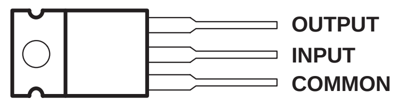
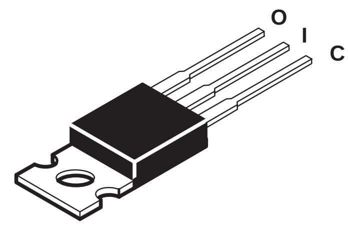
- **3-Terminal Regulators**
- **Output Current Up to 1.5 A**
- **No External Components**
- **Internal Thermal Overload Protection**
- **High-Power Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**
- **Essentially Equivalent to National LM320 Series**

KC PACKAGE
(TOP VIEW)

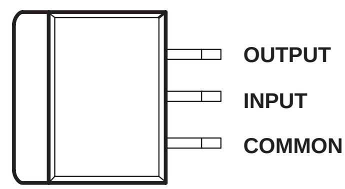


The input terminal is in electrical contact with the mounting base

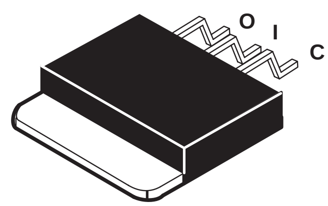
TO–220AB



KTE PACKAGE
(TOP VIEW)



The input terminal is in electrical contact with the mounting base.



description

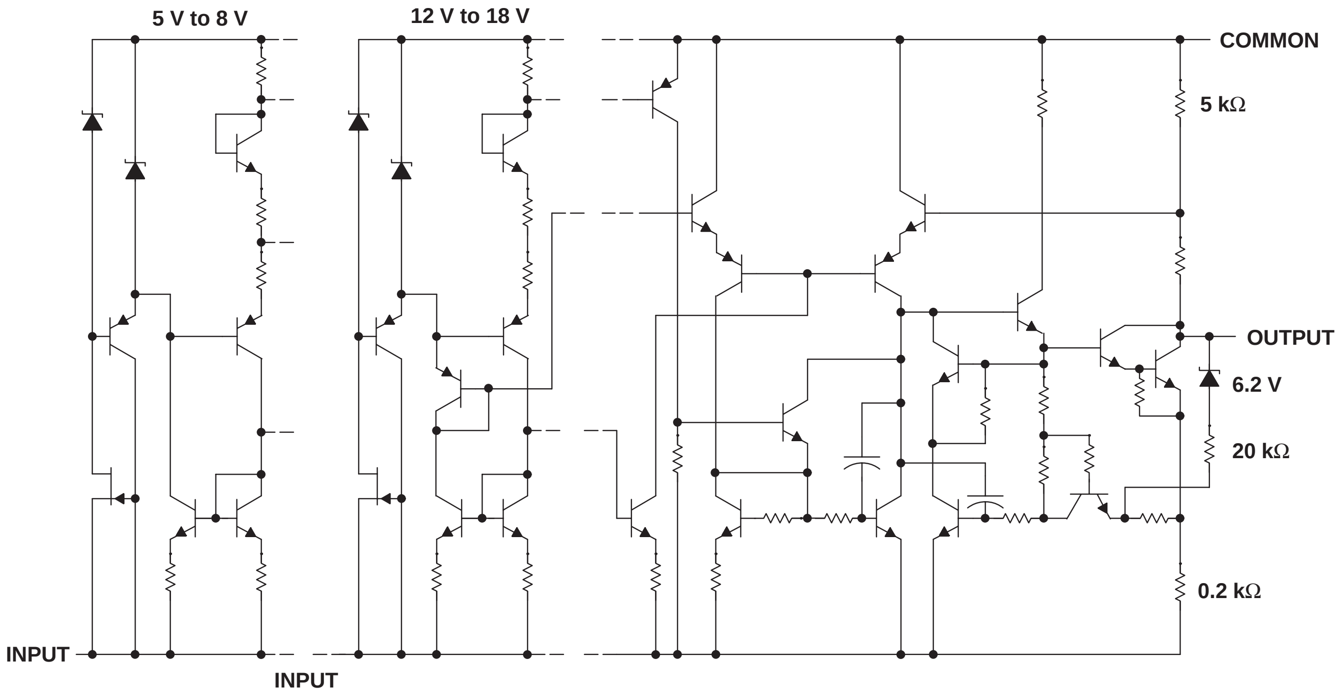
This series of fixed-negative-voltage monolithic integrated-circuit voltage regulators is designed to complement Series μA7800 in a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially 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.

AVAILABLE OPTIONS

T_A	V_O(nom) (V)	PACKAGED DEVICES		CHIP FORM (Y)
		HEAT-SINK MOUNTED (KC)	HEAT-SINK MOUNTED† (KTE)	
0°C to 125°C	–5	μA7905CKC	μA7905CKTE	μA7905Y
	–5.2	μA7952CKC	μA7952CKTE	μA7952Y
	–6	μA7906CKC	μA7906CKTE	μA7906Y
	–8	μA7908CKC	μA7908CKTE	μA7908Y
	–12	μA7912CKC	μA7912CKTE	μA7912Y
	–15	μA7915CKC	μA7915CKTE	μA7915Y
	–18	μA7918CKC	μA7918CKTE	μA7918Y
	–24	μA7924CKC	μA7924CKTE	μA7924Y

† The KTE package is also available taped and reeled.

schematic



All component values are nominal.

absolute maximum ratings over operating temperature range (unless otherwise noted)

Input voltage, V_I: µA7924C . . . . –40 V
All others . . . . –35 V
Continuous total power dissipation at (or below): T_A = 25°C (see Note 1) . . . See Dissipation Rating Tables
T_C = 90°C (see Note 1) . . . See Dissipation Rating Tables
Operating free-air, T_A, case, T_C, or virtual junction, T_J, temperature range . . . . 0 to 150°C
Storage temperature range, T_{stg} . . . . –65 to 150°C
Lead temperature 3.2 mm (1/8 inch) from case for 10 seconds . . . . 260°C

NOTE 1: For operation above 25°C free-air or 90°C case temperature, refer to Figures 1 and 2. To avoid exceeding the design maximum virtual junction temperature, these ratings should not be exceeded. Due to variations in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.

DISSIPATION RATING TABLE — FREE-AIR TEMPERATURE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE T_A = 25°C	T_A = 70°C POWER RATING	T_A = 105°C POWER RATING	T_A = 125°C POWER RATING
KC	2000 mW	16.0 mW/°C	1280 mW	720 mW	400 mW
KTE	1900 mW	15.2 mW/°C	1216 mW	684 mW	380 mW

DISSIPATION RATING TABLE — CASE TEMPERATURE

PACKAGE	$T_C \le 90°C$ POWER RATING	DERATING FACTOR ABOVE T_C = 90°C	T_A = 125°C POWER RATING
KC	15000 mW	250.0 mW/°C	6250 mW
KTE	14300 mW	238.0 mW/°C	5970 mW

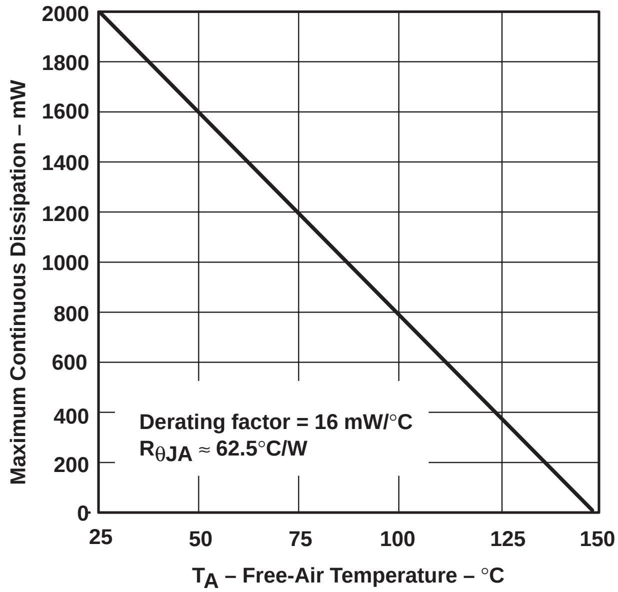


Figure 1

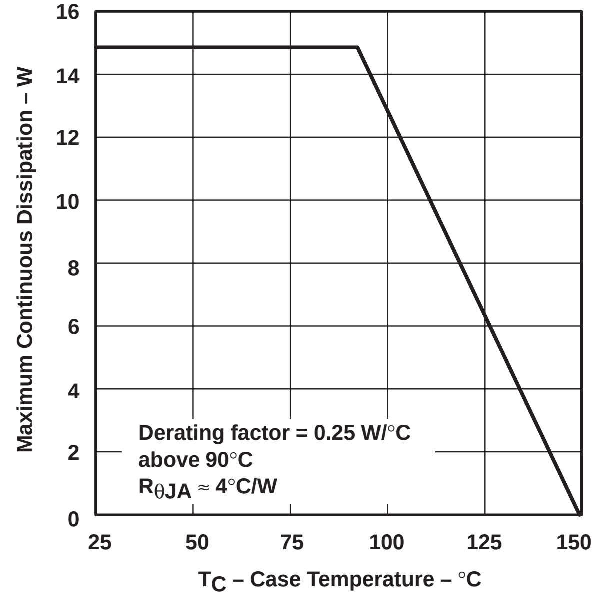


Figure 2

recommended operating conditions

		MIN	MAX	UNIT
Input voltage, V_I	μA7905C	–7	–25	V
	μA7952C	–7.2	–25	
	μA7906C	–8	–25	
	μA7908C	–10.5	–25	
	μA7912C	–14.5	–30	
	μA7915C	–17.5	–30	
	μA7918C	–21	–33	
	μA7924C	–27	–28	
Output current, I_O			1.5	A
Operating virtual junction temperature, T_J		0	125	°C

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

PARAMETER	TEST CONDITIONS	T_J†	μA7905C MIN	μA7905C TYP	μA7905C MAX	UNITS
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 ≤ 15 W	0°C to 125°C	–4.75		–5.25	
Input regulation	V_I = –7 V to –25 V	25°C		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	25°C		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°C to 125°C		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, $V_I = -10$ V, $I_O = 500$ mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA7952C MIN	μA7952C TYP	μA7952C MAX	UNITS
Output voltage‡		25°C	–5	–5.2	–5.4	V
	I_O = 5 mA to 1 A, V_I = –7.2 V to –20 V, P ≤ 15 W	0°C to 125°C	–4.95		–5.45	
Input regulation	V_I = –7.2 V to –25 V	25°C		12.5	100	mV
	V_I = –8.2 V to –12 V			4	50	
Ripple rejection	V_I = –8.2 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	25°C		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 = –7.2 V to –25 V	0°C to 125°C		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.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7906C MIN	μA7906C TYP	μA7906C MAX	UNITS
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 ≤ 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.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7908C MIN	μA7908C TYP	μA7908C MAX	UNITS
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 ≤ 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 MIN	μA7912C TYP	μA7912C MAX	UNITS
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 ≤ 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.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7915C MIN	μA7915C TYP	μA7915C MAX	UNITS
Output voltage‡		25°C	–14.4	–15	–15.6	V
	I_O = 5 mA to 1 A, V_I = –17.5 V to –30 V, P ≤ 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		μV
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

† 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, $V_I = -27$ V, $I_O = 500$ mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA7918C MIN	μA7918C TYP	μA7918C MAX	UNITS
Output voltage‡		25°C	–17.3	–18	–18.7	V
	I_O = 5 mA to 1 A, V_I = –21 V to –33 V, P ≤ 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		μV
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

† 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.

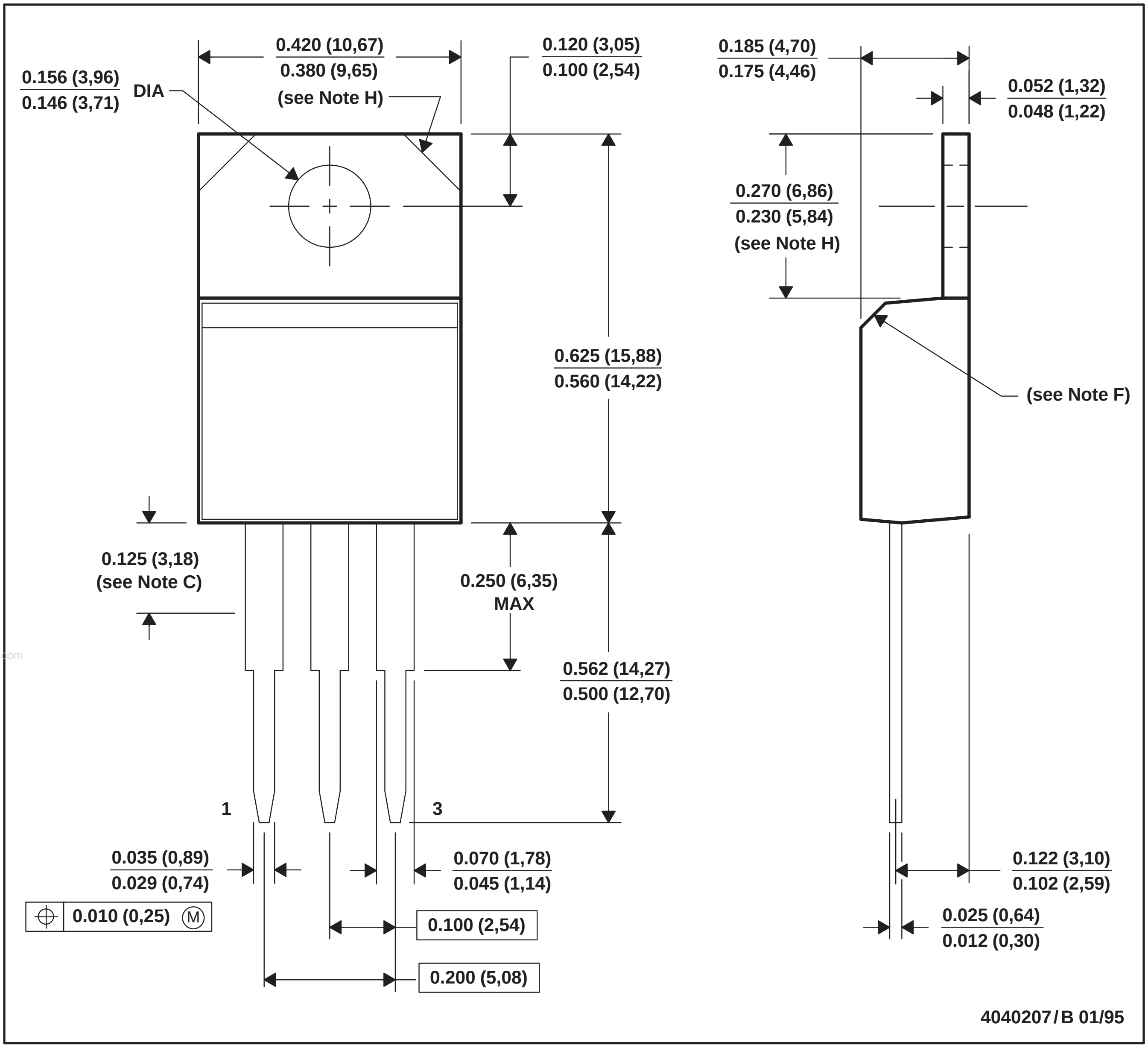
electrical characteristics at specified virtual junction temperature, $V_I = -33$ V, $I_O = 500$ mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA7924C MIN	μA7924C TYP	μA7924C MAX	UNITS
Output voltage‡		25°C	–23	–24	–25	V
	I_O = 5 mA to 1 A, V_I = –27 V to –38 V, P ≤ 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.

MECHANICAL INFORMATION

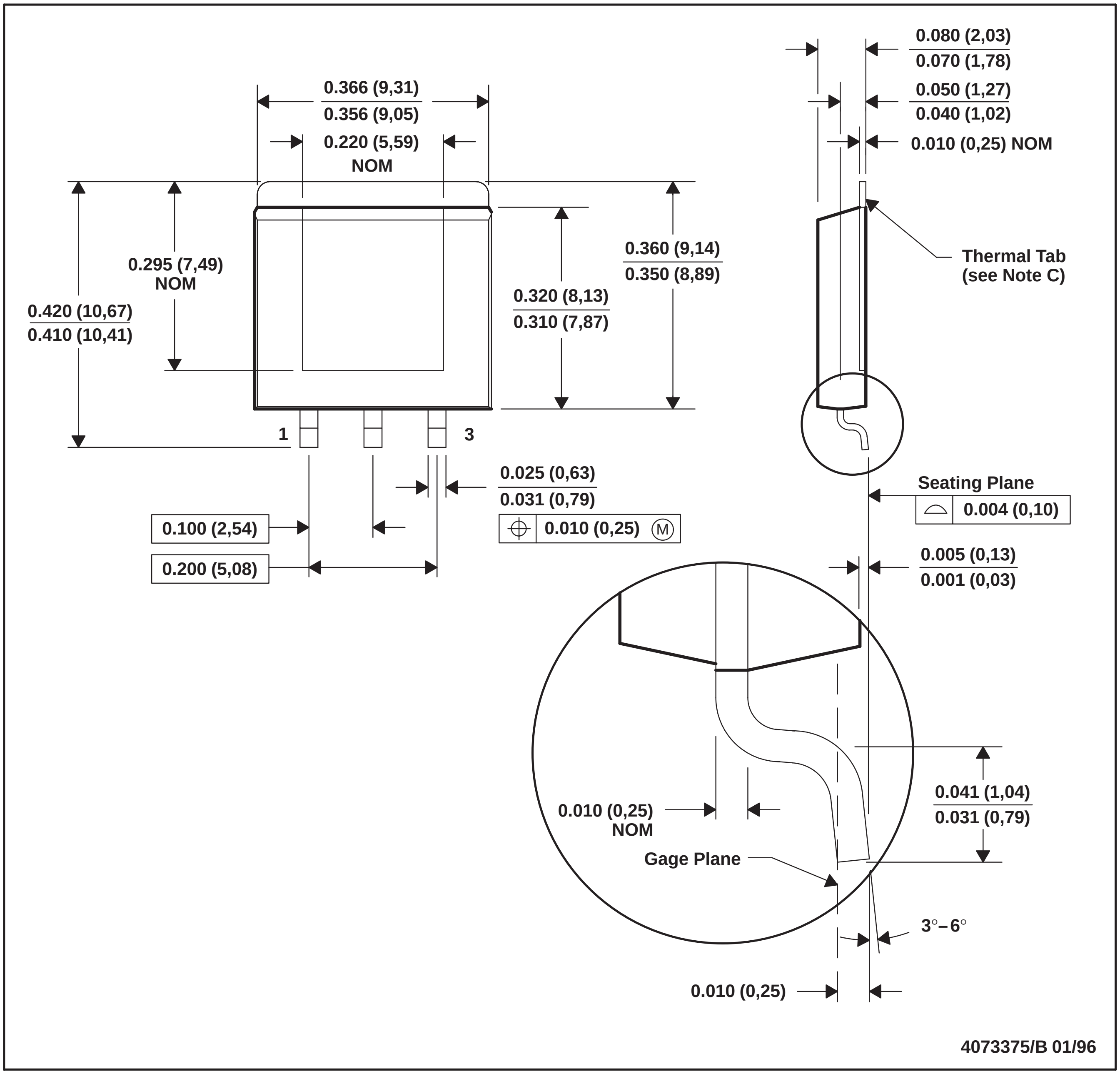
KC (R-PSFM-T3) **PLASTIC FLANGE-MOUNT PACKAGE**



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

MECHANICAL INFORMATION

KTE (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. The center lead is in electrical contact with the thermal tab.

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