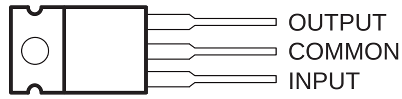
SLVS056E – MAY 1976 – REVISED JULY 1999

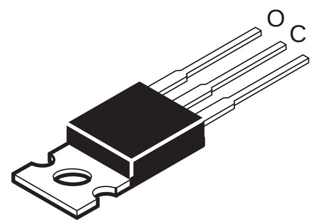
- **3-Terminal Regulators**
- **Output Current up to 1.5 A**
- **Internal Thermal-Overload Protection**
- **High Power-Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**
- **Direct Replacements for Fairchild μA7800 Series**

KC PACKAGE
(TOP VIEW)

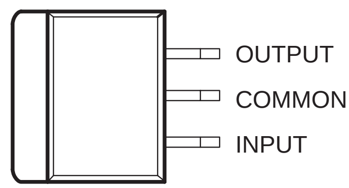


The COMMON terminal is in electrical contact with the mounting base.

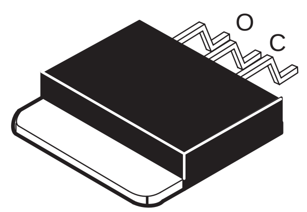
TO-220AB



KTE PACKAGE
(TOP VIEW)



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



description

This series of fixed-voltage monolithic 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 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 can be used as the power-pass element in precision regulators.

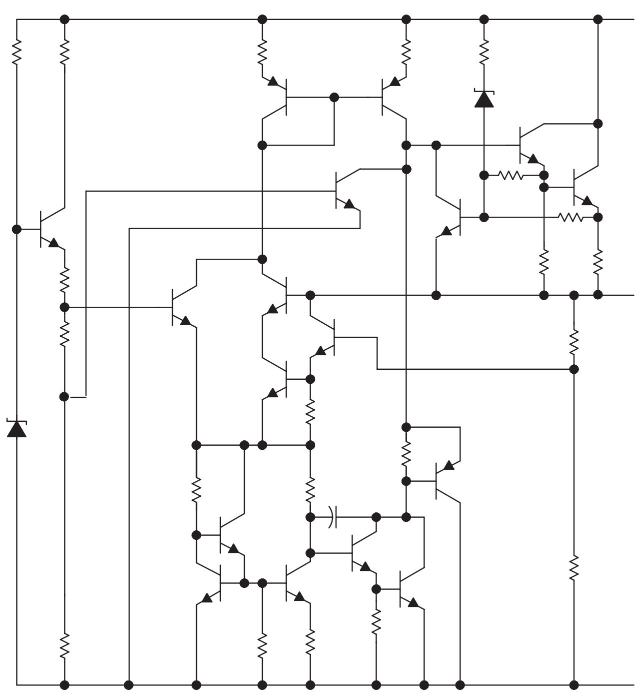
The μA7800C series is characterized for operation over the virtual junction temperature range of 0°C to 125°C.

AVAILABLE OPTIONS

T_J	$V_{O(NOM)}$ (V)	PACKAGED DEVICES PLASTIC FLANGE-MOUNT (KC)	PACKAGED DEVICES HEAT-SINK MOUNTED (KTE)	CHIP FORM (Y)
0°C to 125°C	5	μA7805CKC	μA7805CKTE	μA7805Y
	6	μA7806CKC	μA7806CKTE	μA7806Y
	8	μA7808CKC	μA7808CKTE	μA7808Y
	8.5	μA7885CKC	μA7885CKTE	μA7885Y
	10	μA7810CKC	μA7810CKTE	μA7810Y
	12	μA7812CKC	μA7812CKTE	μA7812Y
	15	μA7815CKC	μA7815CKTE	μA7815Y
	18	μA7818CKC	μA7818CKTE	μA7818Y
	24	μA7824CKC	μA7824CKTE	μA7824Y

The KTE package is only available taped and reeled. Add the suffix R to the device type (e.g., μA7805CKTER). Chip forms are tested at 25°C.

schematic



absolute maximum ratings over operating temperature ranges (unless otherwise noted)†

		μA78xx	UNIT
Input voltage, V_I	μA7824C	40	V
	All others	35	
Virtual junction temperature range, T_J		0 to 150	°C
Package thermal impedance, θ_{JA} (see Notes 1 and 2)	KC package	22	°C
	KTE package	23	
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds		260	°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.

NOTES: 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 impact reliability. 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.

2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		MIN	MAX	UNIT
Input voltage, V_I	μA7805C	7	25	V
	μA7806C	8	25	
	μA7808C	10.5	25	
	μA7885C	10.5	25	
	μA7810C	12.5	28	
	μA7812C	14.5	30	
	μA7815C	17.5	30	
	μA7818C	21	33	
	μA7824C	27	38	
Output current, I_O			1.5	A
Operating virtual junction temperature, T_J	μA7800C series	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†	μA7805C MIN	μA7805C TYP	μA7805C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 7 V to 20 V, $P_D \leq$ 15 W	25°C	4.8	5	5.2	V
		0°C to 125°C	4.75		5.25	
Input voltage regulation	V_I = 7 V to 25 V	25°C		3	100	mV
	V_I = 8 V to 12 V			1	50	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	0°C to 125°C	62	78		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		15	100	mV
	I_O = 250 mA to 750 mA			5	50	
Output resistance	f = 1 kHz	0°C to 125°C		0.017		Ω
Temperature coefficient of output voltage	I_O = 5 mA	0°C to 125°C		–1.1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	25°C		40		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.2	8	mA
Bias current change	V_I = 7 V to 25 V	0°C to 125°C			1.3	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		750		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7806C MIN	μA7806C TYP	μA7806C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 8 V to 21 V, $P_D \leq$ 15 W	25°C	5.75	6	6.25	V
		0°C to 125°C	5.7		6.3	
Input voltage regulation	V_I = 8 V to 25 V	25°C		5	120	mV
	V_I = 9 V to 13 V			1.5	60	
Ripple rejection	V_I = 9 V to 19 V, f = 120 Hz	0°C to 125°C	59	75		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		14	120	mV
	I_O = 250 mA to 750 mA			4	60	
Output resistance	f = 1 kHz	0°C to 125°C		0.019		Ω
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		45		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	V_I = 8 V to 25 V	0°C to 125°C			1.3	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		550		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7808C MIN	μA7808C TYP	μA7808C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 10.5 V to 23 V, $P_D \le$ 15 W	25°C	7.7	8	8.3	V
		0°C to 125°C	7.6		8.4	
Input voltage regulation	V_I = 10.5 V to 25 V	25°C		6	160	mV
	V_I = 11 V to 17 V			2	80	
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz	0°C to 125°C	55	72		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	160	mV
	I_O = 250 mA to 750 mA			4	80	
Output resistance	f = 1 kHz	0°C to 125°C		0.016		Ω
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		52		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	V_I = 10.5 V to 25 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		450		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 15 V, I_O = 500 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA7885C MIN	μA7885C TYP	μA7885C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 11 V to 23.5 V, $P_D \le$ 15 W	25°C	8.15	8.5	8.85	V
		0°C to 125°C	8.1		8.9	
Input voltage regulation	V_I = 10.5 V to 25 V	25°C		6	170	mV
	V_I = 11 V to 17 V			2	85	
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz	0°C to 125°C	54	70		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	170	mV
	I_O = 250 mA to 750 mA			4	85	
Output resistance	f = 1 kHz	0°C to 125°C		0.016		Ω
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		55		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	V_I = 10.5 V to 25 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		450		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 17 V, I_O = 500 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA7810C MIN	μA7810C TYP	μA7810C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 12.5 V to 25 V, $P_D \leq$ 15 W	25°C	9.6	10	10.4	V
		0°C to 125°C	9.5	10	10.5	
Input voltage regulation	V_I = 12.5 V to 28 V	25°C		7	200	mV
	V_I = 14 V to 20 V			2	100	
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz	0°C to 125°C	55	71		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	200	mV
	I_O = 250 mA to 750 mA			4	100	
Output resistance	f = 1 kHz	0°C to 125°C		0.018		W
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		70		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	V_I = 12.5 V to 28 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		400		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7812C MIN	μA7812C TYP	μA7812C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 14.5 V to 27 V, $P_D \leq$ 15 W	25°C	11.5	12	12.5	V
		0°C to 125°C	11.4		12.6	
Input voltage regulation	V_I = 14.5 V to 30 V	25°C		10	240	mV
	V_I = 16 V to 22 V			3	120	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	0°C to 125°C	55	71		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	240	mV
	I_O = 250 mA to 750 mA			4	120	
Output resistance	f = 1 kHz	0°C to 125°C		0.018		W
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		75		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	V_I = 14.5 V to 30 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		350		mA
Peak output current		25°C		2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7815C MIN	μA7815C TYP	μA7815C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 17.5 V to 30 V, P_D ≤ 15 W	25°C	14.4	15	15.6	V
		0°C to 125°C	14.25		15.75	
Input voltage regulation	V_I = 17.5 V to 30 V	25°C		11	300	mV
	V_I = 20 V to 26 V			3	150	
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz	0°C to 125°C	54	70		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	300	mV
	I_O = 250 mA to 750 mA			4	150	
Output resistance	f = 1 kHz	0°C to 125°C		0.019		W
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		90		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.4	8	mA
Bias current change	V_I = 17.5 V to 30 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		230		mA
Peak output current		25°C		2.1		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7818C MIN	μA7818C TYP	μA7818C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, V_I = 21 V to 33 V, P_D ≤ 15 W	25°C	17.3	18	18.7	V
		0°C to 125°C	17.1		18.9	
Input voltage regulation	V_I = 21 V to 33 V	25°C		15	360	mV
	V_I = 24 V to 30 V			5	180	
Ripple rejection	V_I = 22 V to 32 V, f = 120 Hz	0°C to 125°C	53	69		dB
Output voltage regulation	I_O = 5 mA to 1.5 A	25°C		12	360	mV
	I_O = 250 mA to 750 mA			4	180	
Output resistance	f = 1 kHz	0°C to 125°C		0.022		W
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		110		μV
Dropout voltage	I_O = 1 A	25°C		2		V
Bias current		25°C		4.5	8	mA
Bias current change	V_I = 21 V to 33 V	0°C to 125°C			1	mA
	I_O = 5 mA to 1 A				0.5	
Short-circuit output current		25°C		200		mA
Peak output current		25°C		2.1		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

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

PARAMETER	TEST CONDITIONS		T_J†	µA7824C MIN	µA7824C TYP	µA7824C MAX	UNIT
Output voltage	I_O = 5 mA to 1 A, $P_D \le$ 15 W	V_I = 27 V to 38 V,	25°C	23	24	25	V
			0°C to 125°C	22.8		25.2	
Input voltage regulation	V_I = 27 V to 38 V		25°C		18	480	mV
	V_I = 30 V to 36 V				6	240	
Ripple rejection	V_I = 28 V to 38 V,	f = 120 Hz	0°C to 125°C	50	66		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		25°C		12	480	mV
	I_O = 250 mA to 750 mA				4	240	
Output resistance	f = 1 kHz		0°C to 125°C		0.028		W
Temperature coefficient of output voltage	I_O = 5 mA		0°C to 125°C		–1.5		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		170		µV
Dropout voltage	I_O = 1 A		25°C		2		V
Bias current			25°C		4.6	8	mA
Bias current change	V_I = 27 V to 38 V		0°C to 125°C			1	mA
	I_O = 5 mA to 1 A					0.5	
Short-circuit output current			25°C		150		mA
Peak output current			25°C		2.1		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 10 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS		µA7805Y MIN	µA7805Y TYP	µA7805Y MAX	UNIT
Output voltage				5		V
Input voltage regulation	V_I = 7 V to 25 V			3		mV
	V_I = 8 V to 12 V			1		
Ripple rejection	V_I = 8 V to 18 V,	f = 120 Hz		78		dB
Output voltage regulation	I_O = 5 mA to 1.5 A			15		mV
	I_O = 250 mA to 750 mA			5		
Output resistance	f = 1 kHz			0.017		W
Temperature coefficient of output voltage	I_O = 5 mA			–1.1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz			40		µV
Dropout voltage	I_O = 1 A			2		V
Bias current				4.2		mA
Short-circuit output current				750		mA
Peak output current				2.2		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 11 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	µA7806Y			UNIT
		MIN	TYP	MAX	
Output voltage			6		V
Input voltage regulation	V_I = 8 V to 25 V		5		mV
	V_I = 9 V to 13 V		1.5		
Ripple rejection	V_I = 9 V to 19 V, f = 120 Hz		75		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		14		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.019		W
Temperature coefficient of output voltage	I_O = 5 mA		–0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		45		µV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.3		mA
Short-circuit output current			550		mA
Peak output current			2.2		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 14 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	µA7808Y			UNIT
		MIN	TYP	MAX	
Output voltage			8		V
Input voltage regulation	V_I = 10.5 V to 25 V		6		mV
	V_I = 11 V to 17 V		2		
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz		72		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.016		W
Temperature coefficient of output voltage	I_O = 5 mA		–0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		52		µV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.3		mA
Short-circuit output current			450		mA
Peak output current			2.2		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 15 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μA7885Y			UNIT
		MIN	TYP	MAX	
Output voltage			8.5		V
Input voltage regulation	V_I = 10.5 V to 25 V		6		mV
	V_I = 11 V to 17 V		2		
Ripple rejection	V_I = 11.5 V to 21.5 V, f = 120 Hz		70		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.016		W
Temperature coefficient of output voltage	I_O = 5 mA		–0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		55		μV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.3		mA
Short-circuit output current			450		mA
Peak output current			2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 17 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μA7810Y			UNIT
		MIN	TYP	MAX	
Output voltage			10		V
Input voltage regulation	V_I = 12.5 V to 28 V		7		mV
	V_I = 14 V to 20 V		2		
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz		71		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.018		W
Temperature coefficient of output voltage	I_O = 5 mA		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		70		μV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.3		mA
Short-circuit output current			400		mA
Peak output current			2.2		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 19 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	µA7812Y			UNIT
		MIN	TYP	MAX	
Output voltage			12		V
Input voltage regulation	V_I = 14.5 V to 30 V		10		mV
	V_I = 16 V to 22 V		3		
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz		71		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.018		W
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	I_O = 1 A		2		V
Bias current			4.3		mA
Short-circuit output current			350		mA
Peak output current			2.2		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 23 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	µA7815Y			UNIT
		MIN	TYP	MAX	
Output voltage			15		V
Input voltage regulation	V_I = 17.5 V to 30 V		11		mV
	V_I = 20 V to 26 V		3		
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz		70		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.019		W
Temperature coefficient of output voltage	I_O = 5 mA		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		90		µV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.4		mA
Short-circuit output current			230		mA
Peak output current			2.1		A

† Pulse-testing techniques 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 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 27 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μA7818Y			UNIT
		MIN	TYP	MAX	
Output voltage			18		V
Input voltage regulation	V_I = 21 V to 33 V		15		mV
	V_I = 24 V to 30 V		5		
Ripple rejection	V_I = 22 V to 32 V, f = 120 Hz		69		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.022		W
Temperature coefficient of output voltage	I_O = 5 mA		–1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		110		μV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.5		mA
Short-circuit output current			200		mA
Peak output current			2.1		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

electrical characteristics at specified virtual junction temperature, V_I = 33 V, I_O = 500 mA, T_J = 25°C (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μA7824Y			UNIT
		MIN	TYP	MAX	
Output voltage			24		V
Input voltage regulation	V_I = 27 V to 38 V		18		mV
	V_I = 30 V to 36 V		6		
Ripple rejection	V_I = 28 V to 38 V, f = 120 Hz		66		dB
Output voltage regulation	I_O = 5 mA to 1.5 A		12		mV
	I_O = 250 mA to 750 mA		4		
Output resistance	f = 1 kHz		0.028		W
Temperature coefficient of output voltage	I_O = 5 mA		–1.5		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		170		μV
Dropout voltage	I_O = 1 A		2		V
Bias current			4.6		mA
Short-circuit output current			150		mA
Peak output current			2.1		A

† Pulse-testing techniques 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 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

APPLICATION INFORMATION

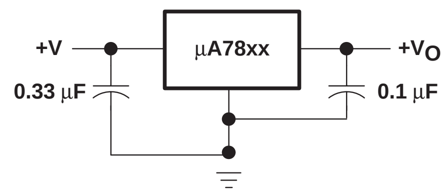


Figure 1. Fixed-Output Regulator

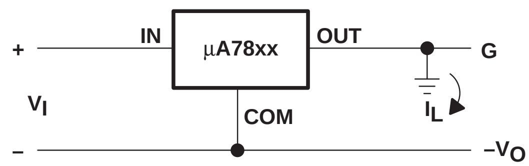
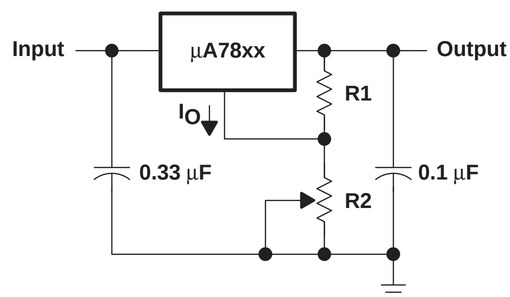


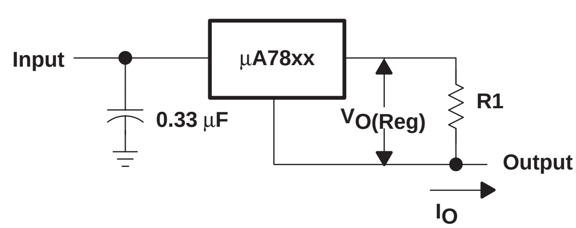
Figure 2. Positive Regulator in Negative Configuration (V_I Must Float)



NOTE A: The following formula is used when V_{XX} is the nominal output voltage (output to common) of the fixed regulator:

$$V_O = V_{xx} + \left(\frac{V_{xx}}{R1} + I_Q\right)R2$$

Figure 3. Adjustable-Output Regulator



$I_O = (V_O/R1) + I_O$ Bias Current

Figure 4. Current Regulator

APPLICATION INFORMATION

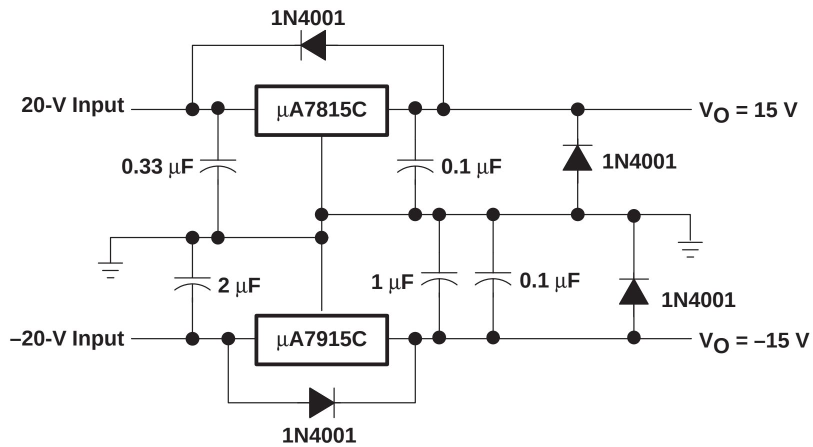


Figure 5. Regulated Dual Supply

operation with a load common to a voltage of opposite polarity

In many cases, a regulator powers a load that is not connected to ground but, instead, is connected to a voltage source of opposite polarity (e.g., operational amplifiers, level-shifting circuits, etc.). In these cases, a clamp diode should be connected to the regulator output as shown in Figure 6. This protects the regulator from output polarity reversals during startup and short-circuit operation.

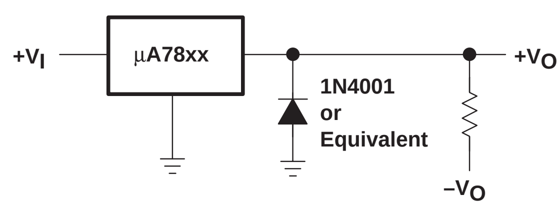


Figure 6. Output Polarity-Reversal-Protection Circuit

reverse-bias protection

Occasionally, the input voltage to the regulator can collapse faster than the output voltage. This can occur, for example, when the input supply is crowbarred during an output overvoltage condition. If the output voltage is greater than approximately 7 V, the emitter-base junction of the series-pass element (internal or external) could break down and be damaged. To prevent this, a diode shunt can be used as shown in Figure 7.

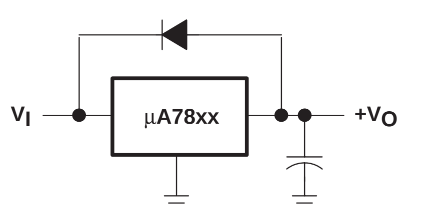
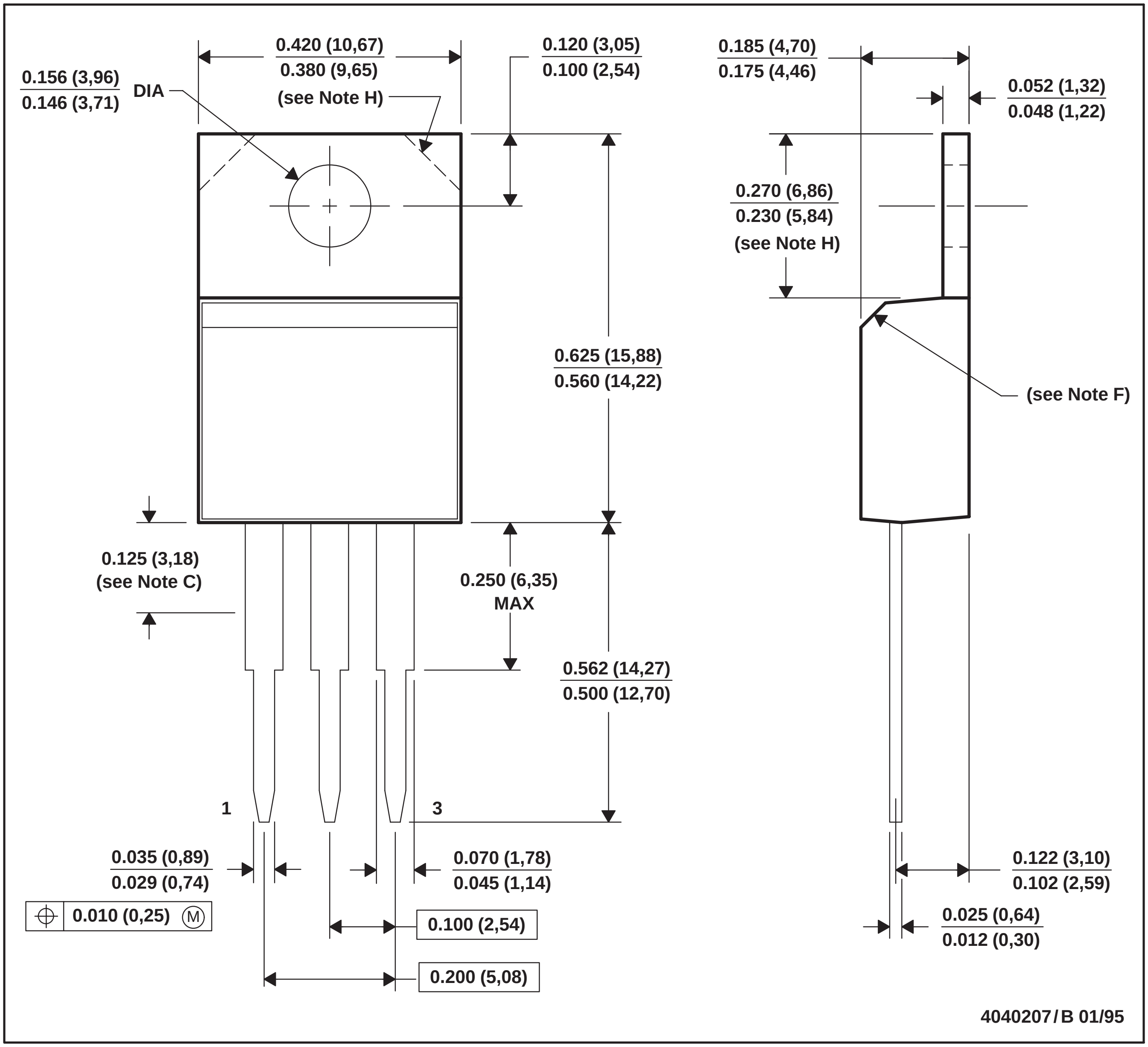


Figure 7. Reverse-Bias-Protection Circuit

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