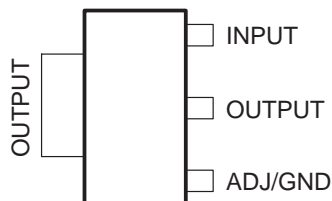


# TLV1117 ADJUSTABLE AND FIXED LOW-DROPOUT VOLTAGE REGULATORS

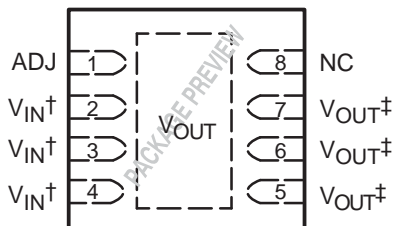
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- 1.5 V, 1.8 V, 2.5 V, 3.3 V, 5 V, and Adjustable Output Voltage Options
- Output Current of 800 mA
- Operates Down to 1.1-V Dropout
- Specified Dropout Voltage at Multiple Current Levels
- 0.2% Line Regulation Maximum
- 0.4% Load Regulation Maximum

DCY (SOT-223) PACKAGE  
(TOP VIEW)

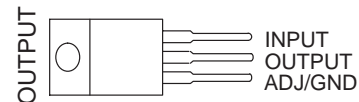


DRJ (QFN) PACKAGE  
(TOP VIEW)

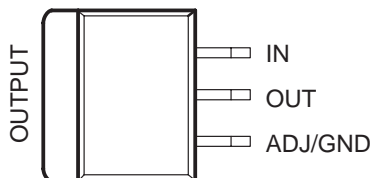


†  $V_{IN}$  pins (2, 3, 4) must be connected together.  
‡  $V_{OUT}$  pins (5, 6, 7) must be connected together.

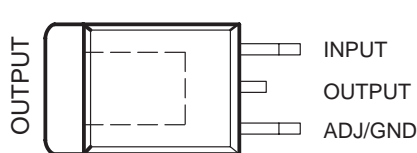
KCS (TO-220) PACKAGE  
(TOP VIEW)



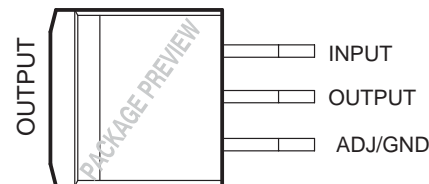
KTE (PowerFLEX™) PACKAGE  
(TOP VIEW)



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, 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	QFN (DRJ)	Reel of 1000	TLV1117-15CDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-15CDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-15CKTTR	PREVIEW
	1.8 V	QFN (DRJ)	Reel of 1000	TLV1117-18CDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-18CDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-18CKTTR	PREVIEW
	2.5 V	QFN (DRJ)	Reel of 1000	TLV1117-25CDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-25CDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-25CKTTR	PREVIEW
	3.3 V	QFN (DRJ)	Reel of 1000	TLV1117-33CDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-33CDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-33CKTTR	PREVIEW
	5 V	QFN (DRJ)	Reel of 1000	TLV1117-50CDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-50CDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-50CKTTR	PREVIEW
	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)	Reel of 2000	TLV1117CKTTR	PREVIEW		

† 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).

‡ Complies with TO-252, variation AC.

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## 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	QFN (DRJ)	Reel of 1000	TLV1117-15IDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-15IDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-15IKTTR	PREVIEW
	1.8 V	QFN (DRJ)	Reel of 1000	TLV1117-18IDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-18IDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-18IKTTR	PREVIEW
	2.5 V	QFN (DRJ)	Reel of 1000	TLV1117-25IDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-25IDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-25IKTTR	PREVIEW
	3.3 V	QFN (DRJ)	Reel of 1000	TLV1117-33IDRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-33IDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-33IKTTR	PREVIEW
	5 V	QFN (DRJ)	Reel of 1000	TLV1117-50DRJR	PREVIEW
		SOT-223 (DCY)	Reel of 2500	TLV1117-50IDCYR	PREVIEW
		TO-263 (KTT)	Reel of 2000	TLV1117-50IKTTR	PREVIEW
	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)	Reel of 2000	TLV1117IKTTR	PREVIEW		

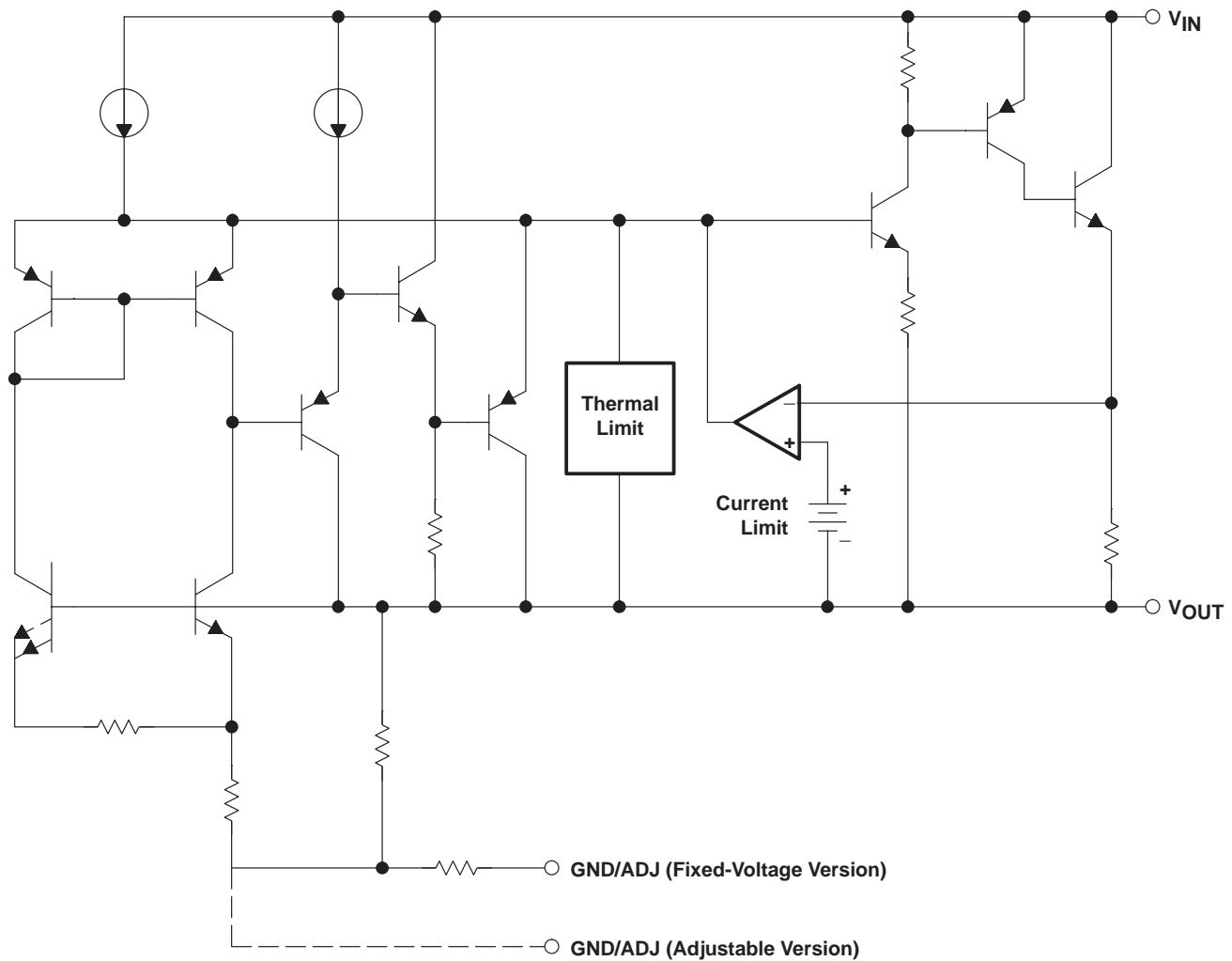
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

‡ Complies with TO-252, variation AC.

# 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 .....	20 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	$\theta_{JP}^\dagger$	$\theta_{JC}$	$\theta_{JA}$
PowerFLEX (KTE)	High K, JESD 51-5	2.7°C/W		23°C/W
PowerFLEX/TO-252 (KTP)	High K, JESD 51-5	1.4°C/W	19°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	17°C/W	19°C/W

$^\dagger$  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  $T_J(\text{max})$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(\text{max}) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.

### recommended operating conditions

		MINT $^\dagger$	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	
		TLV1117-33	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	

$^\dagger$  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:

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

# 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 CONDITION <sup>†</sup>	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	1.25	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	1.25	1.27	
	$V_{IN} = 3.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-15	1.485	1.5	1.515	
	$V_{IN} = 2.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		1.47	1.5	1.53	
	$V_{IN} = 3.8\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-18	1.782	1.8	1.818	
	$V_{IN} = 3.2\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		1.764	1.8	1.836	
	$V_{IN} = 4.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-25	2.475	2.5	2.525	
	$V_{IN} = 3.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		2.45	2.5	2.55	
	$V_{IN} = 5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-33	3.267	3.3	3.333	
	$V_{IN} = 4.75\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		3.235	3.3	3.365	
	$V_{IN} = 7\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-50	4.95	5	5.05	
	$V_{IN} = 6.5\text{ V}$ to $12\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		4.9	5	5.1	
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	mV	
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$	TLV1117-15	1	6		
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.2\text{ V}$ 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		
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.75\text{ V}$ 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	mV	
	$I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 2.9\text{ V}$	TLV1117-15	1	10		
	$I_{OUT} = 0$ 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 $800\text{ mA}$ , $V_{IN} = 4.75\text{ V}$	TLV1117-33	1	10		
	$I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 6.5\text{ V}$	TLV1117-50	1	15		
Dropout voltage, $V_{DO}$ (see Note 2)	$I_{OUT} = 100\text{ mA}$		1.1	1.2	V	
	$I_{OUT} = 500\text{ mA}$		1.15	1.25		
	$I_{OUT} = 800\text{ mA}$		1.2	1.3		
Current limit	$V_{IN} - V_{OUT} = 5\text{ V}$ , $T_J = 25^\circ\text{C}$ <sup>‡</sup>		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	$V_{IN} - V_{OUT} = 3\text{ V}$ , $V_{ripple} = 1\text{ V}_{pp}$ , $f = 120\text{ Hz}$		60	78		dB

<sup>†</sup> 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.

<sup>‡</sup> Current limit test specified under recommended operating conditions

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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**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, $T_A = 125^\circ\text{C}$		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	1.25	1.262	V
	$I_{OUT} = 10\text{ mA}$ to $800\text{ mA}$ , $V_{IN} - V_{OUT} = 1.4\text{ V}$ to $10\text{ V}$	TLV1117	1.2	1.25	1.29	
	$V_{IN} = 3.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-15	1.485	1.5	1.515	
	$V_{IN} = 2.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		1.44	1.5	1.56	
	$V_{IN} = 3.8\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-18	1.782	1.8	1.818	
	$V_{IN} = 3.2\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		1.728	1.8	1.872	
	$V_{IN} = 4.5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-25	2.475	2.5	2.525	
	$V_{IN} = 3.9\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		2.4	2.5	2.6	
	$V_{IN} = 5\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-33	3.267	3.3	3.333	
	$V_{IN} = 4.75\text{ V}$ to $10\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		3.168	3.3	3.432	
	$V_{IN} = 7\text{ V}$ , $I_{OUT} = 10\text{ mA}$ , $T_J = 25^\circ\text{C}$	TLV1117-50	4.95	5	5.05	
	$V_{IN} = 6.5\text{ V}$ to $12\text{ V}$ , $I_{OUT} = 0$ to $800\text{ mA}$		4.8	5	5.2	
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	mV	
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 2.9\text{ V}$ to $10\text{ V}$	TLV1117-15	1	4.5		
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 3.2\text{ V}$ 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		
	$I_{OUT} = 0\text{ mA}$ , $V_{IN} = 4.75\text{ V}$ 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 $800\text{ mA}$ , $V_{IN} = 4.75\text{ V}$	TLV1117-33	1	15		
	$I_{OUT} = 0$ to $800\text{ mA}$ , $V_{IN} = 6.5\text{ V}$	TLV1117-50	1	20		
Dropout voltage, $V_{DO}$ (see Note 2)	$I_{OUT} = 100\text{ mA}$		1.1	1.3	V	
	$I_{OUT} = 500\text{ mA}$		1.15	1.35		
	$I_{OUT} = 800\text{ mA}$		1.2	1.4		
Current limit	$V_{IN} - V_{OUT} = 5\text{ V}$ , $T_J = 25^\circ\text{C}^\ddagger$		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	$V_{IN} - V_{OUT} = 3\text{ V}$ , $V_{ripple} = 1\text{ V}_{pp}$ , $f = 120\text{ Hz}$		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.

‡ Current limit test specified under recommended operating conditions

NOTE 2: Dropout is defined as the  $V_{IN}$  to  $V_{OUT}$  differential at which  $V_{OUT}$  drops  $100\text{ mV}$  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

SLVS561B – DECEMBER 2004 – REVISED APRIL 2005

**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, $T_A = 125^\circ\text{C}$		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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### TYPICAL CHARACTERISTICS (GRAPHS PREVIEW)

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

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

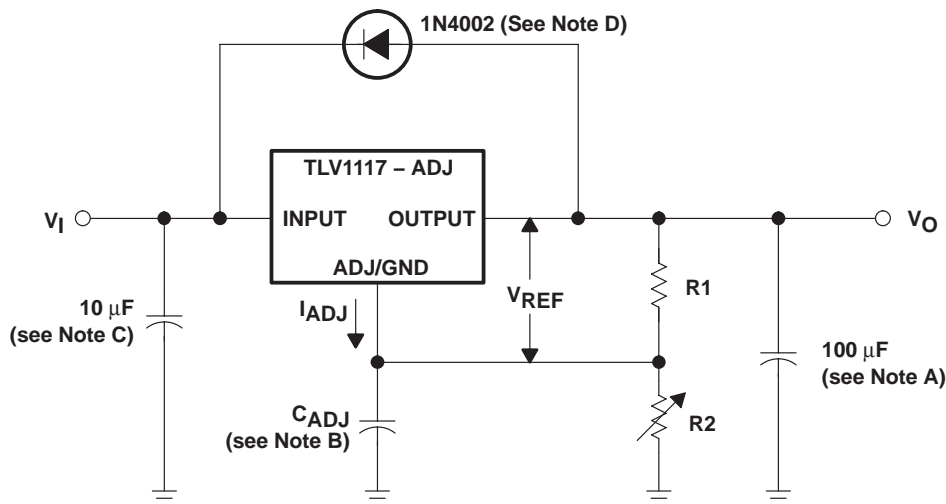
Figure 9. TLV1117-33 Load Transient Response

Figure 10. TLV1117-33 Line Transient Response



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### APPLICATION INFORMATION



$V_{OUT}$  is calculated as:

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

Because  $I_{ADJ}$  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 11. Basic Adjustable Regulator**

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
TLV1117-15CDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-15CDCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117-15CKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-15IDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-15IDCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117-15IKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-18CDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-18CDCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117-18CKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-18IDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-18IDCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117-18IKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-25CKTPR	PREVIEW	PFM	KTP	2	3000	TBD	Call TI	Call TI
TLV1117-33CDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-33CDCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117-33CKC	PREVIEW	TO-220	KC	3	50	TBD	Call TI	Call TI
TLV1117-33CKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-33CKTT	PREVIEW	DDPAK/ TO-263	KTT	3	50	TBD	Call TI	Call TI
TLV1117-33CKTTR	PREVIEW	DDPAK/ TO-263	KTT	3	1000	TBD	Call TI	Call TI
TLV1117-33DCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-33IKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-50CDCY	PREVIEW	SOT-223	DCY	4	80	TBD	Call TI	Call TI
TLV1117-50CKCS	PREVIEW	TO-220	KCS	3	50	TBD	Call TI	Call TI
TLV1117-50CKTER	PREVIEW	PFM	KTE	3	2000	TBD	Call TI	Call TI
TLV1117-50CKTPR	PREVIEW	PFM	KTP	2	3000	TBD	Call TI	Call TI
TLV1117-50CKTT	PREVIEW	DDPAK/ TO-263	KTT	3	50	TBD	Call TI	Call TI
TLV1117-50CKTTR	PREVIEW	DDPAK/ TO-263	KTT	3		TBD	Call TI	Call TI
TLV1117-50DCYR	PREVIEW	SOT-223	DCY	4	2500	TBD	Call TI	Call TI
TLV1117CDCY	ACTIVE	SOT-223	DCY	4	80	TBD	CU	Level-2-235C-1 YEAR
TLV1117CDCYR	ACTIVE	SOT-223	DCY	4	2500	TBD	CU	Level-2-235C-1 YEAR
TLV1117CKC	PREVIEW	TO-220	KC	3	50	TBD	Call TI	Call TI
TLV1117CKCS	ACTIVE	TO-220	KCS	3	50	TBD	Call TI	Level-NC-NC-NC
TLV1117CKCSE3	ACTIVE	TO-220	KCS	3	50	Pb-Free (RoHS)	Call TI	Level-NC-NC-NC
TLV1117CKTER	ACTIVE	PFM	KTE	3	2000	TBD	Call TI	Level-1-220C-UNLIM
TLV1117CKTPR	ACTIVE	PFM	KTP	2	3000	TBD	CU SNPB	Level-1-220C-UNLIM
TLV1117IDCY	ACTIVE	SOT-223	DCY	4	80	TBD	CU	Level-2-235C-1 YEAR
TLV1117IDCYR	ACTIVE	SOT-223	DCY	4	2500	TBD	CU	Level-2-235C-1 YEAR
TLV1117IKCS	ACTIVE	TO-220	KCS	3	50	TBD	Call TI	Level-NC-NC-NC

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
TLV1117IKCSE3	ACTIVE	TO-220	KCS	3	50	Pb-Free (RoHS)	Call TI	Level-NC-NC-NC
TLV1117IKTER	ACTIVE	PFM	KTE	3	2000	TBD	Call TI	Level-1-220C-UNLIM
TLV1117IKTPR	ACTIVE	PFM	KTP	2	3000	TBD	CU SNPB	Level-1-220C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.

**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)

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

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DCY (R-PDSO-G4)

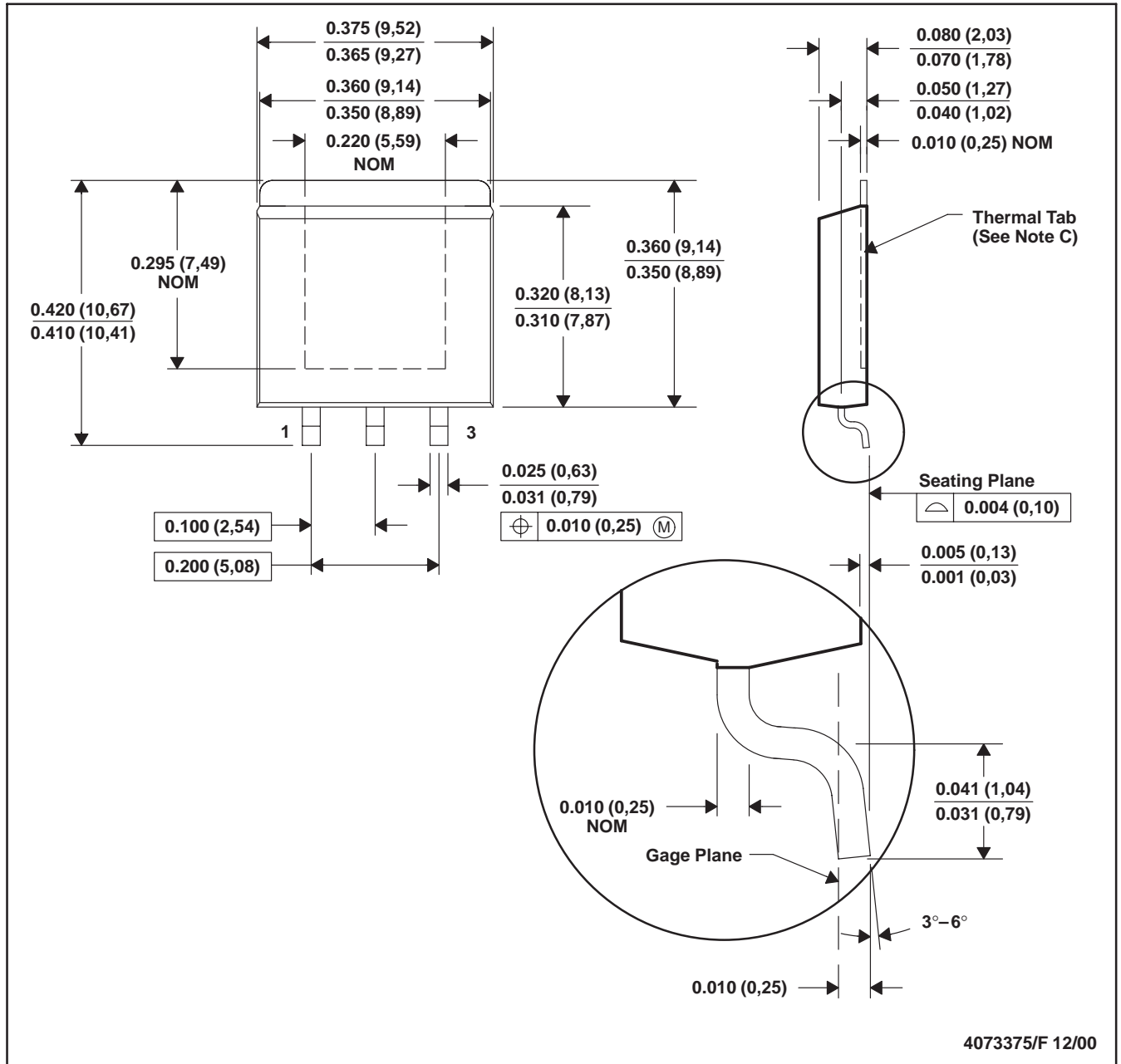
PLASTIC SMALL-OUTLINE



- 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).  
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 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

PowerFLEX is a trademark of Texas Instruments.



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.

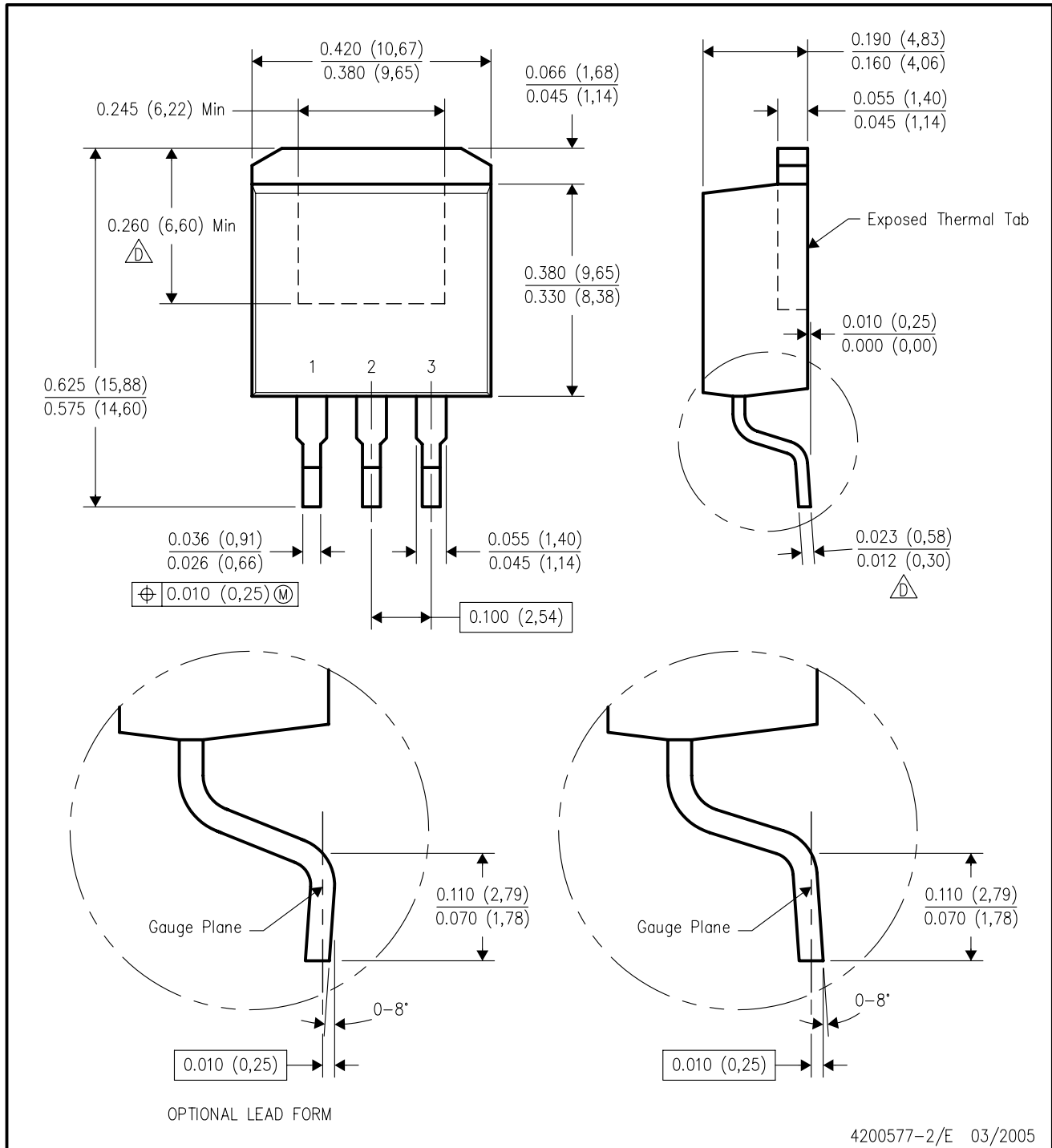
PowerFLEX is a trademark of Texas Instruments.





KTT (R-PSFM-G3)

PLASTIC FLANGE-MOUNT PACKAGE

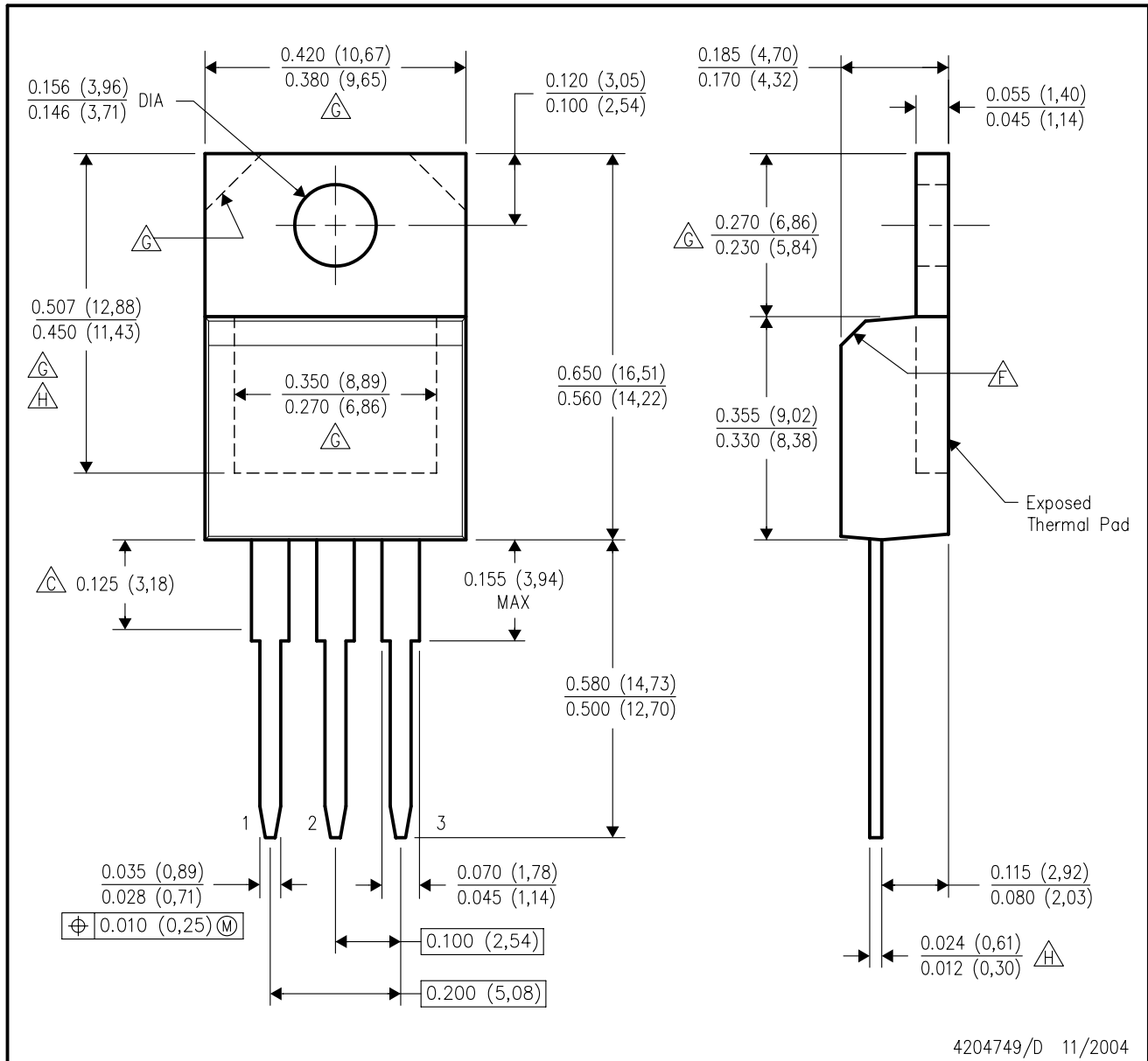


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- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion. Mold flash or protrusion not to exceed 0.005 (0,13) per side.
- △ Falls within JEDEC TO-263 variation AA, except minimum lead thickness and minimum exposed pad length.

KCS (R-PSFM-T3)

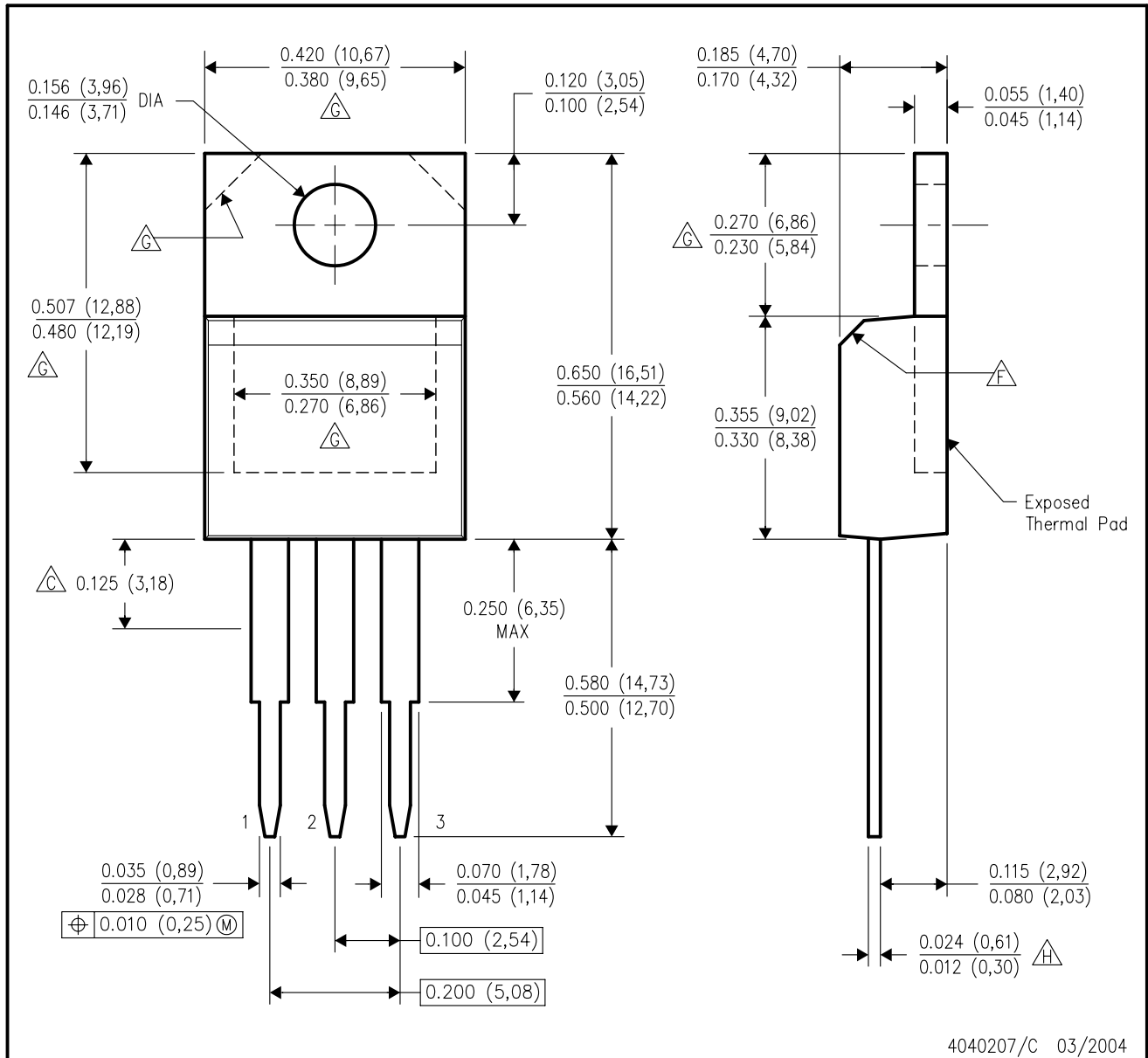
PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - △ 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.
  - △ The chamfer is optional.
  - △ Thermal pad contour optional within these dimensions.
  - △ Falls within JEDEC TO-220 variation AB, except minimum lead thickness and minimum exposed pad length.

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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