

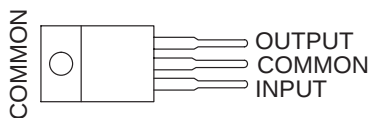
The μ A78M15 is obsolete and no longer is supplied.

μ A78M00 SERIES POSITIVE-VOLTAGE REGULATORS

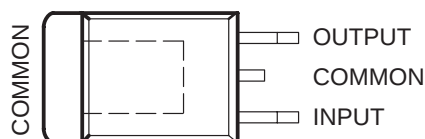
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- 3-Terminal Regulators
- Output Current Up To 500 mA
- No External Components
- Internal Thermal-Overload Protection
- High Power-Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation

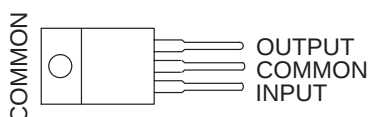
KC (TO-220) PACKAGE
(TOP VIEW)



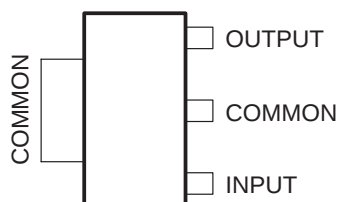
KTP PACKAGE
(TOP VIEW)



KCS (TO-220) PACKAGE
(TOP VIEW)



DCY (SOT-223) PACKAGE
(TOP VIEW)



description/ordering information

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.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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μA78M00 SERIES **POSITIVE-VOLTAGE REGULATORS**

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description/ordering information (continued)

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
	10	Power Flex (KTP)	Reel of 3000	μA78M10CKTPR	UA78M10C
	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.



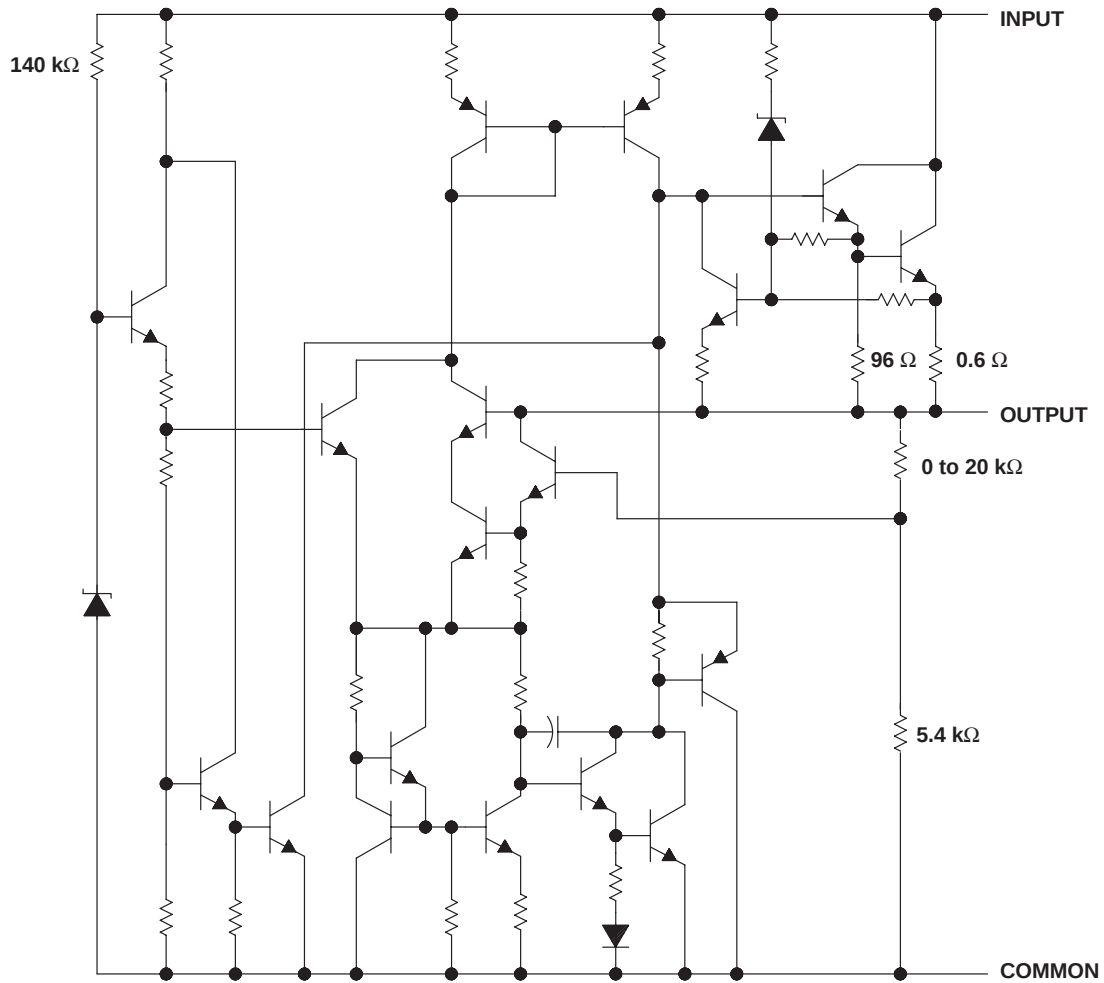
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schematic



Resistor values shown are nominal.

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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 $T_J(\text{max})$, θ_{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	μA78M33	5.3	25
		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



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electrical characteristics at specified virtual junction temperature, $V_I = 8\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78M33C			UNIT
		MIN	TYP	MAX	
Output voltage‡	$I_O = 5\text{ mA to }350\text{ mA}$, $V_I = 8\text{ V to }20\text{ V}$		3.2	3.3	V
				3.4	
Input voltage regulation	$I_O = 200\text{ mA}$				mV
Ripple rejection	$V_I = 8\text{ V to }18\text{ V}$, $f = 120\text{ Hz}$				dB
Output voltage regulation	$V_I = 8\text{ V}$, $I_O = 5\text{ mA to }500\text{ mA}$		20	100	mV
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$		–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$		40	200	μV
Dropout voltage			2		V
Bias current			4.5	6	mA
Bias current change	$I_O = 200\text{ mA}$, $V_I = 8\text{ V to }25\text{ V}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$			0.8	mA
	$I_O = 5\text{ mA to }350\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$			0.5	
Short-circuit output current	$V_I = 35\text{ V}$		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, $V_I = 10\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

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

μA78M00 SERIES **POSITIVE-VOLTAGE REGULATORS**

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electrical characteristics at specified virtual junction temperature, $V_I = 11\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M06C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }350\text{ mA}$, $V_I = 8\text{ V to }21\text{ V}$		5.75	6	6.25	V
		$T_J = 0^\circ\text{C to }125^\circ\text{C}$	5.7		6.3	
Input voltage regulation	$I_O = 200\text{ mA}$	$V_I = 8\text{ V to }25\text{ V}$		5	100	mV
		$V_I = 9\text{ V to }25\text{ V}$		1.5	50	
Ripple rejection	$V_I = 9\text{ V to }19\text{ V}$, $f = 120\text{ Hz}$	$I_O = 100\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$	59			dB
		$I_O = 300\text{ mA}$	59	80		
Output voltage regulation	$I_O = 5\text{ mA to }500\text{ mA}$			20	120	mV
	$I_O = 5\text{ mA to }200\text{ mA}$			10	60	
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$			–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$			45		μV
Dropout voltage				2		V
Bias current				4.5	6	mA
Bias current change	$V_I = 9\text{ V to }25\text{ V}$, $I_O = 200\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$				0.8	mA
	$I_O = 5\text{ mA to }350\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$				0.5	
Short-circuit output current	$V_I = 35\text{ V}$			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, $V_I = 14\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

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



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electrical characteristics at specified virtual junction temperature, $V_I = 16\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		μA78M09C			UNIT
			MIN	TYP	MAX	
Output voltage	$V_I = 11.5\text{ V to }24\text{ V}$, $I_O = 5\text{ mA to }350\text{ mA}$		8.6	9	9.4	V
		$T_J = 0^\circ\text{C to }125^\circ\text{C}$	8.5		9.5	
Input voltage regulation	$I_O = 200\text{ mA}$	$V_I = 11.5\text{ V to }26\text{ V}$		6	100	mV
		$V_I = 12\text{ V to }26\text{ V}$		2	50	
Ripple rejection	$V_I = 13\text{ V to }23\text{ V}$, $f = 120\text{ Hz}$	$I_O = 100\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$	56			dB
		$I_O = 300\text{ mA}$	56	80		
Output voltage regulation	$I_O = 5\text{ mA to }500\text{ mA}$			25	180	mV
	$I_O = 5\text{ mA to }200\text{ mA}$			10	90	
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$			–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$			58		μV
Dropout voltage				2		V
Bias current				4.6	6	mA
Bias current change	$V_I = 11.5\text{ V to }26\text{ V}$, $I_O = 200\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$				0.8	mA
	$I_O = 5\text{ mA to }350\text{ mA}$, $T_J = 0^\circ\text{C to }125^\circ\text{C}$				0.5	
Short-circuit output current	$V_I = 35\text{ V}$			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, $V_I = 17\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

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

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electrical characteristics at specified virtual junction temperature, $V_I = 19\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

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

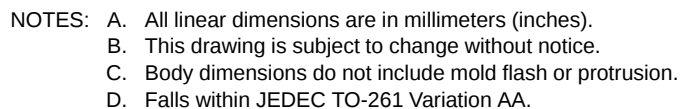
electrical characteristics at specified virtual junction temperature, $V_I = 23\text{ V}$, $I_O = 350\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

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

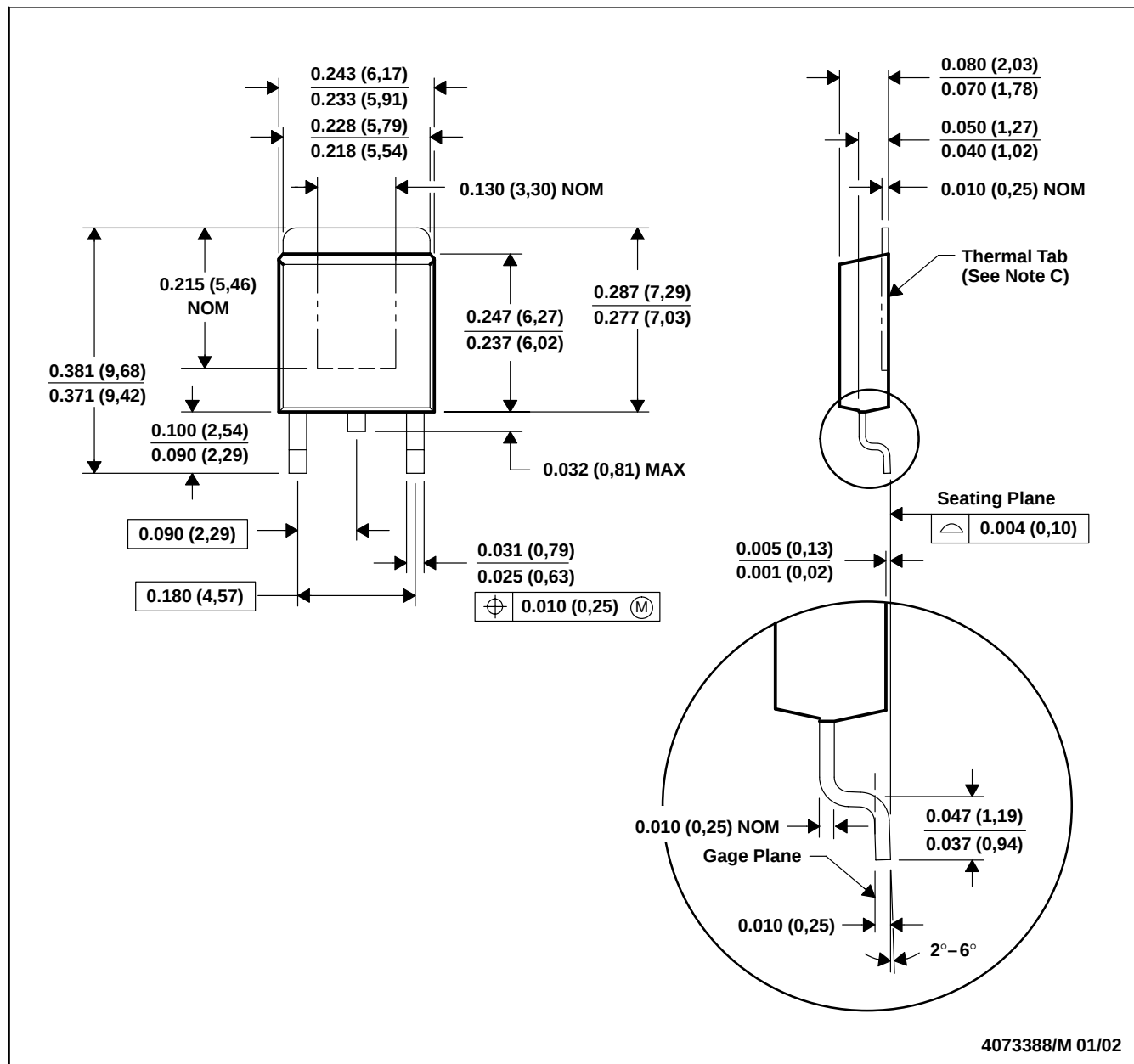


PLASTIC SMALL-OUTLINE



KTP (R-PSFM-G2)

PowerFLEX™ PLASTIC FLANGE-MOUNT PACKAGE



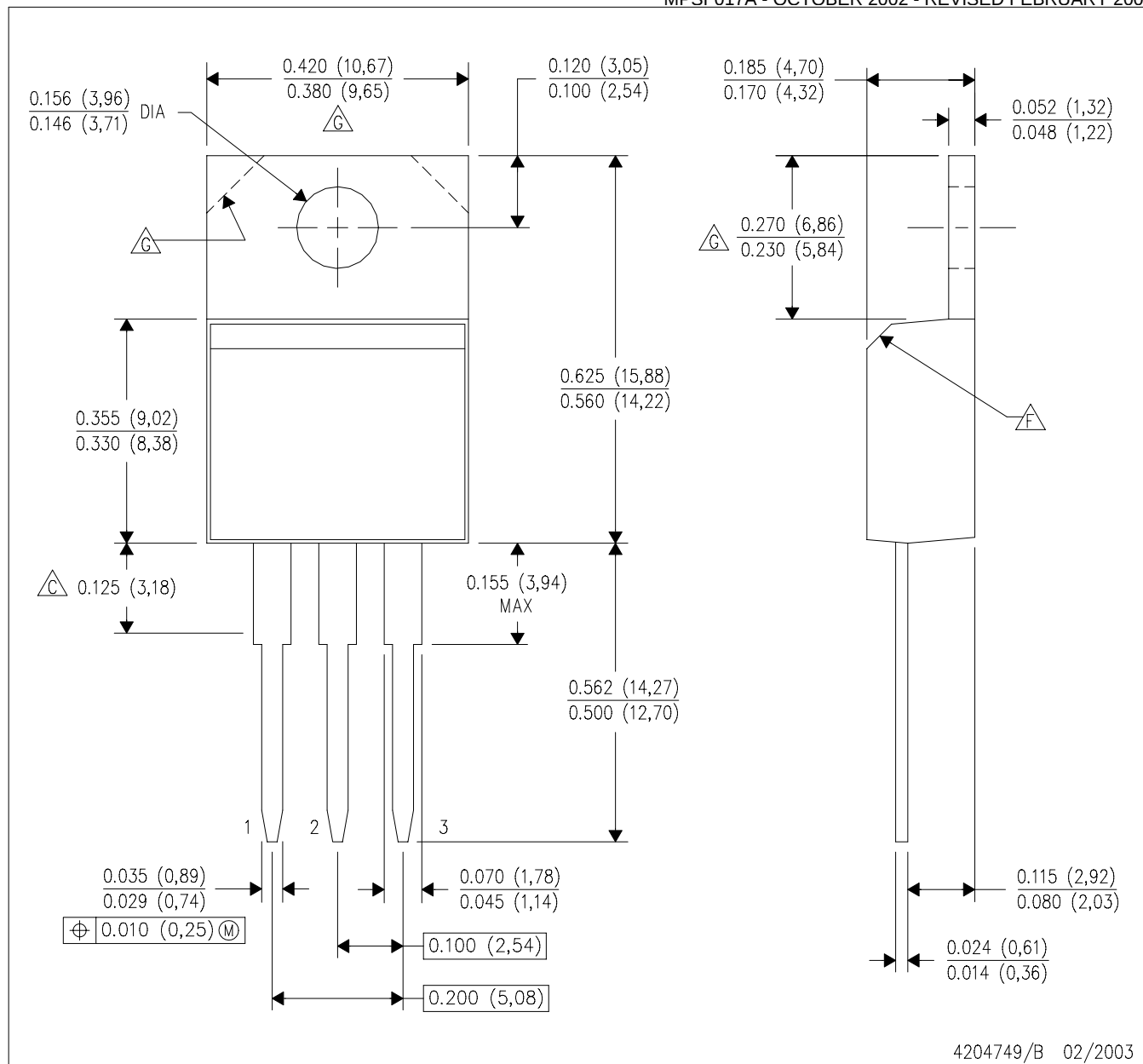
- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - The center lead is in electrical contact with the thermal tab.
 - Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).
 - Falls within JEDEC TO-252 variation AC.

PowerFLEX is a trademark of Texas Instruments.

KCS (R-PSFM-T3)

PLASTIC FLANGE-MOUNT PACKAGE

MPSF017A - OCTOBER 2002 - REVISED FEBRUARY 2003



4204749/B 02/2003

- 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.

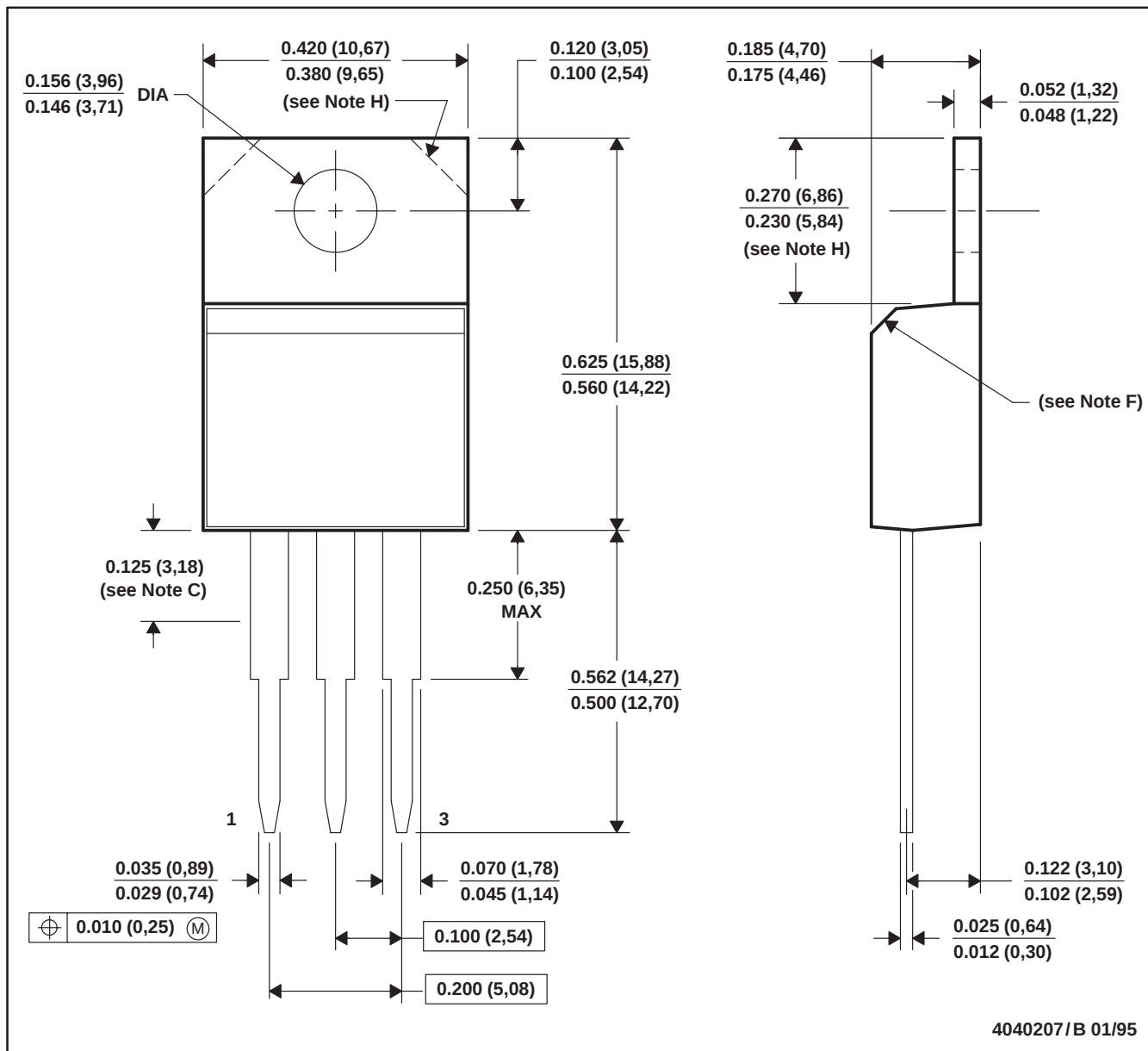
SCALE
A
SIZE

4204749

B
REV
2
SHEET
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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