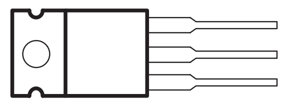
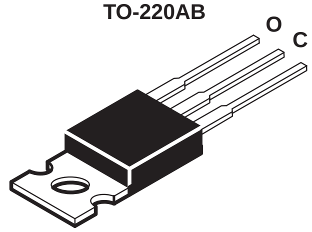
- 3-Terminal Regulators
- Output Current Up to 1.5 A
- Internal Thermal-Overload Protection
- High Power-Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Direct Replacements for Fairchild μA7800 Series

KC PACKAGE
(TOP VIEW)

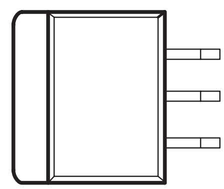


The common terminal is in electrical contact with the mounting base.

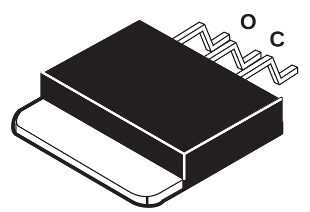
TO-220AB



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.

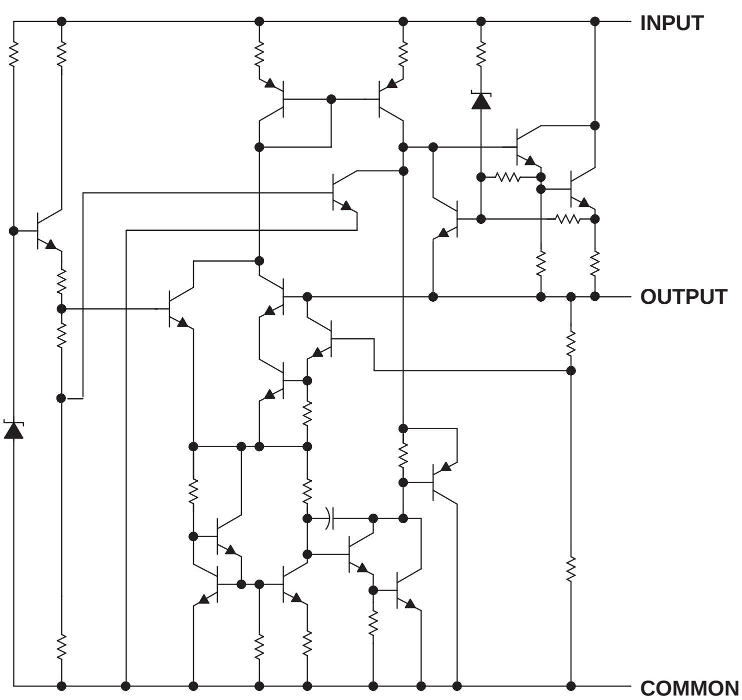
The μA7800C series is characterized for operation over the virtual junction temperature range of 0°C to 125°C. The μA7805Q and μA7812Q are characterized for operation over the virtual junction temperature range of –40°C to 125°C.

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
–40°C to 125°C	5	µA7805QKC	µA7805QKTE	—
	12	µA7812QKC	µA7812QKTE	—

† The KTE package is only available taped and reeled (e.g., µA7805CKTER)

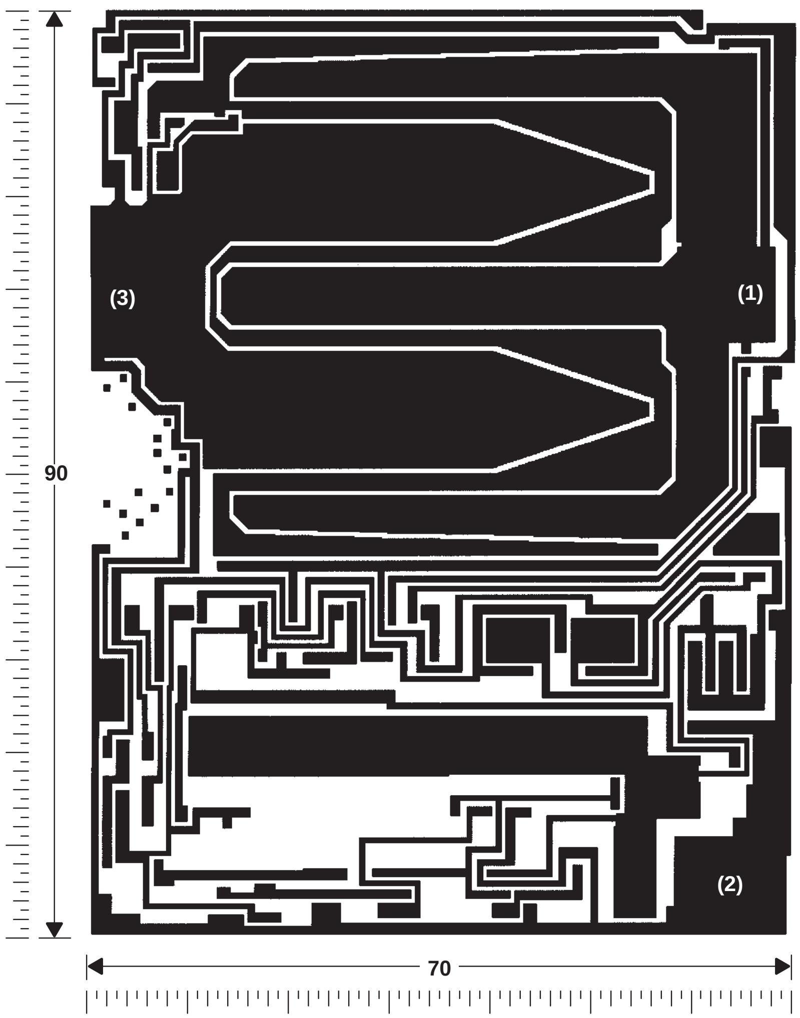
schematic

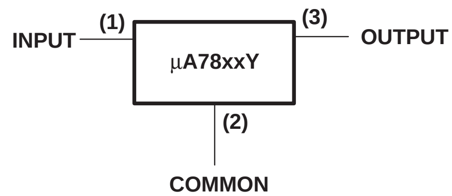


μA78xxY chip information

These chips, when properly assembled, have characteristics similar to the μA78xxC. Thermal compression or ultrasonic bonding can be used on the doped-aluminum bonding pads. The chips can be mounted with conductive epoxy or a gold-silicon preform.

BONDING-PAD ASSIGNMENTS





CHIP THICKNESS: 15 MILS TYPICAL

BONDING PADS: 4 X 4 MILS MINIMUM

T_J(max) = 150°C

TOLERANCES ARE ± 10%

ALL DIMENSIONS ARE IN MILS.

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

		μA78xx	UNIT
Input voltage, V_I	μA7824C	40	V
	All others	35	
Continuous total power dissipation (see Note 1)		See Dissipation Rating Tables 1 and 2	
Virtual junction temperature range, T_J	μA7800C series	0 to 150	°C
	μA7805Q, μA7812Q	–40 to 150	
Storage temperature range, T_{stg}		–65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds		260	°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.

NOTE 1: For operation above 25°C free-air or 90°C case temperature, refer to Figure 1 and Figure 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 1 — 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 2 — 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

recommended operating conditions

		MIN	MAX	UNIT
Input voltage, V_I	µA7805C, µA7805Q	7	25	V
	µA7806C	8	25	
	µA7808C	10.5	25	
	µA7885C	10.5	25	
	µA7810C	12.5	28	
	µA7812C, µA7812Q	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
	µA7805Q, µA7812Q	–40	125	

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

PARAMETER	TEST CONDITIONS	T_J†	µA7805C, µA7805Q			UNIT
			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 ≤ 15 W	Full range§	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	Full range§	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	Full range§		0.017		Ω
Temperature coefficient of output voltage	I_O = 5 mA	Full range§		–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	Full range§			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.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.
§ Full-range virtual junction temperature is 0°C to 125°C for the µA7805C and –40°C to 125°C for the µA7805Q.

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‡		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 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.
‡ 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†	μA7808C MIN	μA7808C TYP	μA7808C MAX	UNIT
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 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.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

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‡		25°C	8.15	8.5	8.85	V
	I_O = 5 mA to 1 A, V_I = 11 V to 23.5 V, P ≤ 15 W	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.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

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‡		25°C	9.6	10	10.4	V
	I_O = 5 mA to 1 A, V_I = 12.5 V to 25 V, P ≤ 15 W	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.
‡ 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†	µA7812C, µA7812Q MIN	TYP	MAX	UNIT
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	Full range§	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	Full range§	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	Full range§		0.018		W
Temperature coefficient of output voltage	I_O = 5 mA	Full range§		–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	Full range§			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.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.
§ Full range virtual junction temperature is 0°C to 125°C for the µA7812C and –40°C to 125°C for the µA7812Q.

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

PARAMETER	TEST CONDITIONS	T_J†	μA7815C			UNIT
			MIN	TYP	MAX	
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 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.

‡ 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†	μA7818C			UNIT
			MIN	TYP	MAX	
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 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.
‡ 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†	µA7824C MIN	µA7824C TYP	µA7824C MAX	UNIT
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 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.
‡ 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, 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.
‡ 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, $T_J = 25°C$† (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.
‡ 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, $T_J = 25°C$† (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.
‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

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

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

APPLICATION INFORMATION

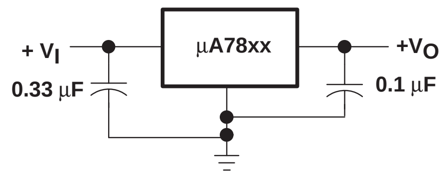


Figure 1. Fixed-Output Regulator

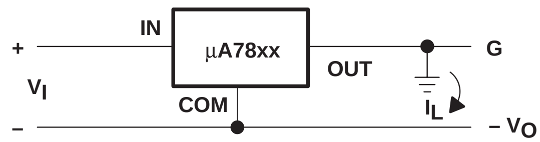
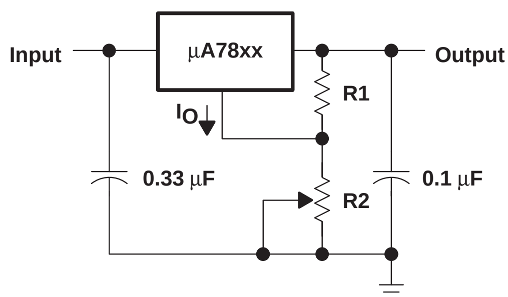


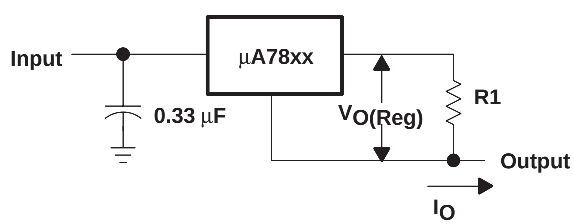
Figure 2. Positive Regulator in Negative Configuration (V_I Must Float)



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

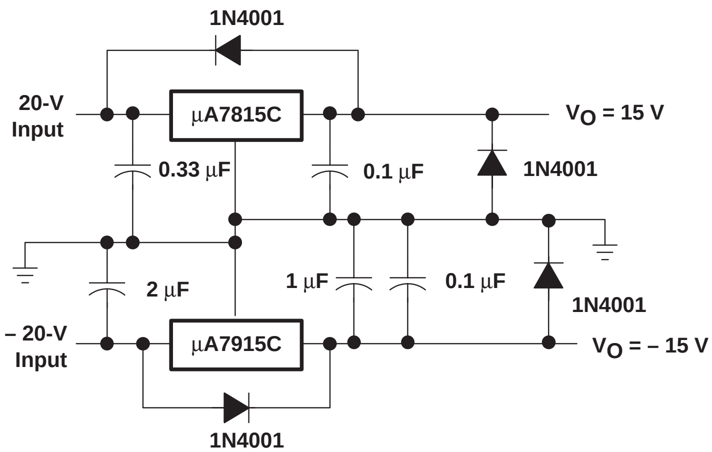


Figure 5. Regulated Dual Supply

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 is connected to a voltage source of opposite polarity (e.g., op amps, 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 start-up and short-circuit operation.

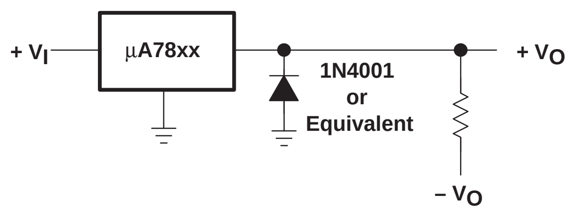


Figure 6. Output Polarity-Reversal Protection Circuit

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.

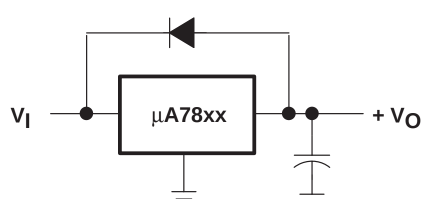


Figure 7. Reverse-Bias Protection Circuit

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