|-----------------------|------------------|
| -40°C to 125°C | 5 V                    | PowerFLEX (KTE)         | Reel of 2000    | TLV1117-50IKTER       | PREVIEW          |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117-50IKTPR       | PREVIEW          |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117-50DRJR        | PREVIEW          |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117-50IDCY        | PREVIEW          |
|                |                        |                         | Reel of 2500    | TLV1117-50IDCYR       |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117-50IKCS        | PREVIEW          |
|                |                        | TO-263 (KTT)            | Tube of         | TLV1117-50IKTT        | PREVIEW          |
|                | Reel of                |                         | TLV1117-50IKTTR |                       |                  |
|                | ADJ                    | PowerFLEX (KTE)         | Reel of 2000    | TLV1117IKTER          | TLV1117I         |
|                |                        | PowerFLEX/TO-252* (KTP) | Reel of 2000    | TLV1117IKTPR          | TY1117           |
|                |                        | QFN (DRJ)               | Reel of 1000    | TLV1117IDRJR          | PREVIEW          |
|                |                        | SOT-223 (DCY)           | Tube of 80      | TLV1117IDCY           | V2               |
|                |                        |                         | Reel of 2500    | TLV1117IDCYR          |                  |
|                |                        | TO-220 (KCS)            | Tube of 50      | TLV1117IKCS           | TLV1117I         |
| TO-263 (KTT)   |                        | Tube of                 | TLV1117IKTT     | PREVIEW               |                  |
|                | Reel of                | TLV1117IKTTR            |                 |                       |                  |

\*Complies with TO-252, variation AC.

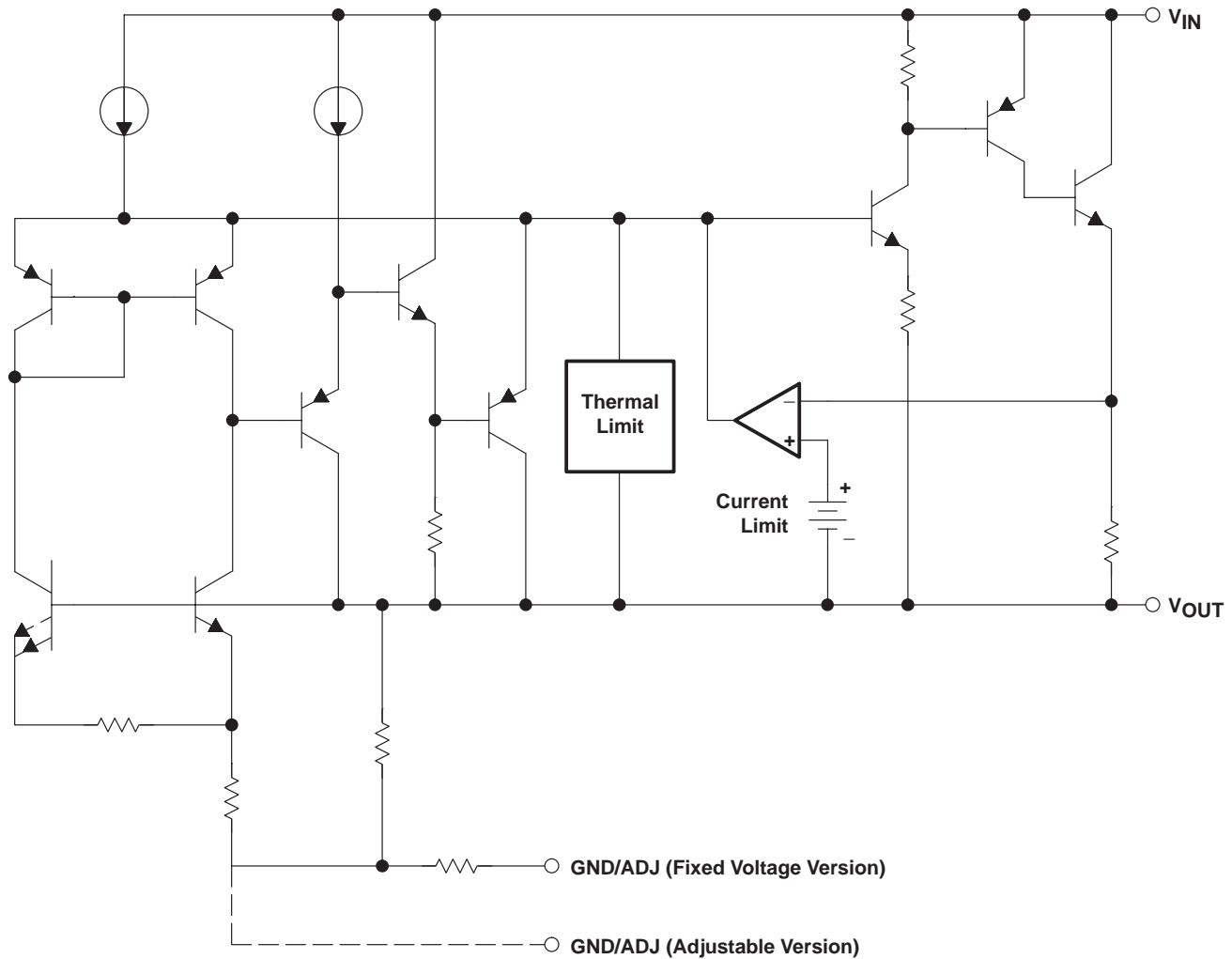
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

| DEVICE COMPONENT COUNT |  |
|------------------------|--|
| Transistors            |  |
| Diodes                 |  |
| Resistors              |  |
| Capacitors             |  |
| JFET                   |  |
| Tunnels (emitter R)    |  |

# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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## functional block diagram



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

|  |                |
|--|----------------|
| Continuous input voltage               | 15 V           |
| Operating virtual junction temperature | 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.

# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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### package thermal data (see Note 1)

| PACKAGE                | BOARD             | $\theta_{JP}^*$ | $\theta_{JC}$ | $\theta_{JA}$ |
|------------------------|-------------------|-----------------|---------------|---------------|
| PowerFLEX (KTE)        | High K, JESD 51-5 | 2.7°C/W         |               | 23°C/W        |
| PowerFLEX/TO-252 (KTP) | High K, JESD 51-5 | 3°C/W           |               | 28°C/W        |
| QFN (DRJ)              | High K, JESD 51-5 | TBD             |               | TBD           |
| SOT (DCY)              | High K, JESD 51-7 |                 | 4°C/W         | 53°C/W        |
| TO-263 (KTT)           | High K, JESD 51-5 | TBD             |               | TBD           |
| TO-220 (KCS)           | High K, JESD 51-5 | 3°C/W           |               | 19°C/W        |

\*For packages with exposed thermal pads, such as QFN, PowerPAD, and PowerFLEX,  $\theta_{JP}$  is defined as the thermal resistance between the die junction and the bottom of the exposed pad.

NOTE 1: Maximum power dissipation is a function of  $T_{J(max)}$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_{J(max)} - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.

### recommended operating conditions

|           |  | MINT†       | MAX  | UNIT |    |
|-----------|--|-------------|------|------|----|
| $V_{IN}$  | Input voltage                                | TLV1117     | 2.7  | 15   | V  |
|           |  | TLV1117-15  | 2.9  | 15   |    |
|           |  | TLV1117-18  | 3.2  | 15   |    |
|           |  | TLV1117-25  | 3.9  | 15   |    |
|           |  | TLV1117-285 | 4.25 | 15   |    |
|           |  | TLV1117-33  | 4.7  | 15   |    |
|           |  | TLV1117-50  | 6.4  | 15   |    |
| $I_{OUT}$ | Output current                               |             | 0.8  | A    |    |
| $T_J$     | Operating virtual junction temperature range | TLV1117C    | 0    | 125  | °C |
|           |  | TLV1117I    | -40  | 125  |    |

† The input-to-output differential across the regulator should provide for some margin against regulator operation at the maximum dropout (for a particular current value). This margin is needed to account for tolerances in both the input voltage (lower limit) and the output voltage (upper limit). The absolute minimum  $V_{IN}$  for a desired maximum output current can be calculated by the following:

$$V_{IN(min)} = V_{OUT(max)} + V_{DO(max @ \text{rated current})}$$

# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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**TLV1117C electrical characteristics,  $T_J = 0^\circ\text{C}$  to  $125^\circ\text{C}$ , all typical values are at  $T_J = 25^\circ\text{C}$  (unless otherwise noted)**

| PARAMETER                                 | TEST CONDITIONS†   | MIN                       | TYP   | MAX   | UNIT  |   |
|---|--|---------------------------|-------|-------|-------|---|
| Output voltage, $V_{OUT}$                 | $V_{IN} - V_{OUT} = 2\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$            | TLV1117                   | 1.238 | 1.250 | 1.262 | V |
|   | $I_{OUT} = 10\text{ mA}$ to $800\text{ mA}$ , $V_{IN} - V_{OUT} = 1.4\text{ V}$ to $10\text{ V}$ |                           | 1.225 | 1.250 | 1.270 |   |
|   | $V_{IN} = 3.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-15                | 1.485 | 1.500 | 1.515 |   |
|   | $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 1.470 | 1.500 | 1.530 |   |
|   | $V_{IN} = 3.8\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-18                | 1.782 | 1.800 | 1.818 |   |
|   | $V_{IN} = 3.2\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 1.764 | 1.800 | 1.836 |   |
|   | $V_{IN} = 4.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-25                | 2.475 | 2.500 | 2.525 |   |
|   | $V_{IN} = 3.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 2.450 | 2.500 | 2.550 |   |
|   | $V_{IN} = 4.85\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                   | TLV1117-285               | 2.820 | 2.850 | 2.880 |   |
|   | $V_{IN} = 4.25\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                     |                           | 2.790 | 2.850 | 2.910 |   |
|   | $V_{IN} = 4.1\text{ V}$ , $I_{OUT} = 0$ to $500\text{ mA}$                                       |                           | 2.790 | 2.850 | 2.910 |   |
|   | $V_{IN} = 5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                      | TLV1117-33                | 3.267 | 3.300 | 3.333 |   |
|   | $V_{IN} = 4.75\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                     |                           | 3.235 | 3.300 | 3.365 |   |
|   | $V_{IN} = 7\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                      | TLV1117-50                | 4.950 | 5.000 | 5.050 |   |
|   | $V_{IN} = 6.5\text{ V}$ to $12\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 4.900 | 5.000 | 5.100 |   |
| Line regulation                           | $I_{OUT} = 10\text{ mA}$ , $V_{IN} - V_{OUT} = 1.5\text{ V}$ to $13.75\text{ V}$                 | TLV1117                   | 0.035 | 0.2   | %     |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$                               | TLV1117-15                | 1     | 6     | mV    |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.2\text{ V}$ to $10\text{ V}$                               | TLV1117-18                | 1     | 6     |       |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.9\text{ V}$ to $10\text{ V}$                               | TLV1117-25                | 1     | 6     |       |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.25\text{ V}$ to $10\text{ V}$                              | TLV1117-285               | 1     | 6     |       |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.75\text{ V}$ to $15\text{ V}$                              | TLV1117-33                | 1     | 6     |       |   |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 6.5\text{ V}$ to $15\text{ V}$                               | TLV1117-50                | 1     | 10    |       |   |
| Load regulation                           | $I_{OUT} = 10\text{ mA}$ to $800\text{ mA}$ , $V_{IN} - V_{OUT} = 3\text{ V}$                    | TLV1117                   | 0.2   | 0.4   |       | % |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 2.9\text{ V}$                                       | TLV1117-15                | 1     | 10    | mV    |   |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 3.2\text{ V}$                                       | TLV1117-18                | 1     | 10    |       |   |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 3.9\text{ V}$                                       | TLV1117-25                | 1     | 10    |       |   |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 4.25\text{ V}$                                      | TLV1117-285               | 1     | 10    |       |   |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 4.75\text{ V}$                                      | TLV1117-33                | 1     | 10    |       |   |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 6.5\text{ V}$                                       | TLV1117-50                | 1     | 15    |       |   |
| Dropout voltage, $V_{DO}$<br>(see Note 2) | $I_{OUT} = 100\text{ mA}$  |                           | 1.1   | 1.20  |       | V |
|   | $I_{OUT} = 500\text{ mA}$  |                           | 1.15  | 1.25  |       |   |
|   | $I_{OUT} = 800\text{ mA}$  |                           | 1.2   | 1.3   |       |   |
| Current limit                             | $V_{IN} - V_{OUT} = 5\text{ V}$ , $T_J = 25^\circ\text{C}$                                       | 0.8                       | 1.2   | 1.5   | A     |   |
| Minimum load current                      | $V_{IN} = 15\text{ V}$   | TLV1117                   | 1.7   | 5     | mA    |   |
| Quiescent current                         | $V_{IN} \leq 15\text{ V}$  | All fixed voltage options | 5     | 10    | mA    |   |
| Thermal regulation                        | 30 ms pulse, $T_A = 25^\circ\text{C}$  |                           | 0.01  | 0.1   | %/W   |   |
| Ripple rejection                          | $V_{IN} - V_{OUT} = 3\text{ V}$ , $V_{ripple} = 1\text{ V}_{pp}$<br>$f = 120\text{ Hz}$          |                           | 60    | 78    | dB    |   |

† All characteristics are measured with a 10- $\mu\text{F}$  capacitor across the input and a 10- $\mu\text{F}$  capacitor across the output. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

NOTE 2: Dropout is defined as the  $V_{IN}$  to  $V_{OUT}$  differential at which  $V_{OUT}$  drops 100 mV below the value of  $V_{OUT}$ , measured at  $V_{IN} = V_{OUT(nom)} + 1.5\text{ V}$ .



# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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**TLV1117C electrical characteristics,  $T_J = 0^\circ\text{C}$  to  $125^\circ\text{C}$ , all typical values are at  $T_J = 25^\circ\text{C}$  (unless otherwise noted) (continued)**

| PARAMETER                                     | TEST CONDITIONS†  | MIN | TYP   | MAX | UNIT          |
|---|---|-----|-------|-----|---------------|
| ADJUSTMENT pin current                        |   |     | 80    | 120 | $\mu\text{A}$ |
| Change in ADJUSTMENT pin current              | $I_{\text{OUT}} = 10\text{ mA to }800\text{ mA}$ , $V_{\text{IN}} - V_{\text{OUT}} = 1.4\text{ V to }10\text{ V}$ |     | 0.2   | 5   | $\mu\text{A}$ |
| Temperature stability                         | $T_J = \text{full range}$   |     | 0.5   |     | %             |
| Long-term stability                           | 1000 hrs, no load <span style="float: right;"><math>T_A = 125^\circ\text{C}</math></span>                         |     | 0.3   |     | %             |
| Output noise voltage (% of $V_{\text{OUT}}$ ) | $f = 10\text{ Hz to }100\text{ kHz}$ ,  |     | 0.003 |     | %             |

† All characteristics are measured with a 10- $\mu\text{F}$  capacitor across the input and a 10- $\mu\text{F}$  capacitor across the output. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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TLV1117I electrical characteristics,  $T_J = -40^\circ\text{C}$  to  $125^\circ\text{C}$ , all typical values are at  $T_J = 25^\circ\text{C}$  (unless otherwise noted)

| PARAMETER                                 | TEST CONDITIONS†   | MIN                       | TYP   | MAX   | UNIT  |    |
|---|--|---------------------------|-------|-------|-------|----|
| Output voltage, $V_{OUT}$                 | $V_{IN} - V_{OUT} = 2\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$            | TLV1117                   | 1.238 | 1.250 | 1.262 | V  |
|   | $I_{OUT} = 10\text{ mA}$ to $800\text{ mA}$ , $V_{IN} - V_{OUT} = 1.4\text{ V}$ to $10\text{ V}$ |                           | 1.200 | 1.250 | 1.290 |    |
|   | $V_{IN} = 3.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-15                | 1.485 | 1.500 | 1.515 |    |
|   | $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 1.440 | 1.500 | 1.560 |    |
|   | $V_{IN} = 3.8\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-18                | 1.782 | 1.800 | 1.818 |    |
|   | $V_{IN} = 3.2\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 1.728 | 1.800 | 1.872 |    |
|   | $V_{IN} = 4.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                    | TLV1117-25                | 2.475 | 2.500 | 2.525 |    |
|   | $V_{IN} = 3.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 2.400 | 2.500 | 2.600 |    |
|   | $V_{IN} = 4.85\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                   | TLV1117-285               | 2.820 | 2.850 | 2.880 |    |
|   | $V_{IN} = 4.25\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                     |                           | 2.736 | 2.850 | 2.964 |    |
|   | $V_{IN} = 5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                      | TLV1117-33                | 3.267 | 3.300 | 3.333 |    |
|   | $V_{IN} = 4.75\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                     |                           | 3.168 | 3.300 | 3.432 |    |
|   | $V_{IN} = 7\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$                      | TLV1117-50                | 4.950 | 5.000 | 5.050 |    |
|   | $V_{IN} = 6.5\text{ V}$ to $12\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$                      |                           | 4.800 | 5.000 | 5.200 |    |
| Line regulation                           | $I_{OUT} = 10\text{ mA}$ , $V_{IN} - V_{OUT} = 1.5\text{ V}$ to $13.75\text{ V}$                 | TLV1117                   | 0.035 | 0.3   | %     |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$                               | TLV1117-15                | 1     | 4.5   | mV    |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.2\text{ V}$ to $10\text{ V}$                               | TLV1117-18                | 1     | 5.5   |       |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.9\text{ V}$ to $10\text{ V}$                               | TLV1117-25                | 1     | 7.5   |       |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.25\text{ V}$ to $10\text{ V}$                              | TLV1117-285               | 1     | 8.5   |       |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.75\text{ V}$ to $15\text{ V}$                              | TLV1117-33                | 1     | 10    |       |    |
|   | $I_{OUT} = 0\text{ mA}$ , $V_{IN} = 6.5\text{ V}$ to $15\text{ V}$                               | TLV1117-50                | 1     | 15    |       |    |
| Load regulation                           | $I_{OUT} = 10\text{ mA}$ to $800\text{ mA}$ , $V_{IN} - V_{OUT} = 3\text{ V}$                    | TLV1117                   | 0.2   | 0.5   |       | mV |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 2.9\text{ V}$                                       | TLV1117-15                | 1     | 7.5   |       |    |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 3.2\text{ V}$                                       | TLV1117-18                | 1     | 9     |       |    |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 3.9\text{ V}$                                       | TLV1117-25                | 1     | 12.5  |       |    |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 4.25\text{ V}$                                      | TLV1117-285               | 1     | 14.5  |       |    |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 4.75\text{ V}$                                      | TLV1117-33                | 1     | 15    |       |    |
|   | $I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 6.5\text{ V}$                                       | TLV1117-50                | 1     | 20    |       |    |
| Dropout voltage, $V_{DO}$<br>(see Note 2) | $I_{OUT} = 100\text{ mA}$  |                           | 1.10  | 1.30  | V     |    |
|   | $I_{OUT} = 500\text{ mA}$  |                           | 1.15  | 1.35  |       |    |
|   | $I_{OUT} = 800\text{ mA}$  |                           | 1.20  | 1.40  |       |    |
| Current limit                             | $V_{IN} - V_{OUT} = 5\text{ V}$ , $T_J = 25^\circ\text{C}$                                       | 0.8                       | 1.2   | 1.5   | A     |    |
| Minimum load current                      | $V_{IN} = 15\text{ V}$   | TLV1117                   | 1.7   | 5     | mA    |    |
| Quiescent current                         | $V_{IN} \leq 15\text{ V}$  | All fixed-voltage options | 5     | 15    | mA    |    |
| Thermal regulation                        | 30-ms pulse, $T_A = 25^\circ\text{C}$  |                           | 0.01  | 0.1   | %/W   |    |
| Ripple rejection                          | $V_{IN} - V_{OUT} = 3\text{ V}$ , $V_{\text{ripple}} = 1\text{ V}_{pp}$ , $f = 120\text{ Hz}$    |                           | 60    | 75    | dB    |    |

† All characteristics are measured with a  $10\text{-}\mu\text{F}$  capacitor across the input and a  $10\text{-}\mu\text{F}$  capacitor across the output. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

NOTE 2: Dropout is defined as the  $V_{IN}$  to  $V_{OUT}$  differential at which  $V_{OUT}$  drops 100 mV below the value of  $V_{OUT}$ , measured at  $V_{IN} = V_{OUT}(\text{nom}) + 1.5\text{ V}$ .



# TLV1117

## ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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**TLV1117I electrical characteristics,  $T_J = 40^\circ\text{C}$  to  $125^\circ\text{C}$ , all typical values are at  $T_J = 25^\circ\text{C}$  (unless otherwise noted) (continued)**

| PARAMETER                                     | TEST CONDITIONS†  | MIN | TYP   | MAX | UNIT          |
|---|---|-----|-------|-----|---------------|
| ADJUSTMENT pin current                        |   |     | 80    | 120 | $\mu\text{A}$ |
| Change in ADJUSTMENT pin current              | $I_{\text{OUT}} = 10\text{ mA to }800\text{ mA}$ , $V_{\text{IN}} - V_{\text{OUT}} = 1.4\text{ V to }10\text{ V}$ |     | 0.2   | 10  | $\mu\text{A}$ |
| Temperature stability                         | $T_J = \text{full range}$   |     | 0.5   |     | %             |
| Long-term stability                           | 1000 hrs, no load <span style="float: right;"><math>T_A = 125^\circ\text{C}</math></span>                         |     | 0.3   |     | %             |
| Output noise voltage (% of $V_{\text{OUT}}$ ) | $f = 10\text{ Hz to }100\text{ kHz}$ ,  |     | 0.003 |     | %             |

† All characteristics are measured with a  $10\text{-}\mu\text{F}$  capacitor across the input and a  $10\text{-}\mu\text{F}$  capacitor across the output. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.

### GRAPHS (PREVIEW):

Figure 1. Short-Circuit Current vs ( $V_{\text{IN}} - V_{\text{OUT}}$ )

Figure 2. Load Regulation vs Temperature

Figure 3. Ripple Rejection vs Frequency (ADJ Version)

Figure 4. Ripple Rejection vs Current (ADJ Version)

Figure 5. Temperature Stability

Figure 6. ADJ Pin Current vs Temperature

Figure 7. TLV1117-25 Load Transient Response

Figure 8. TLV1117-25 Line Transient Response

Figure 9. TLV1117-285 Load Transient Response

Figure 10. TLV1117-285 Line Transient Response

Figure 11. TLV1117-33 Load Transient Response

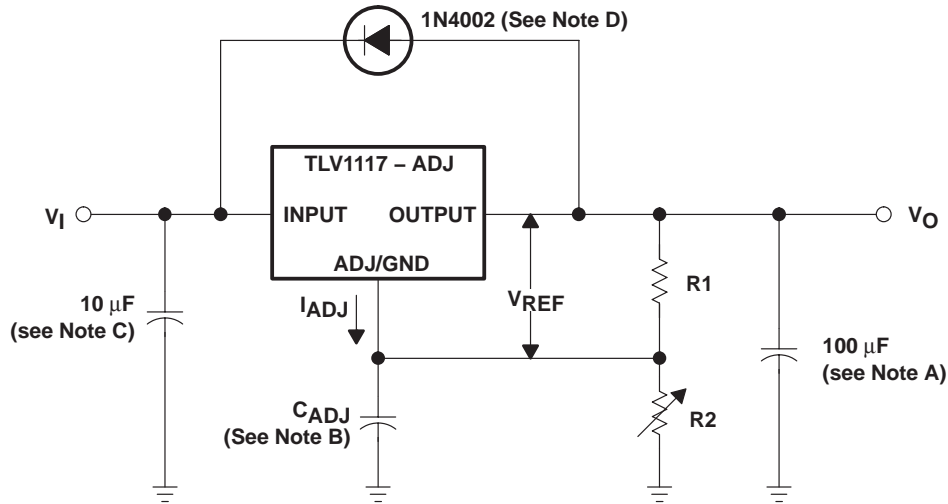
Figure 12. TLV1117-33 Line Transient Response



# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

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## APPLICATION INFORMATION



$V_{OUT}$  is calculated as:

$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + (I_{ADJ} \times R2)$$

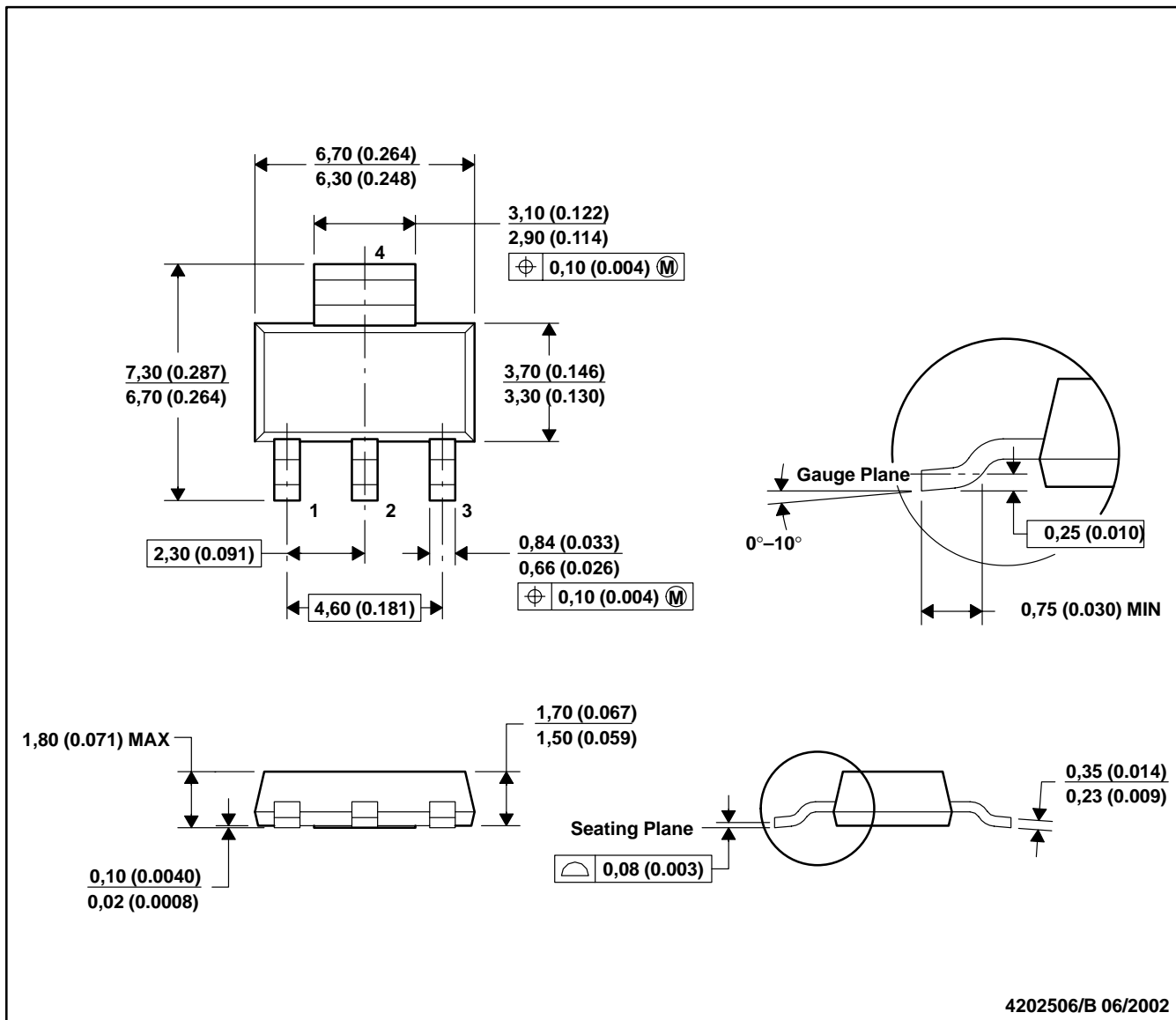
Since  $I_{ADJ}$  typically is 55  $\mu$ A, it is negligible in most applications.

- NOTES:
- A. Output capacitor selection is critical for regulator stability. The recommended minimum is 10- $\mu$ F tantalum or 50- $\mu$ F aluminum electrolytic, with either one having an ESR between 0.3  $\Omega$  and 22  $\Omega$ . Larger  $C_{OUT}$  values benefit the regulator by improving transient response and loop stability.
  - B.  $C_{ADJ}$  can be used to improve ripple rejection. Ensure that the impedance of  $C_{ADJ}$   $\left( X_{CADJ} = \frac{1}{2\pi f_{ripple} C_{ADJ}} \right)$  is  $< R1$  to prevent the ripple from being amplified. If  $C_{ADJ}$  is used, then a larger  $C_{OUT}$  is required (22- $\mu$ F tantalum or 150- $\mu$ F aluminum electrolytic).
  - C.  $C_{IN}$  is recommended if TLV1117 is not located near the power-supply filter.
  - D. An external diode is recommended to protect the regulator if the input instantaneously is shorted to GND.

**Figure 13. Basic Adjustable Regulator**

DCY (R-PDSO-G4)

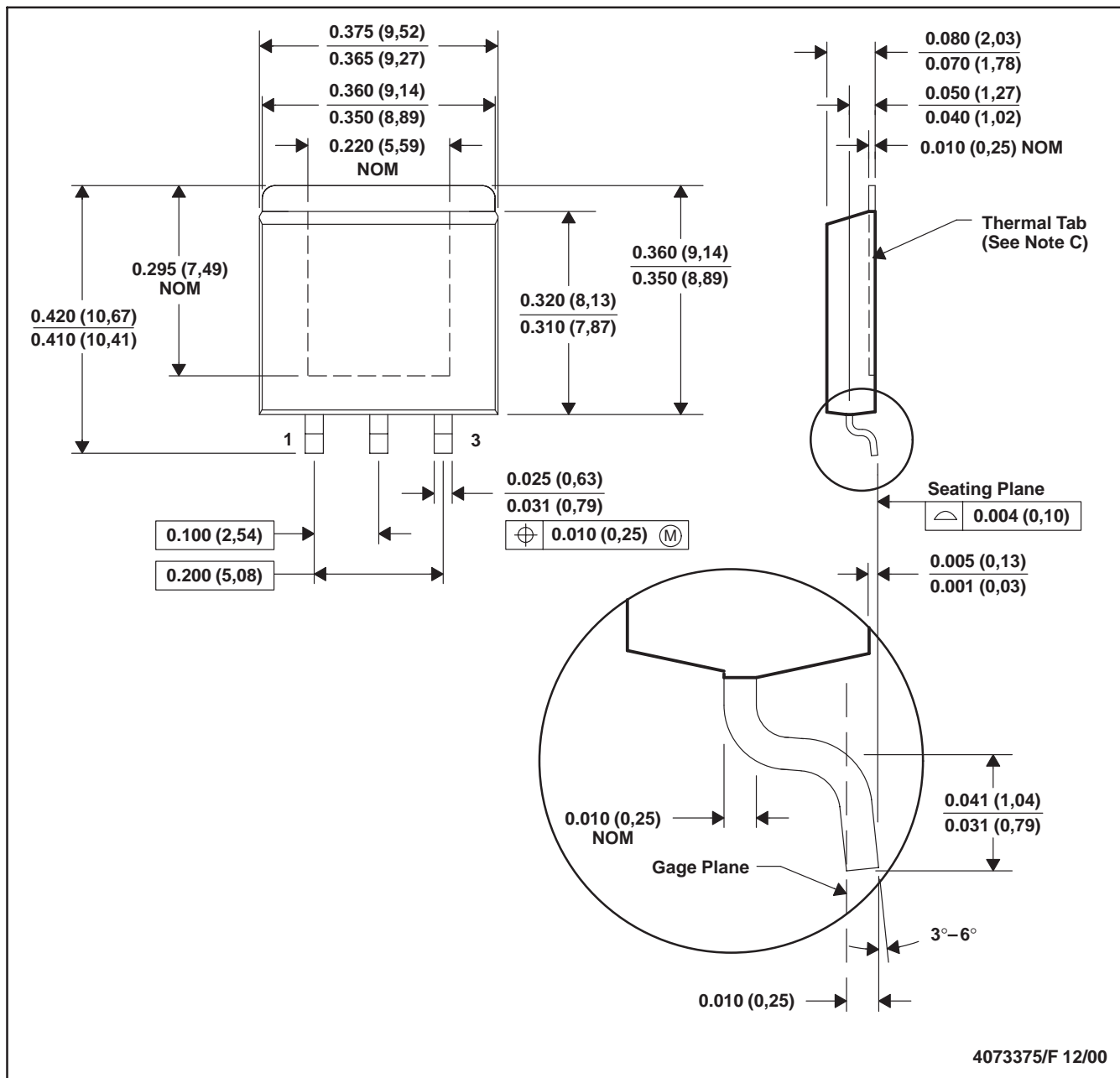
PLASTIC SMALL-OUTLINE



- NOTES: A. All linear dimensions are in millimeters (inches).  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion.  
 D. Falls within JEDEC TO-261 Variation AA.

KTE (R-PSFM-G3)

PowerFLEX™ PLASTIC FLANGE-MOUNT



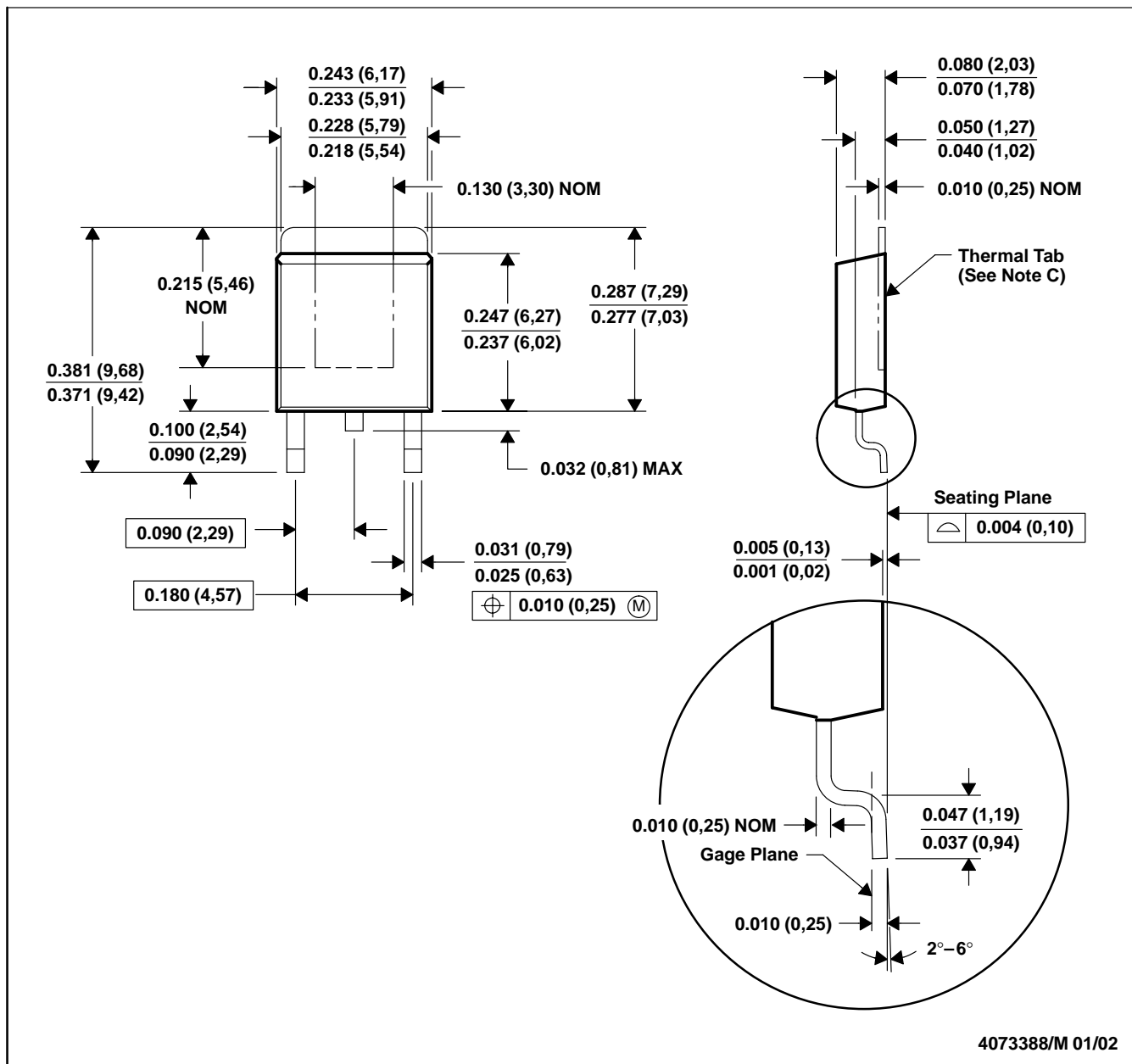
- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. The center lead is in electrical contact with the thermal tab.  
 D. Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).  
 E. Falls within JEDEC MO-169

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KTP (R-PSFM-G2)

PowerFLEX™ PLASTIC FLANGE-MOUNT PACKAGE



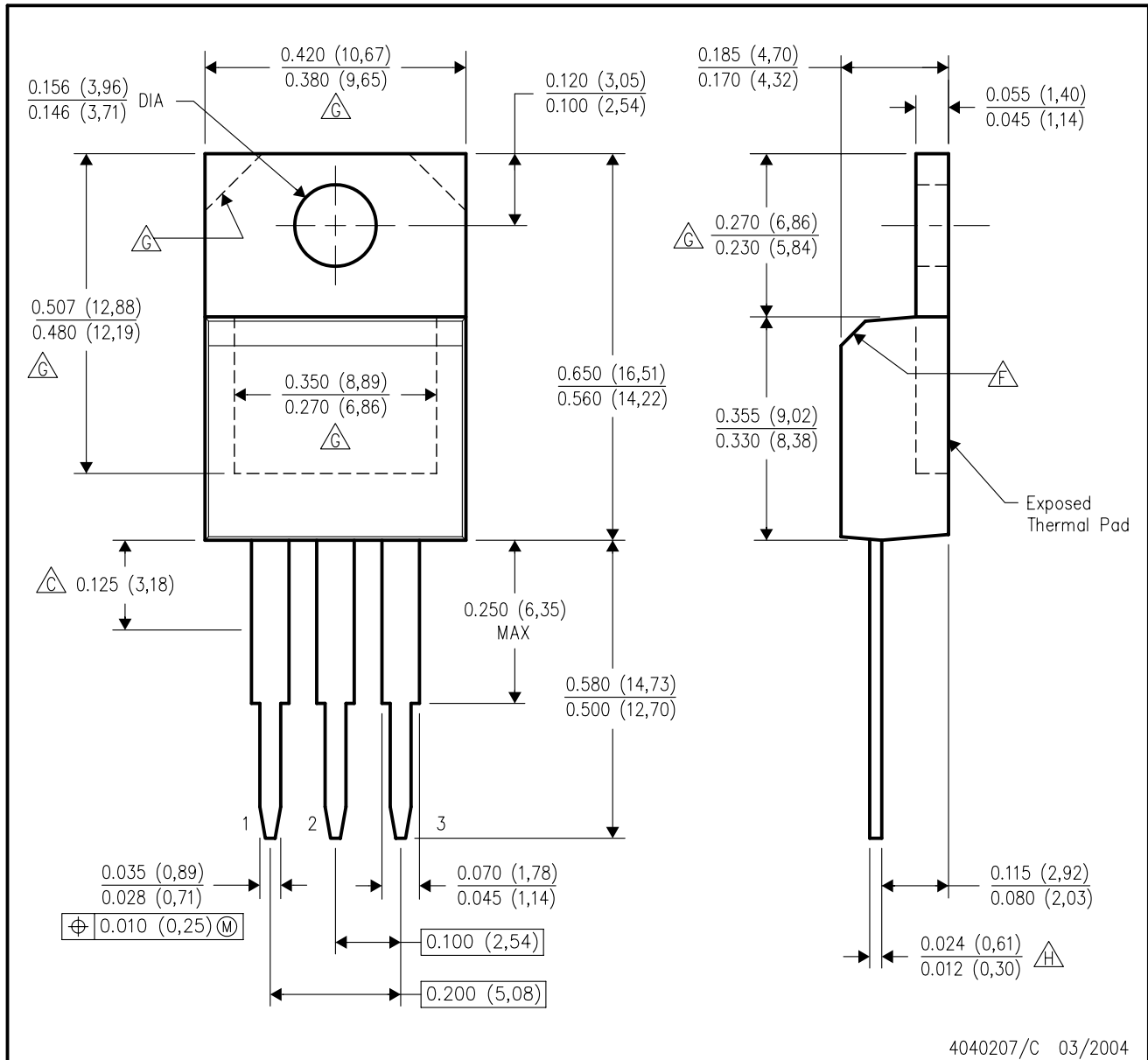
- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. The center lead is in electrical contact with the thermal tab.  
 D. Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).  
 E. Falls within JEDEC TO-252 variation AC.

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KC (R-PSFM-T3)

PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Lead dimensions are not controlled within this area.
  - D. All lead dimensions apply before solder dip.
  - E. The center lead is in electrical contact with the mounting tab.
  - F. The chamfer is optional.
  - G. Thermal pad contour optional within these dimensions.
  - H. Falls within JEDEC TO-220 variation AB, except minimum lead thickness.

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