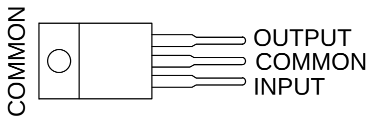
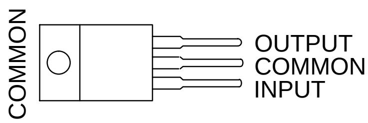
The µA78M10 and µA78M15 are obsolete and are no longer supplied

- **3-Terminal Regulators**
- **Output Current Up To 500 mA**
- **No External Components**
- **Internal Thermal-Overload Protection**
- **High Power-Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**

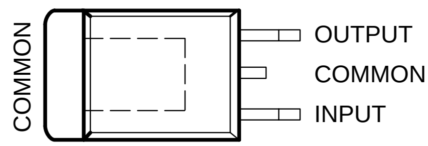
KC (TO-220) PACKAGE
(TOP VIEW)



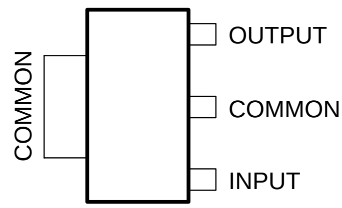
KCS (TO-220) PACKAGE
(TOP VIEW)



KTP PACKAGE
(TOP VIEW)



DCY (SOT-223) PACKAGE
(TOP VIEW)



description/ordering information

ORDERING INFORMATION

T_J	V_O(NOM) (V)	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 125°C	3.3	Power Flex (KTP)	Reel of 3000	µA78M33CKTPR	UA78M33C
		SOT-223 (DCY)	Tube of 80	µA78M33CDCY	C3
			Reel of 2500	µA78M33CDCYR	
		TO-220 (KC)	Tube of 50	µA78M33CKC	UA78M33C
	5	Power Flex (KTP)	Reel of 3000	µA78M05CKTPR	UA78M05C
		SOT-223 (DCY)	Tube of 80	µA78M05CDCY	C5
			Reel of 2500	µA78M05CDCYR	
		TO-220 (KC)	Tube of 50	µA78M05CKC	UA78M05C
		TO-220, short shoulder (KCS)	Tube of 20	µA78M05CKCS	
	6	Power Flex (KTP)	Reel of 3000	µA78M06CKTPR	UA78M06C
	8	Power Flex (KTP)	Reel of 3000	µA78M08CKTPR	UA78M08C
		SOT-223 (DCY)	Tube of 80	µA78M08CDCY	C8
			Reel of 2500	µA78M08CDCYR	
		TO-220 (KC)	Tube of 50	µA78M08CKC	UA78M08C
	9	Power Flex (KTP)	Reel of 3000	µA78M09CKTPR	UA78M09C
	12	Power Flex (KTP)	Reel of 3000	µA78M12CKTPR	UA78M12C
		TO-220 (KC)	Tube of 50	µA78M12CKC	UA78M12C

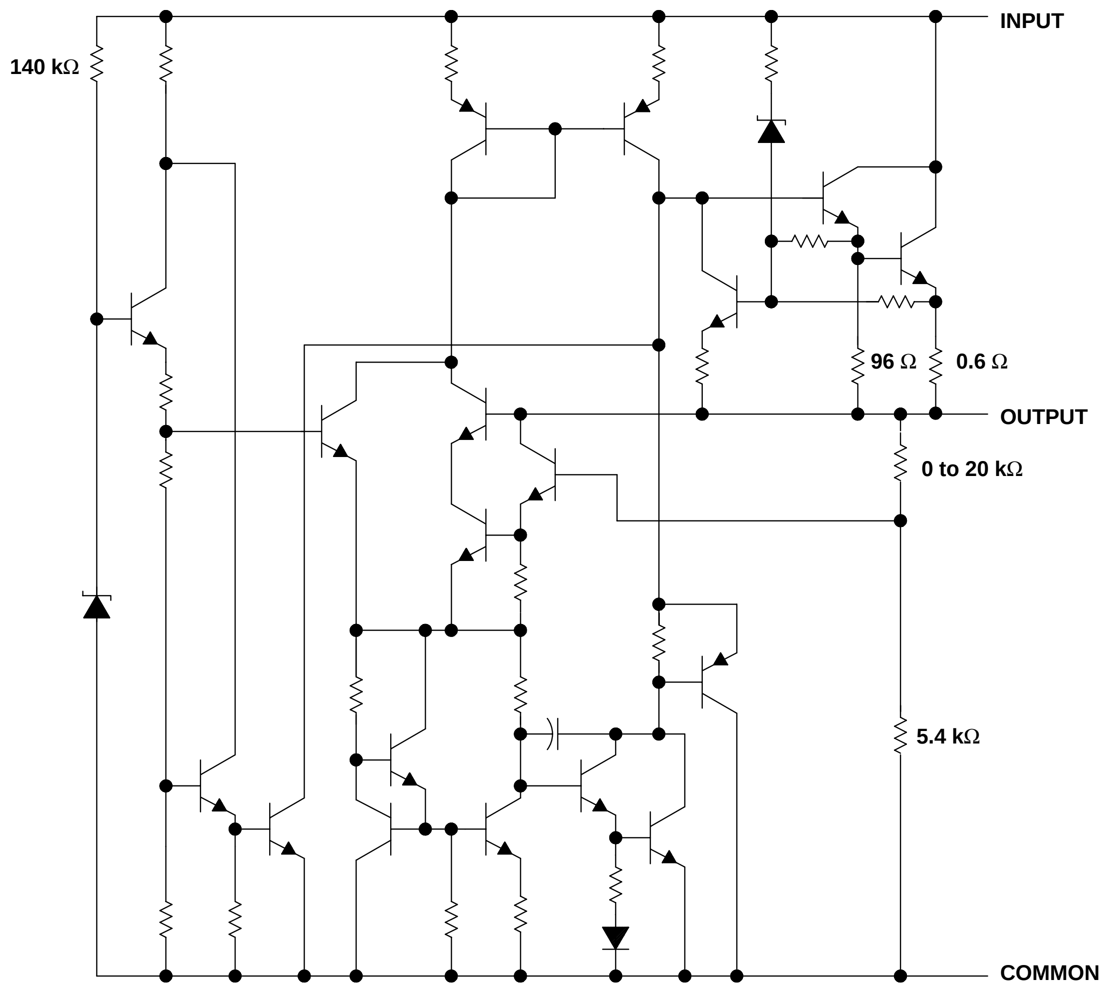
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

The μA78M10 and μA78M15 are obsolete and are no longer supplied

description/ordering information (continued)

This series of fixed-voltage integrated-circuit voltage regulators is designed for 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 500 mA 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.

schematic



Resistor values shown are nominal.

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

Input voltage, V_I . . . . 35 V
Operating virtual junction temperature, T_J . . . . 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . 260°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.

package thermal data (see Note 1)

PACKAGE	BOARD	θ_{JC}	θ_{JA}
POWER-FLEX (KTP)	High K, JESD 51-5	19°C/W	28°C/W
SOT-223 (DCY)	High K, JESD 51-7	4°C/W	53°C/W
TO-220 (KC/KCS)	High K, JESD 51-5	3°C/W	19°C/W

NOTE 1: Maximum power dissipation is a function of T_J(max), θ_{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

			MIN	MAX	UNIT
V_I	Input voltage	µA78M33	5.3	25	V
		µA78M05	7	25	
		µA78M06	8	25	
		µA78M08	10.5	25	
		µA78M09	11.5	26	
		µA78M10	12.5	28	
		µA78M12	14.5	30	
		µA78M15	17.5	30	
I_O	Output current			500	mA
T_J	Operating virtual junction temperature		0	125	°C

The μA78M10 and μA78M15 are obsolete and are no longer supplied

electrical characteristics at specified virtual junction temperature, V_I = 8 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M33C MIN	μA78M33C TYP	μA78M33C MAX	UNIT
Output voltage‡	I_O = 5 mA to 350 mA, V_I = 8 V to 20 V		3.2	3.3	3.4	V
		T_J = 0°C to 125°C	3.1	3.3	3.5	
Input voltage regulation	I_O = 200 mA	V_I = 5.3 V to 25 V		9	100	mV
		V_I = 8 V to 25 V		3	50	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	62			dB
		I_O = 300 mA	62	80		
Output voltage regulation	V_I = 8 V,	I_O = 5 mA to 500 mA		20	100	mV
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz			40	200	μV
Dropout voltage				2		V
Bias current				4.5	6	mA
Bias current change	I_O = 200 mA,	V_I = 8 V to 25 V, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C			0.5	
Short-circuit output current	V_I = 35 V			300		mA
Peak output current				700		mA

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

electrical characteristics at specified virtual junction temperature, V_I = 10 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M05C MIN	μA78M05C TYP	μA78M05C MAX	UNIT
Output voltage	I_O = 5 mA to 350 mA, V_I = 7 V to 20 V		4.8	5	5.2	V
		T_J = 0°C to 125°C	4.75		5.25	
Input voltage regulation	I_O = 200 mA	V_I = 7 V to 25 V		3	100	mV
		V_I = 8 V to 25 V		1	50	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	62			dB
		I_O = 300 mA	62	80		
Output voltage regulation	I_O = 5 mA to 500 mA			20	100	mV
	I_O = 5 mA to 200 mA			10	50	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz			40	200	μV
Dropout voltage				2		V
Bias current				4.5	6	mA
Bias current change	I_O = 200 mA,	V_I = 8 V to 25 V, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C			0.5	
Short-circuit output current	V_I = 35 V			300		mA
Peak output current				0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

The μA78M10 and μA78M15 are obsolete and are no longer supplied

electrical characteristics at specified virtual junction temperature, V_I = 11 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M06C MIN	TYP	MAX	UNIT
Output voltage	I_O = 5 mA to 350 mA,	V_I = 8 V to 21 V		5.75	6	6.25	V
			T_J = 0°C to 125°C	5.7		6.3	
Input voltage regulation	I_O = 200 mA	V_I = 8 V to 25 V			5	100	mV
		V_I = 9 V to 25 V			1.5	50	
Ripple rejection	V_I = 9 V to 19 V,	f = 120 Hz	I_O = 100 mA, T_J = 0°C to 125°C	59			dB
			I_O = 300 mA	59	80		
Output voltage regulation	I_O = 5 mA to 500 mA				20	120	mV
	I_O = 5 mA to 200 mA				10	60	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				45		μV
Dropout voltage					2		V
Bias current					4.5	6	mA
Bias current change	V_I = 9 V to 25 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				270		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 14 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			μA78M08C MIN	TYP	MAX	UNIT
Output voltage	V_I = 10.5 V to 23 V,	I_O = 5 mA to 350 mA		7.7	8	8.3	V
			T_J = 0°C to 125°C	7.6		8.4	
Input voltage regulation	I_O = 200 mA	V_I = 10.5 V to 25 V			6	100	mV
		V_I = 11 V to 25 V			2	50	
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	56			dB
		I_O = 300 mA		56	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	160	mV
	I_O = 5 mA to 200 mA				10	80	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				52		μV
Dropout voltage					2		V
Bias current					4.6	6	mA
Bias current change	V_I = 10.5 V to 25 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				250		mA
Peak output current					0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

The μA78M10 and μA78M15 are obsolete and are no longer supplied

electrical characteristics at specified virtual junction temperature, V_I = 16 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78M09C MIN	μA78M09C TYP	μA78M09C MAX	UNIT
Output voltage	V_I = 11.5 V to 24 V, I_O = 5 mA to 350 mA	8.6	9	9.4	V
	V_I = 11.5 V to 24 V, I_O = 5 mA to 350 mA, T_J = 0°C to 125°C	8.5		9.5	V
Input voltage regulation	I_O = 200 mA, V_I = 11.5 V to 26 V		6	100	mV
	I_O = 200 mA, V_I = 12 V to 26 V		2	50	mV
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz, I_O = 100 mA, T_J = 0°C to 125°C	56			dB
	V_I = 13 V to 23 V, f = 120 Hz, I_O = 300 mA	56	80		dB
Output voltage regulation	I_O = 5 mA to 500 mA		25	180	mV
	I_O = 5 mA to 200 mA		10	90	mV
Temperature coefficient of output voltage	I_O = 5 mA, T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		58		μV
Dropout voltage			2		V
Bias current			4.6	6	mA
Bias current change	V_I = 11.5 V to 26 V, I_O = 200 mA, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA, T_J = 0°C to 125°C			0.5	mA
Short-circuit output current	V_I = 35 V		250		mA
Peak output current			0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 17 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78M10C MIN	μA78M10C TYP	μA78M10C MAX	UNIT
Output voltage	V_I = 12.5 V to 25 V, I_O = 5 mA to 350 mA	9.6	10	10.4	V
	V_I = 12.5 V to 25 V, I_O = 5 mA to 350 mA, T_J = 0°C to 125°C	9.5		10.5	V
Input voltage regulation	I_O = 200 mA, V_I = 12.5 V to 28 V		7	100	mV
	I_O = 200 mA, V_I = 14 V to 28 V		2	50	mV
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz, I_O = 100 mA, T_J = 0°C to 125°C	59			dB
	V_I = 15 V to 25 V, f = 120 Hz, I_O = 300 mA	55	80		dB
Output voltage regulation	I_O = 5 mA to 500 mA		25	200	mV
	I_O = 5 mA to 200 mA		10	100	mV
Temperature coefficient of output voltage	I_O = 5 mA, T_J = 0°C to 125°C		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		64		μV
Dropout voltage			2		V
Bias current			4.7	6	mA
Bias current change	V_I = 12.5 V to 28 V, I_O = 200 mA, T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA, T_J = 0°C to 125°C			0.5	mA
Short-circuit output current	V_I = 35 V		245		mA
Peak output current			0.7		A

† All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 19 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			µA78M12C MIN	µA78M12C TYP	µA78M12C MAX	UNIT
Output voltage	V_I = 14.5 V to 27 V,	I_O = 5 mA to 350 mA		11.5	12	12.5	V
			T_J = 0°C to 125°C	11.4		12.6	
Input voltage regulation	I_O = 200 mA	V_I = 14.5 V to 30 V			8	100	mV
		V_I = 16 V to 30 V			2	50	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	55			dB
		I_O = 300 mA		55	80		
Output voltage regulation	I_O = 5 mA to 500 mA				25	240	mV
	I_O = 5 mA to 200 mA				10	120	
Temperature coefficient of output voltage	I_O = 5 mA				–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				75		µV
Dropout voltage					2		V
Bias current					4.8	6	mA
Bias current change	V_I = 14.5 V to 30 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				240		mA
Peak output current					0.7		A

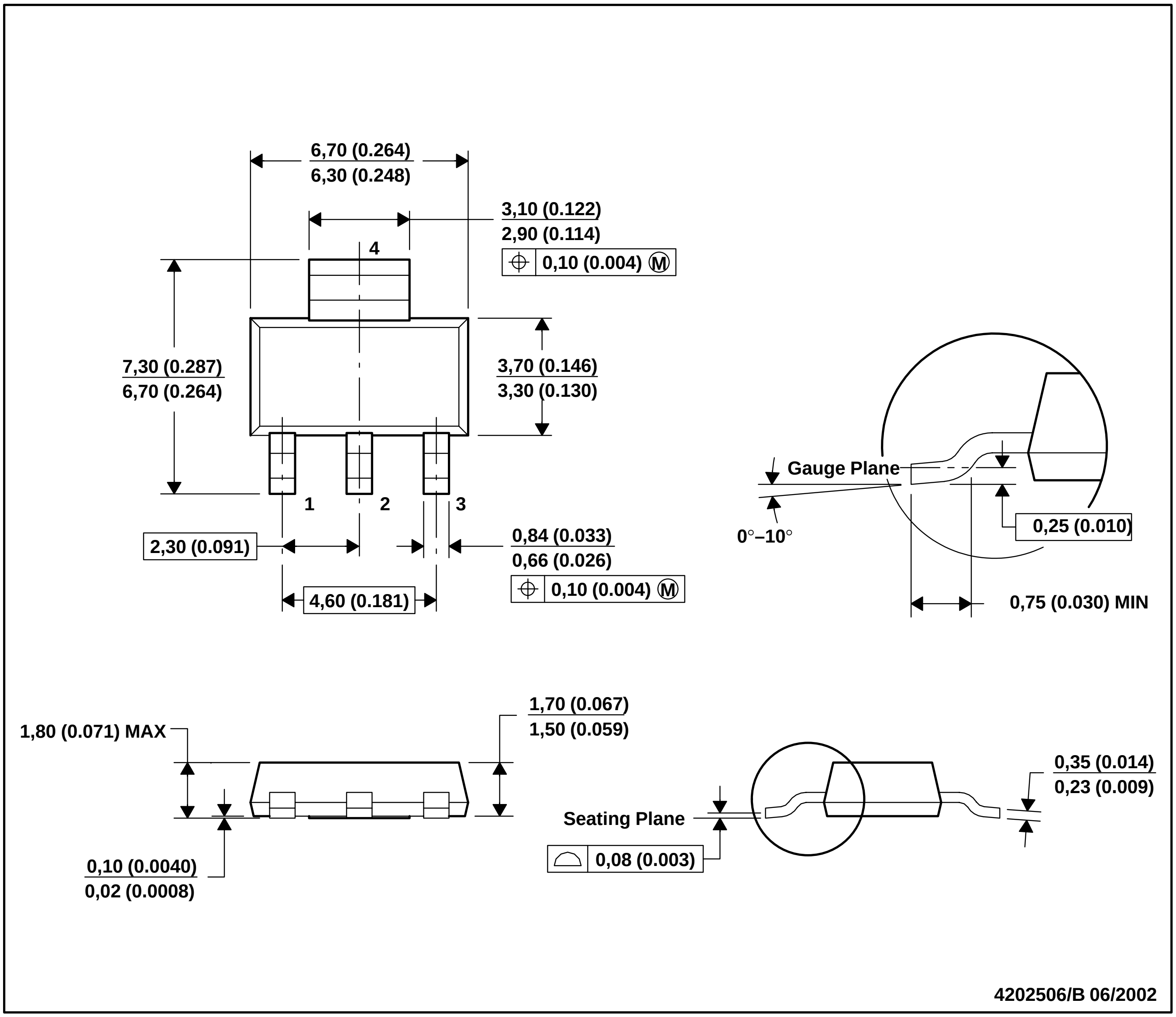
† All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

electrical characteristics at specified virtual junction temperature, V_I = 23 V, I_O = 350 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			µA78M15C MIN	µA78M15C TYP	µA78M15C MAX	UNIT
Output voltage	V_I = 17.5 V to 30 V,	I_O = 5 mA to 350 mA		14.4	15	15.6	V
			T_J = 0°C to 125°C	14.25		15.75	
Input voltage regulation	I_O = 200 mA	V_I = 17.5 V to 30 V			10	100	mV
		V_I = 20 V to 30 V			3	50	
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz	I_O = 100 mA,	T_J = 0°C to 125°C	54			dB
		I_O = 300 mA		54	70		
Output voltage regulation	I_O = 5 mA to 500 mA				25	300	mV
	I_O = 5 mA to 200 mA				10	150	
Temperature coefficient of output voltage	I_O = 5 mA,	T_J = 0°C to 125°C			–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz				90		µV
Dropout voltage					2		V
Bias current					4.8	6	mA
Bias current change	V_I = 17.5 V to 30 V,	I_O = 200 mA,	T_J = 0°C to 125°C			0.8	mA
	I_O = 5 mA to 350 mA,	T_J = 0°C to 125°C				0.5	
Short-circuit output current	V_I = 35 V				240		mA
Peak output current					0.7		A

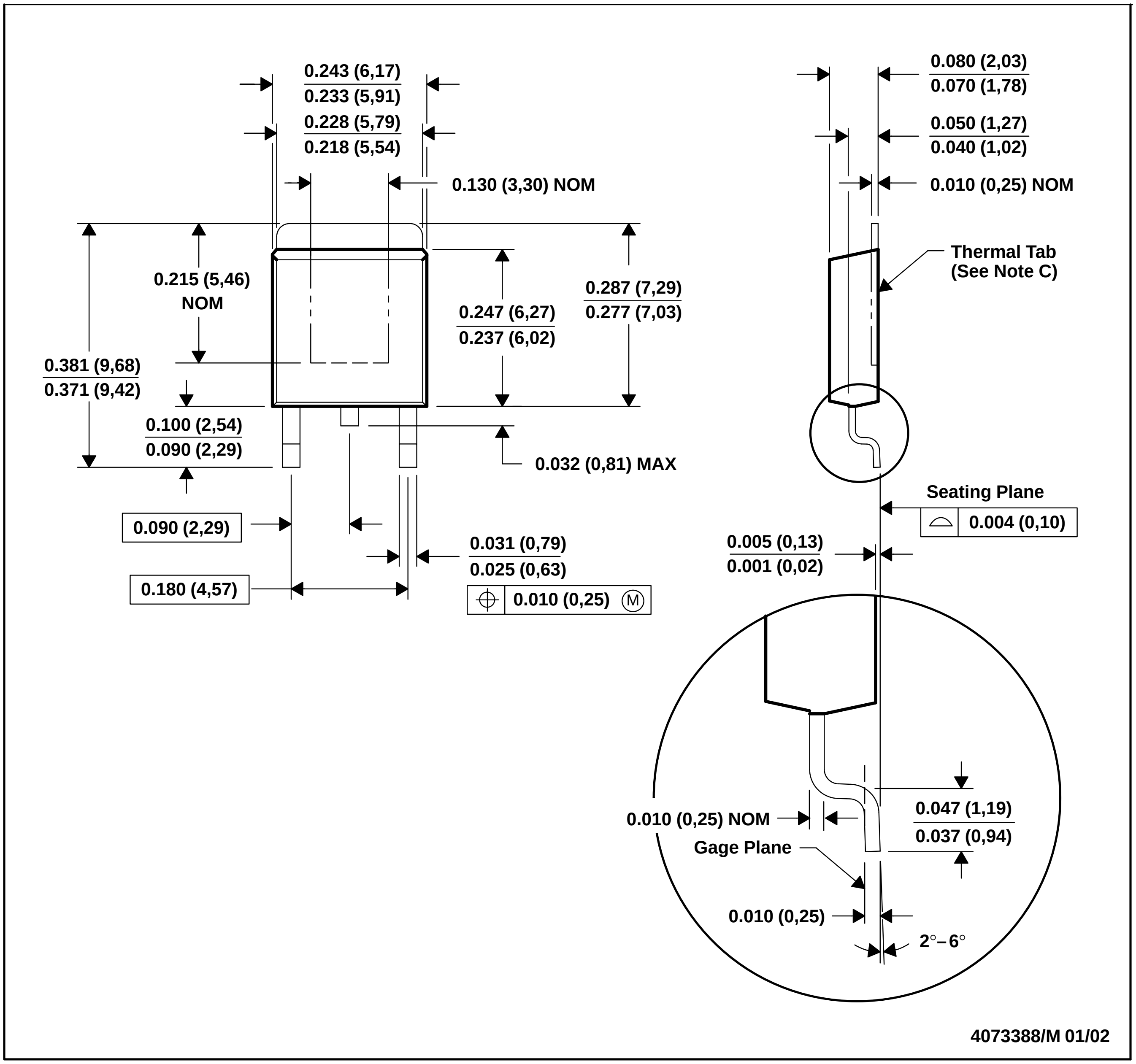
† All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output. Pulse-testing techniques maintain T_J as close to T_A as possible. Thermal effects must be taken into account separately.

DCY (R-PDSO-G4) **PLASTIC SMALL-OUTLINE**



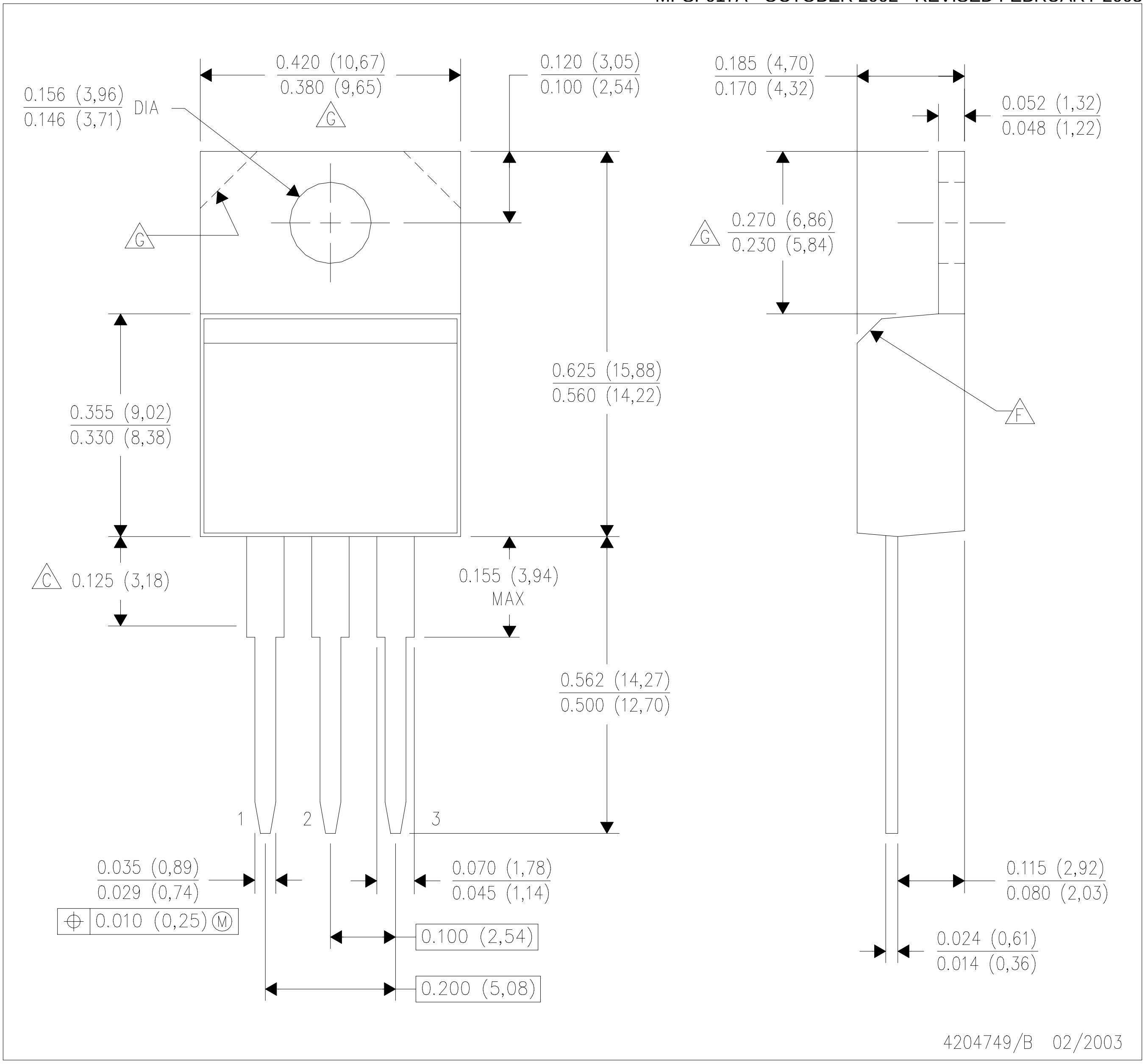
NOTES: A. All linear dimensions are in millimeters (inches).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.
D. Falls within JEDEC TO-261 Variation AA.

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.

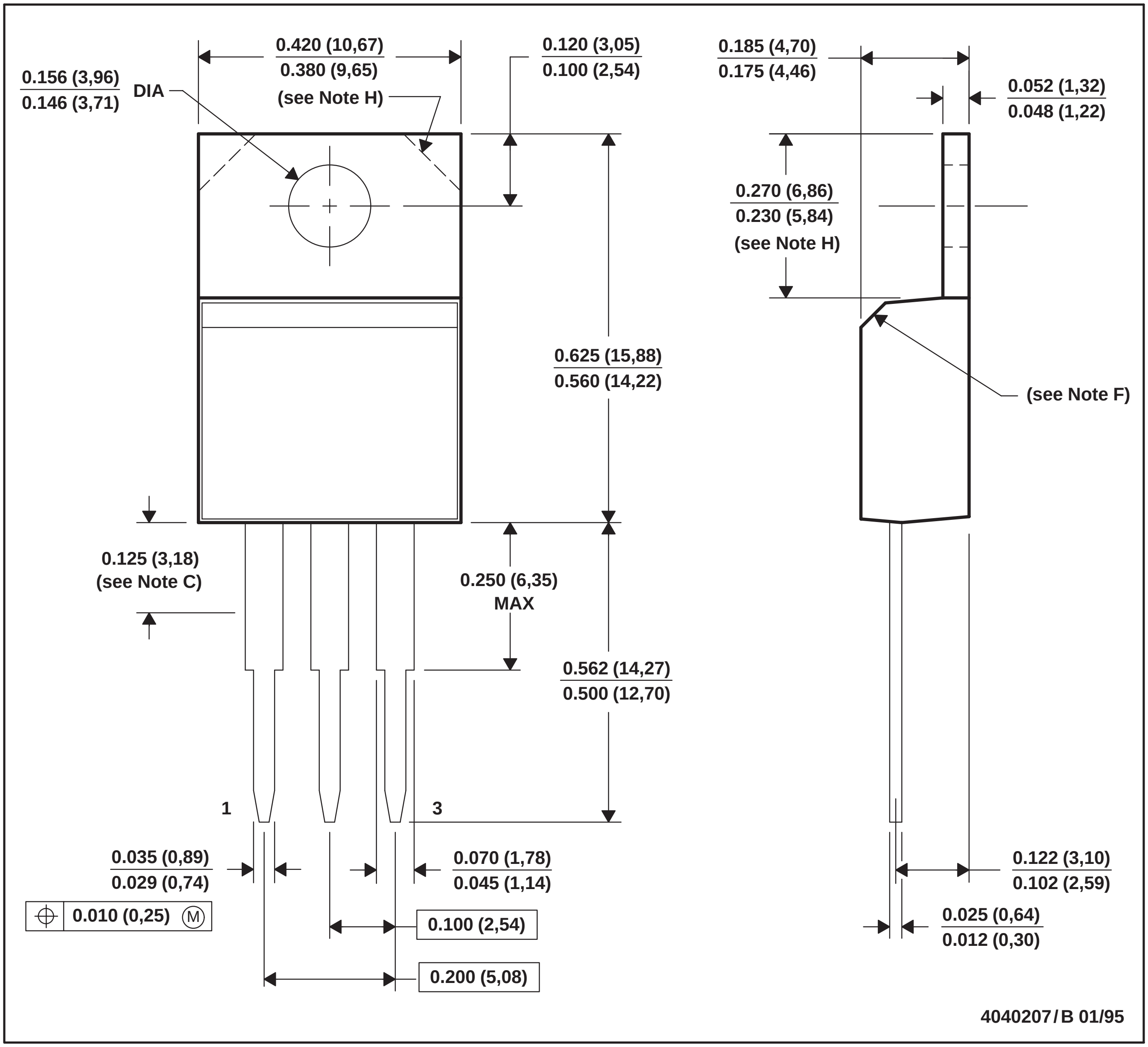
PowerFLEX is a trademark of Texas Instruments.



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. Tab contour optional within these dimensions.
- H. Falls within JEDEC TO–220 variation AB.

SCALE	SIZE A	4204749	REV B	SHEET 2/3

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. Falls within JEDEC TO-220AB
- H. Tab contour optional within these dimensions

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