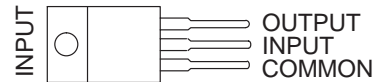


# **μA7900 SERIES** **NEGATIVE-VOLTAGE REGULATORS**

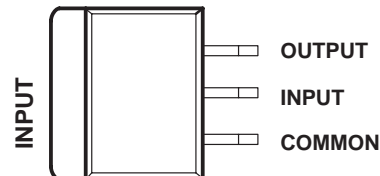
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- 3-Terminal Regulators
- Output Current Up To 1.5 A
- No External Components
- Internal Thermal Overload Protection
- High-Power Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation

**KCS (TO-220) PACKAGE**  
**(TOP VIEW)**



**KTE PACKAGE**  
**(TOP VIEW)**



## **description/ordering information**

This series of fixed-negative-voltage integrated-circuit voltage regulators is designed to complement Series μA7800 in a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current limiting and thermal shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents and also as the power-pass element in precision regulators.

## **ORDERING INFORMATION**

$T_J$	$V_{O(NOM)}$ (V)	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 125°C	–15	Power Flex (KTE)	Reel of 2000	μA7915CKTER	μA7915C
		TO-220, short shoulder (KCS)	Tube of 50	μA7915CKCS	μA7915C
	–12	Power Flex (KTE)	Reel of 2000	μA7912CKTER	μA7912C
		TO-220, short shoulder (KCS)	Tube of 50	μA7912CKCS	μA7912C
	–8	Power Flex (KTE)	Reel of 2000	μA7908CKTER	μA7908C
		TO-220, short shoulder (KCS)	Tube of 50	μA7908CKCS	μA7908C
	–5	Power Flex (KTE)	Reel of 2000	μA7905CKTER	μA7905C
		TO-220, short shoulder (KCS)	Tube of 50	μA7905CKCS	μA7905C

† 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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**TEXAS  
INSTRUMENTS**

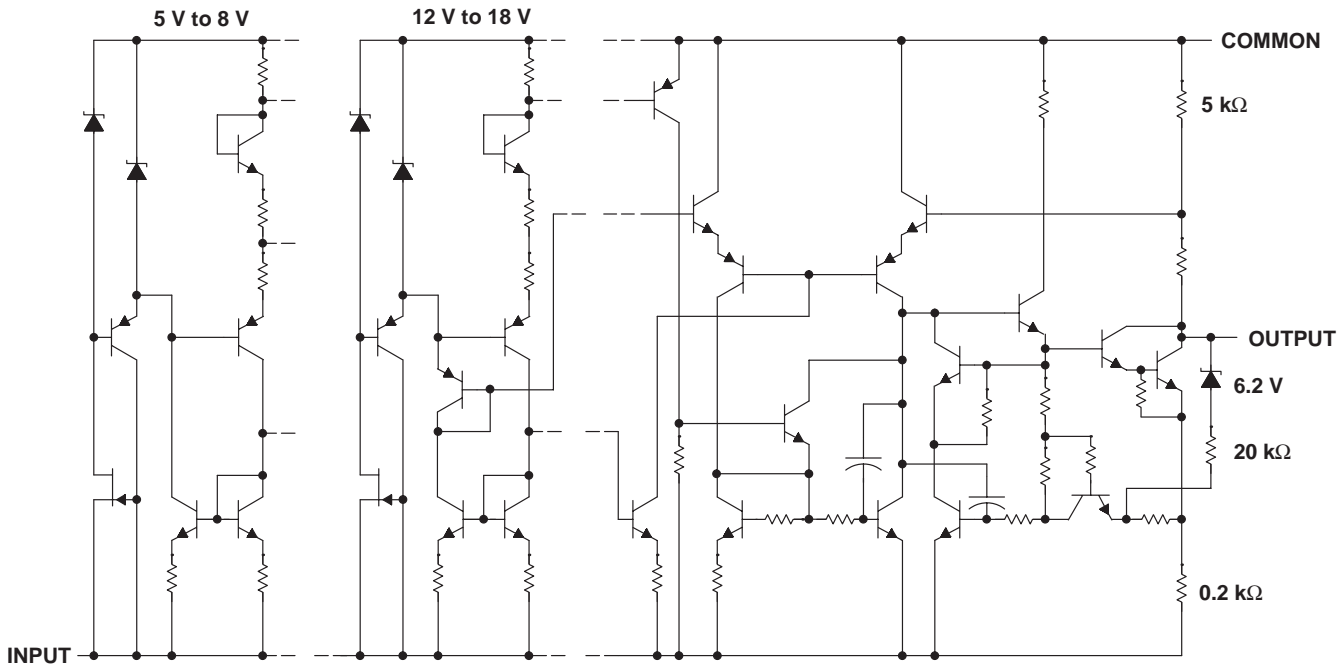
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**μA7900 SERIES**  
**NEGATIVE-VOLTAGE REGULATORS**

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**schematic**



All component values are nominal.

**absolute maximum ratings over virtual junction temperature range (unless otherwise noted)†**

Input voltage, $V_I$ : $\mu A7924C$	–40 V
All others	–35 V
Operating virtual junction temperature, $T_J$	150°C
Storage temperature range, $T_{stg}$	–65 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.

**package thermal data (see Note 1)**

PACKAGE	BOARD	$\theta_{JC}$	$\theta_{JA}$
Power Flex (KTE)	High K, JESD 51-5	3°C/W	23°C/W
TO-220 (KCS)	High K, JESD 51-5	3°C/W	19°C/W

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**

			MIN	MAX	UNIT
$V_I$	Input voltage	$\mu A7905C$	–7	–25	V
		$\mu A7908C$	–10.5	–25	
		$\mu A7912C$	–14.5	–30	
		$\mu A7915C$	–17.5	–30	
$I_O$	Output current			1.5	A
$T_J$	Operating virtual junction temperature		0	125	°C

# **μA7900 SERIES** **NEGATIVE-VOLTAGE REGULATORS**

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**electrical characteristics at specified virtual junction temperature,  $V_I = -10$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J$ †	μA7905C			UNITS
			MIN	TYP	MAX	
Output voltage‡		25°C	-4.8	-5	-5.2	V
	$I_O = 5$ mA to 1 A, $V_I = -7$ V to -20 V, $P \leq 15$ W	0°C to 125°C	-4.75		-5.25	
Input regulation	$V_I = -7$ V to -25 V			12.5	50	mV
	$V_I = -8$ V to -12 V			4	15	
Ripple rejection	$V_I = -8$ V to -18 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			15	100	mV
	$I_O = 250$ mA to 750 mA			5	50	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-0.4		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		125		μV
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	$V_I = -7$ V to -25 V			0.15	0.5	mA
	$I_O = 5$ mA to 1 A			0.08	0.5	
Peak output current		25°C		2.1		A

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2-μF capacitor across the input and a 1-μF capacitor across the output.

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

**electrical characteristics at specified virtual junction temperature,  $V_I = -11$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J$ †	μA7906C			UNITS
			MIN	TYP	MAX	
Output voltage‡		25°C	-5.75	-6	-6.25	V
	$I_O = 5$ mA to 1 A, $V_I = -8$ V to -21 V, $P \leq 15$ W	0°C to 125°C	-5.7		-6.3	
Input regulation	$V_I = -8$ V to -25 V			12.5	120	mV
	$V_I = -9$ V to -13 V			4	60	
Ripple rejection	$V_I = -9$ V to -19 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			15	120	mV
	$I_O = 250$ mA to 750 mA			5	60	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-0.4		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		150		μV
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	$V_I = -8$ V to -25 V			0.15	1.3	mA
	$I_O = 5$ mA to 1 A			0.08	0.5	
Peak output current		25°C		2.1		A

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2-μF capacitor across the input and a 1-μF capacitor across the output.

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.



# **μA7900 SERIES** **NEGATIVE-VOLTAGE REGULATORS**

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**electrical characteristics at specified virtual junction temperature,  $V_I = -14$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J$ †	μA7908C			UNITS
			MIN	TYP	MAX	
Output voltage‡		25°C	-7.7	-8	-8.3	V
	$I_O = 5$ mA to 1 A, $V_I = -10.5$ V to -23 V, $P \leq 15$ W	0°C to 125°C	-7.6		-8.4	
Input regulation	$V_I = -10.5$ V to -25 V			12.5	160	mV
	$V_I = -11$ V to -17 V			4	80	
Ripple rejection	$V_I = -11.5$ V to -21.5 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			15	160	mV
	$I_O = 250$ mA to 750 mA			5	80	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-0.6		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		200		μV
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	$V_I = -10.5$ V to -25 V			0.15	1	mA
	$I_O = 5$ mA to 1 A			0.08	0.5	
Peak output current		25°C		2.1		A

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2-μF capacitor across the input and a 1-μF capacitor across the output.

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

**electrical characteristics at specified virtual junction temperature,  $V_I = -19$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J$ †	μA7912C			UNITS
			MIN	TYP	MAX	
Output voltage‡		25°C	-11.5	-12	-12.5	V
	$I_O = 5$ mA to 1 A, $V_I = -14.5$ V to -27 V, $P \leq 15$ W	0°C to 125°C	-11.4		-12.6	
Input regulation	$V_I = -14.5$ V to -30 V			5	80	mV
	$V_I = -16$ V to -22 V			3	30	
Ripple rejection	$V_I = -15$ V to -25 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			15	200	mV
	$I_O = 250$ mA to 750 mA			5	75	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-0.8		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		300		μV
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	$V_I = -14.5$ V to -30 V			0.04	0.5	mA
	$I_O = 5$ mA to 1 A			0.06	0.5	
Peak output current		25°C		2.1		A

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2-μF capacitor across the input and a 1-μF capacitor across the output.

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.



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# $\mu$ A7900 SERIES NEGATIVE-VOLTAGE REGULATORS

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**electrical characteristics at specified virtual junction temperature,  $V_I = -23$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J^\dagger$	$\mu$ A7915C			UNITS
			MIN	TYP	MAX	
Output voltage $^\ddagger$		25°C	-14.4	-15	-15.6	V
	$I_O = 5$ mA to 1 A, $V_I = -17.5$ V to -30 V, $P \leq 15$ W	0°C to 125°C	-14.25		-15.75	
Input regulation	$V_I = -17.5$ V to -30 V			5	100	mV
	$V_I = -20$ V to -26 V			3	50	
Ripple rejection	$V_I = -18.5$ V to -28.5 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			20	300	mV
	$I_O = 250$ mA to 750 mA			8	150	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		375		$\mu$ V
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	$V_I = -17.5$ V to -30 V			0.04	0.5	mA
	$I_O = 5$ mA to 1 A			0.06	0.5	
Peak output current		25°C		2.1		A

$^\dagger$  Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2- $\mu$ F capacitor across the input and a 1- $\mu$ F capacitor across the output.

$^\ddagger$  This specification applies only for dc power dissipation permitted by absolute maximum ratings.

**electrical characteristics at specified virtual junction temperature,  $V_I = -27$  V,  $I_O = 500$  mA (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_J^\dagger$	$\mu$ A7918C			UNITS
			MIN	TYP	MAX	
Output voltage $^\ddagger$		25°C	-17.3	-18	-18.7	V
	$I_O = 5$ mA to 1 A, $V_I = -21$ V to -33 V, $P \leq 15$ W	0°C to 125°C	-17.1		-18.9	
Input regulation	$V_I = -21$ V to -33 V			5	360	mV
	$V_I = -24$ V to -30 V			3	180	
Ripple rejection	$V_I = -22$ V to -32 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			30	360	mV
	$I_O = 250$ mA to 750 mA			10	180	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		450		$\mu$ V
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	$V_I = -21$ V to -33 V			0.04	1	mA
	$I_O = 5$ mA to 1 A			0.06	0.5	
Peak output current		25°C		2.1		A

$^\dagger$  Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2- $\mu$ F capacitor across the input and a 1- $\mu$ F capacitor across the output.

$^\ddagger$  This specification applies only for dc power dissipation permitted by absolute maximum ratings.



# **μA7900 SERIES** **NEGATIVE-VOLTAGE REGULATORS**

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**electrical characteristics at specified virtual junction temperature,  $V_I = -33$  V,  $I_O = 500$  mA (unless otherwise noted)**

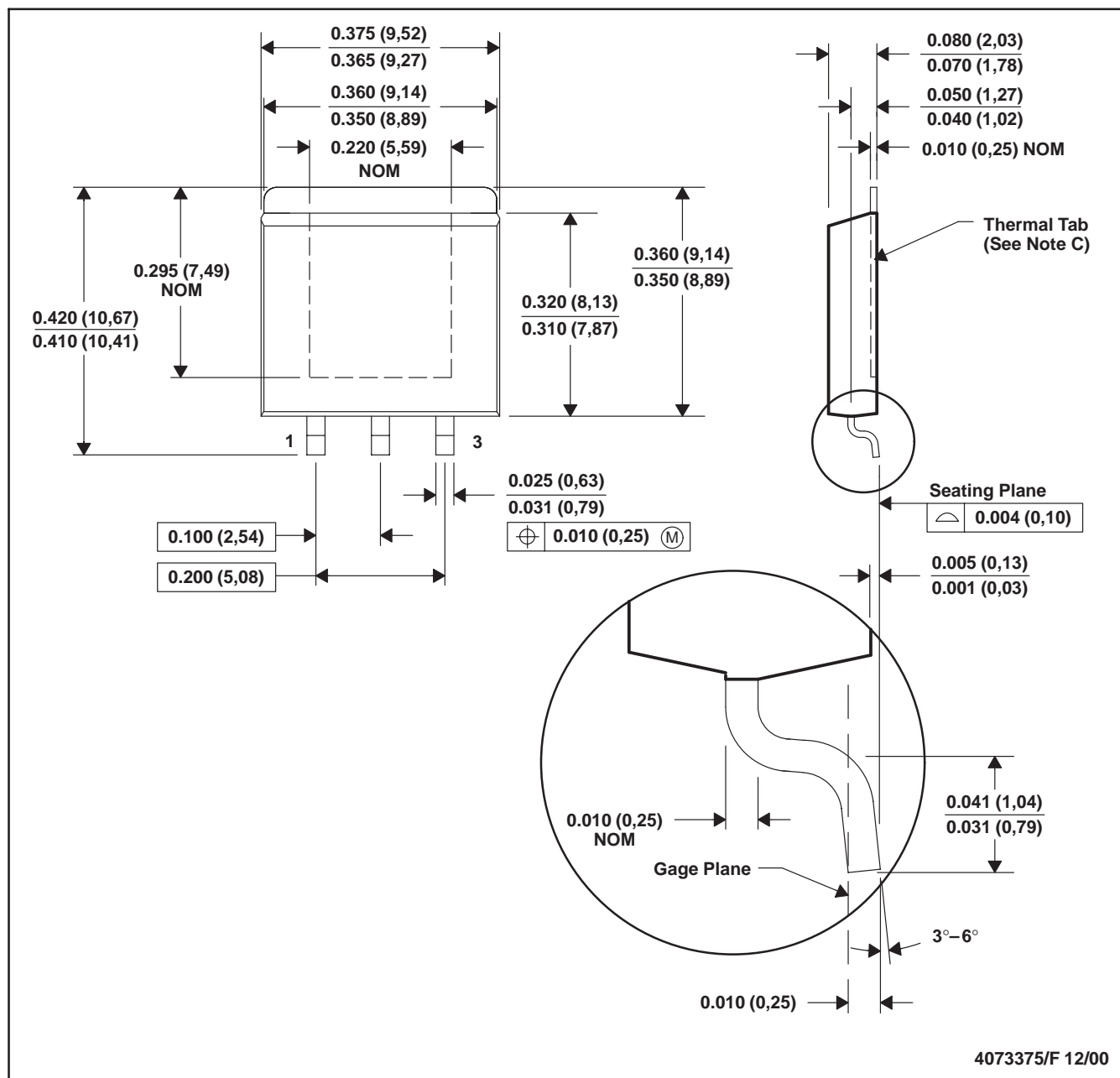
PARAMETER	TEST CONDITIONS	$T_J$ †	μA7924C			UNITS
			MIN	TYP	MAX	
Output voltage‡		25°C	-23	-24	-25	V
	$I_O = 5$ mA to 1 A, $V_I = -27$ V to -38 V, $P \leq 15$ W	0°C to 125°C	-22.8		-25.2	
Input regulation	$V_I = -27$ V to -38 V			5	480	mV
	$V_I = -30$ V to -36 V			3	240	
Ripple rejection	$V_I = -28$ V to -38 V, $f = 120$ Hz	0°C to 125°C	54	60		dB
Output regulation	$I_O = 5$ mA to 1.5 A			85	480	mV
	$I_O = 250$ mA to 750 mA			25	240	
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C		-1		mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C		600		μV
Dropout voltage	$I_O = 1$ A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	$V_I = -27$ V to -38 V			0.04	1	mA
	$I_O = 5$ mA to 1 A			0.06	0.5	
Peak output current		25°C		2.1		A

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 2-μF capacitor across the input and a 1-μF capacitor across the output.

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

## KTE (R-PSFM-G3)

## PowerFLEX™ PLASTIC FLANGE-MOUNT

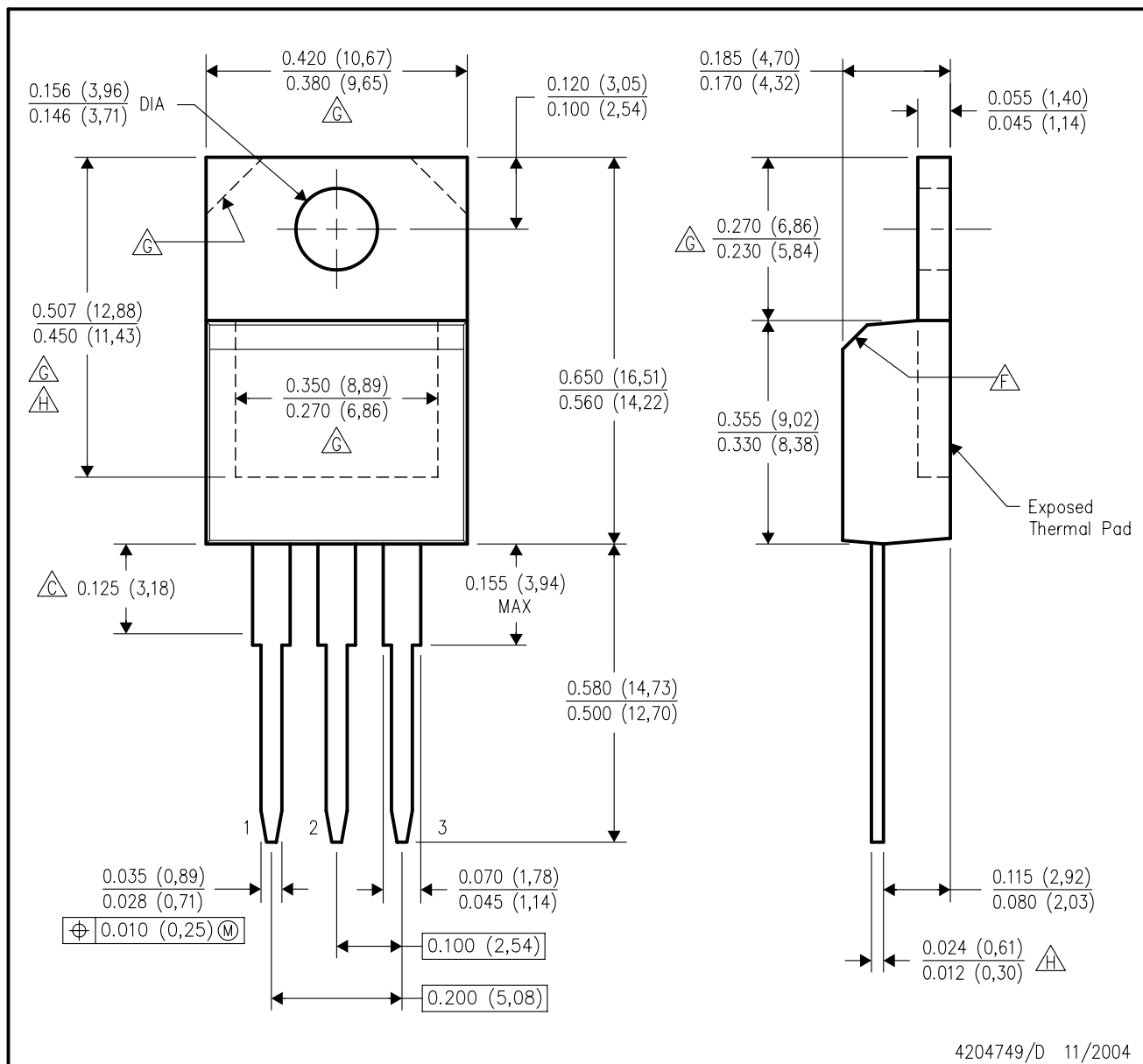


- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - The center lead is in electrical contact with the thermal tab.
  - Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).
  - Falls within JEDEC MO-169

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## KCS (R-PSFM-T3)

## PLASTIC FLANGE-MOUNT PACKAGE



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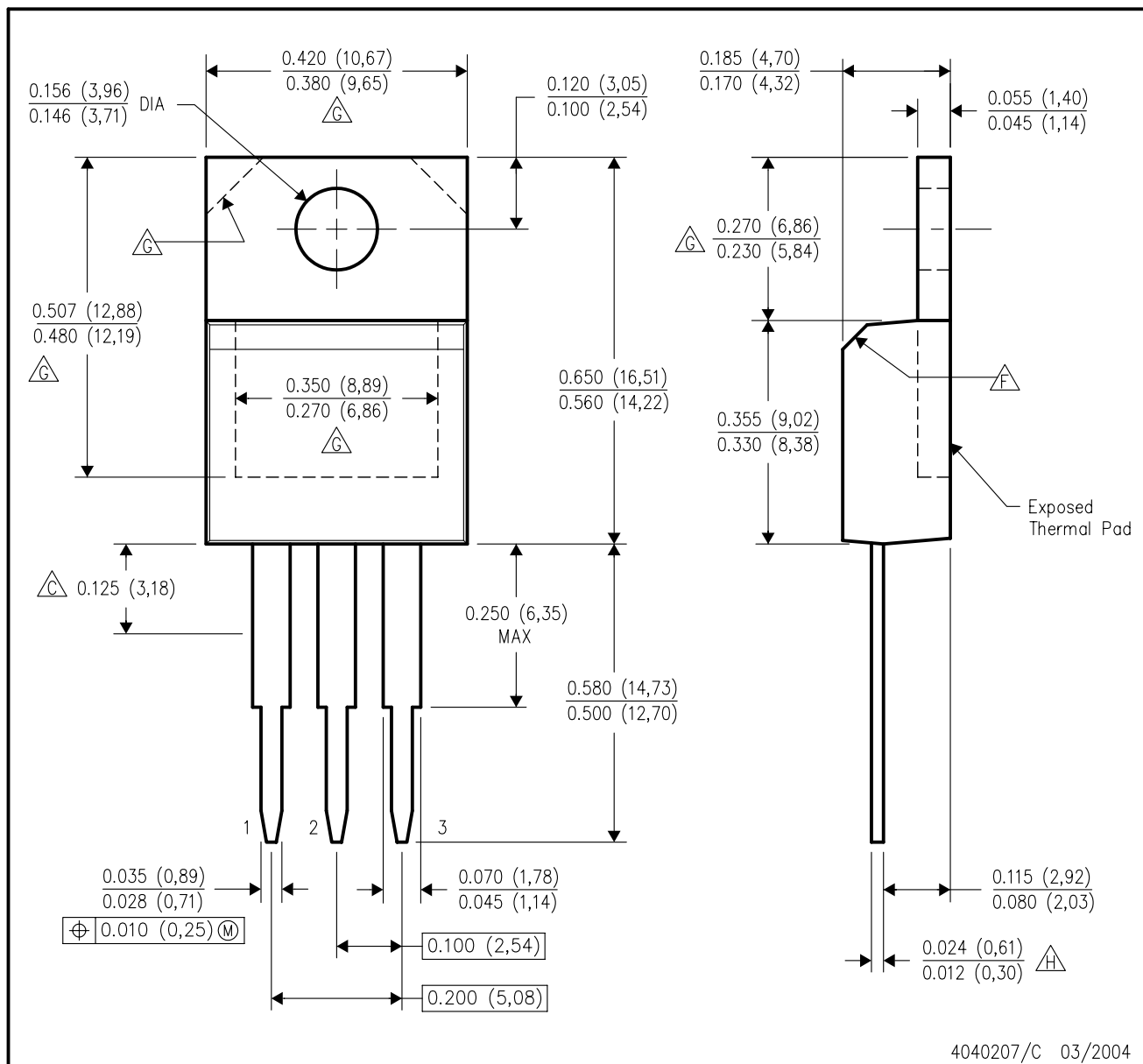
## NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. 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 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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Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265

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