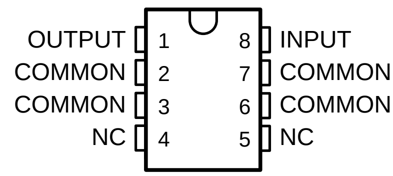
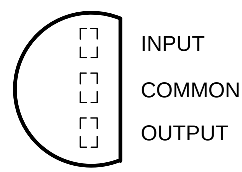
- **3-Terminal Regulators**
- **Output Current up to 100 mA**
- **No External Components**
- **Internal Thermal Overload Protection**
- **Internal Short-Circuit Current Limiting**
- **Direct Replacements for Fairchild µA78L00 Series**

D PACKAGE
(TOP VIEW)



NC–No internal connection

LP PACKAGE
(TOP VIEW)



TO-226AA

description

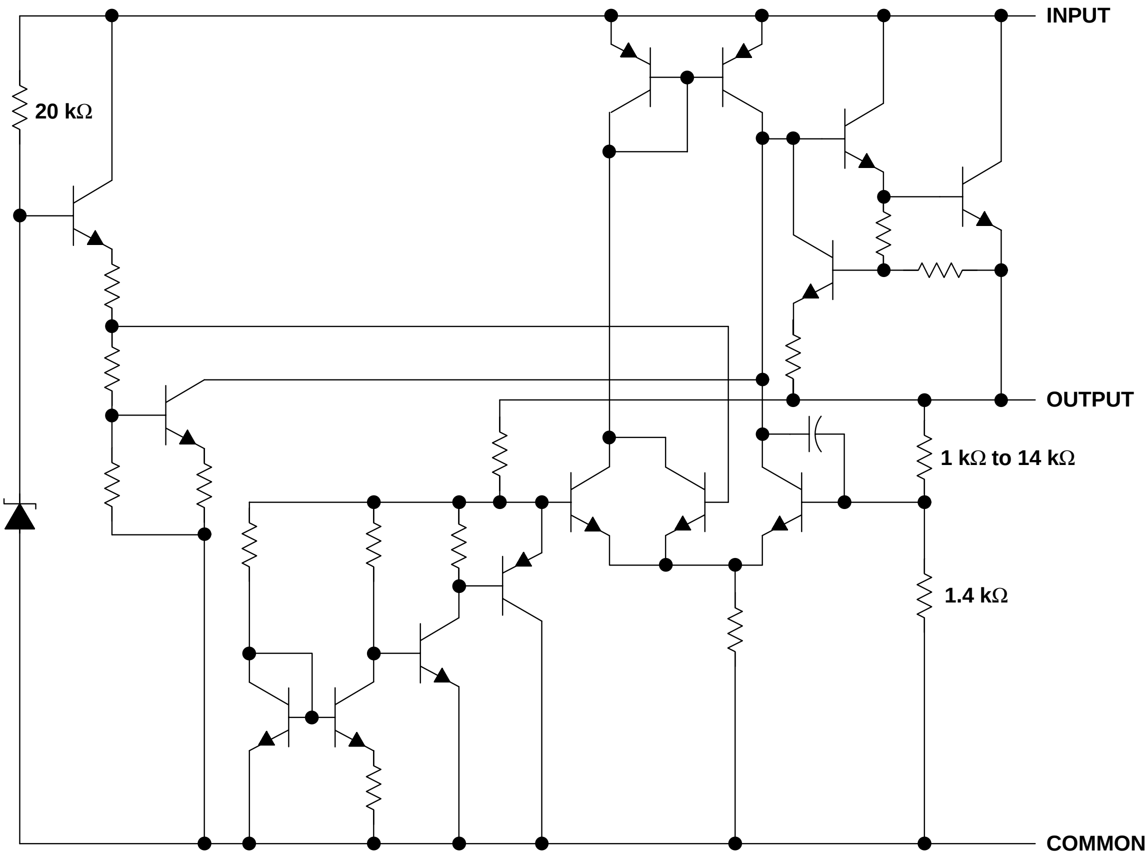
This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. One of these regulators can deliver up to 100 mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower bias current.

AVAILABLE OPTIONS

T_J	$V_{O(nom)}$ (V)	PACKAGED DEVICES				CHIP FORM (Y)
		SMALL OUTLINE (D)		PLASTIC CYLINDRICAL (LP)		
		OUTPUT VOLTAGE TOLERANCE				
		5%	10%	5%	10%	
0°C to 125°C	2.6	µA78L02ACD	µA78L02CD	µA78L02ACLP	µA78L02CLP	µA78L02Y
	5	µA78L05ACD	µA78L05CD	µA78L05ACLP	µA78L05CLP	µA78L05Y
	6.2	µA78L06ACD	µA78L06CD	µA78L06ACLP	µA78L06CLP	µA78L06Y
	8	µA78L08ACD	µA78L08CD	µA78L08ACLP	µA78L08CLP	µA78L08Y
	9	µA78L09ACD	µA78L09CD	µA78L09ACLP	µA78L09CLP	µA78L09Y
	10	µA78L10ACD	µA78L10CD	µA78L10ACLP	µA78L10CLP	µA78L10Y
	12	µA78L12ACD	µA78L12CD	µA78L12ACLP	µA78L12CLP	µA78L12Y
	15	µA78L15ACD	µA78L15CD	µA78L15ACLP	µA78L15CLP	µA78L15Y
–40°C to 125°C	5	µA78L05AQD	µA78L05QD	µA78L05QLP	µA78L05QLP	—
	12	µA78L12AQD	µA78L12QD	µA78L12QLP	µA78L12QLP	—

D and LP packages are available taped and reeled. Add R suffix to device type (e.g., µA78L05ACDR).

schematic

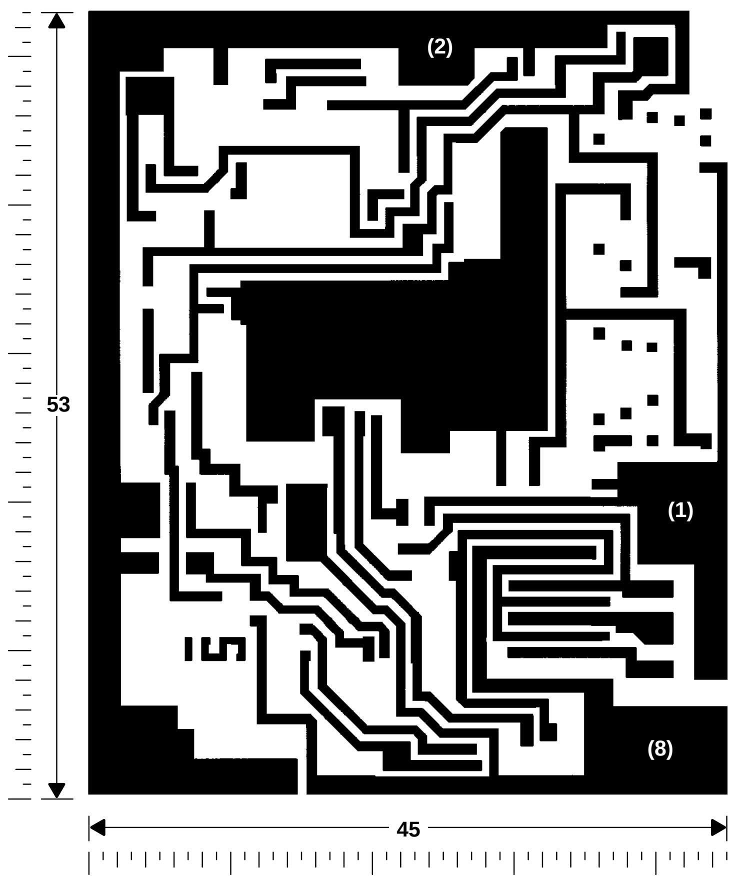


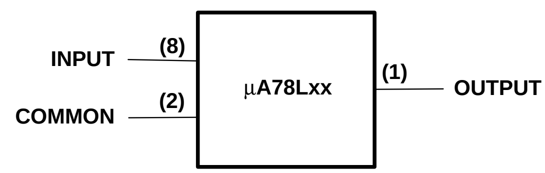
NOTE: Resistor values shown are nominal.

µA78LxxY chip information

These chips, when properly assembled, display characteristics similar to the µA78LxxY. Thermal compression or ultrasonic bonding may be used on the doped aluminum bonding pads. The chips may be mounted with conductive epoxy or a gold-silicon preform.

BONDING PAD ASSIGNMENTS





CHIP THICKNESS: 15 MILS TYPICAL

BONDING PADS: 4 × 4 MILS MINIMUM

$T_J$max = 150°C

TOLERANCES ARE ±10%.

ALL DIMENSIONS ARE IN MILS.

TERMINALS 2,3,6, AND 7 ARE CONNECTED TOGETHER.

TERMINALS 4 AND 5 ARE NOT CONNECTED.

µA78LxxC absolute maximum ratings over operating temperature range (unless otherwise noted)

	µA78L02C, µA78L02AC THROUGH µA78L10C, µA78L10AC	µA78L12C, µA78L12AC µA78L15C, µA78L15AC	UNIT
Input voltage	30	35	V
Continuous total power dissipation (see Note 1)	See Dissipation Rating Tables 1 and 2		
Operating free-air, T_A, case, T_C, or virtual junction, T_J, temperature range	0 to 125	0 to 125	°C
Storage temperature range, T_{stg}	–65 to 150	–65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260	260	°C

NOTE 1: 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.

µA78LxxQ absolute maximum ratings over operating temperature range (unless otherwise noted)

	µA78L05Q, µA78L05AQ	µA78L12Q, µA78L12AQ	UNIT
Input voltage	30	35	V
Continuous total power dissipation (see Note 1)	See Dissipation Rating Tables 1 and 2		
Operating free-air, T_A, case, T_C, or virtual junction, T_J, temperature range	–40 to 150	–40 to 150	°C
Storage temperature range, T_{stg}	–65 to 150	–65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260	260	°C

NOTE 1: 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	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70°C$ POWER RATING
D	725 mW	5.8 mW/°C	25°C	464 mW
LP†	775 mW	6.2 mW/°C	25°C	496 mW

† The LP package dissipation rating is based on thermal resistance $R_{\theta JA}$ measured in still air with the device mounted in an Augat socket. The bottom of the package is 10 mm (0.375 in) above the socket.

DISSIPATION RATING TABLE 2 – CASE TEMPERATURE

PACKAGE	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_C	$T_C = 125°C$ POWER RATING
D	1600 mW	19.6 mW/°C	65°C	424 mW
LP	1600 mW	28.6 mW/°C	94°C	713 mW

recommended operating conditions

		MIN	MAX	UNIT
Input voltage, V_I	μA78L02C, μA78L02AC	4.75	20	V
	μA78L05C, μA78L05AC, μA78L05Q, μA78L05AQ	7	20	
	μA78L06C, μA78L06AC	8.5	20	
	μA78L08C, μA78L08AC	10.5	23	
	μA78L09C, μA78L09AC	11.5	24	
	μA78L10C, μA78L10AC	12.5	25	
	μA78L12C, μA78L12AC, μA78L12Q, μA78L12AQ	14.5	27	
	μA78L15C, μA78L15AC	17.5	30	
Output current, I_O			100	mA
Operating virtual junction temperature, T_J	μA78LxxC through μA78LxxAC	0	125	°C
	μA78LxxQ and μA78LxxAQ	–40	125	

electrical characteristics at specified virtual junction temperature, V_I = 9 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA78L02C MIN	μA78L02C TYP	μA78L02C MAX	μA78L02AC MIN	μA78L02AC TYP	μA78L02AC MAX	UNIT
Output voltage‡		25°C	2.4	2.6	2.8	2.5	2.6	2.7	V
	V_I = 4.75 V to 20 V, I_O = 1 mA to 40 mA	Full range§	2.35		2.85	2.45		2.75	
	I_O = 1 mA to 70 mA		2.35		2.85	2.45		2.75	
Input voltage regulation	V_I = 4.75 V to 20 V	25°C		20	125		20	100	mV
	V_I = 5 V to 20 V			16	100		16	75	
Ripple rejection	V_I = 6 V to 20 V, f = 120 Hz	25°C	42	51		43	51		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		12	50		12	50	mV
	I_O = 1 mA to 40 mA			6	25		6	25	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		30			30		μV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		3.6	6		3.6	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 5 V to 20 V	Full range§			2.5			2.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 μA78L02, μA78L02AC, μA78L05C, and μA78L05AC and –40°C to 125°C for μA78L05Q and μA78L05AQ.

electrical characteristics at specified virtual junction temperature, V_I = 10 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA78L05C, μA78L05Q MIN	μA78L05C, μA78L05Q TYP	μA78L05C, μA78L05Q MAX	μA78L05AC, μA78L05AQ MIN	μA78L05AC, μA78L05AQ TYP	μA78L05AC, μA78L05AQ MAX	UNIT
Output voltage‡		25°C	4.6	5	5.4	4.8	5	5.2	V
	V_I = 7 V to 20 V, I_O = 1 mA to 40 mA	Full range§	4.5		5.5	4.75		5.25	
	I_O = 1 mA to 70 mA		4.5		5.5	4.75		5.25	
Input voltage regulation	V_I = 7 V to 20 V	25°C		32	200		32	150	mV
	V_I = 8 V to 20 V			26	150		26	100	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	25°C	40	49		41	49		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		15	60		15	60	mV
	I_O = 1 mA to 40 mA			8	30		8	30	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		42			42		μV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		3.8	6		3.8	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 8 V to 20 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 μA78L02, μA78L02AC, μA78L05C, and μA78L05AC and –40°C to 125°C for μA78L05Q and μA78L05AQ.

electrical characteristics at specified virtual junction temperature, V_I = 12 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	µA78L06C			µA78L06AC			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	5.7	6.2	6.7	5.95	6.2	6.45	V
	V_I = 8.5 V to 20 V, I_O = 1 mA to 40 mA	Full range§	5.6		6.8	5.9		6.5	
	I_O = 1 mA to 70 mA		5.6		6.8	5.9		6.5	
Input voltage regulation	V_I = 8.5 V to 20 V	25°C		35	200		35	175	mV
	V_I = 9 V to 20 V			29	150		29	125	
Ripple rejection	V_I = 10 V to 20 V, f = 120 Hz	25°C	39	48		40	48		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		16	80		16	80	mV
	I_O = 1 mA to 40 mA			9	40		9	40	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		46			46		µV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		3.9	6		3.9	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 9 V to 20 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 µA78L06C, µA78L06AC, µA78L08C, and µA78L08AC.

electrical characteristics at specified virtual junction temperature, V_I = 14 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	µA78L08C			µA78L08AC			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	7.36	8	8.64	7.7	8	8.3	V
	V_I = 10.5 V to 23 V, I_O = 1 mA to 40 mA	Full range§	7.2		8.8	7.6		8.4	
	I_O = 1 mA to 70 mA		7.2		8.8	7.6		8.4	
Input voltage regulation	V_I = 10.5 V to 23 V	25°C		42	200		42	175	mV
	V_I = 11 V to 23 V			36	150		36	125	
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz	25°C	36	46		37	46		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		18	80		18	80	mV
	I_O = 1 mA to 40 mA			10	40		10	40	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		54			54		µV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		4	6		4	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 5 V to 20 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 µA78L06C, µA78L06AC, µA78L08C, and µA78L08AC.

electrical characteristics at specified virtual junction temperature, V_I = 16 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA78L09C			μA78L09AC			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	8.3	9	9.7	8.6	9	9.4	V
	V_I = 12 V to 24 V, I_O = 1 mA to 40 mA	Full range§	8.1		9.9	8.55		9.45	
	I_O = 1 mA to 70 mA		8.1		9.9	8.55		9.45	
Input voltage regulation	V_I = 12 V to 24 V	25°C		45	225		45	175	mV
	V_I = 13 V to 24 V			40	175		40	125	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	25°C	36	45		38	45		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		19	90		19	90	mV
	I_O = 1 mA to 40 mA			11	40		11	40	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		58			58		μV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		4.1	6		4.1	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 13 V to 24 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 μA78L09C, μA78L09AC, μA78L10C, and μA78L10AC.

electrical characteristics at specified virtual junction temperature, V_I = 14 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	μA78L10C			μA78L10AC			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	9.2	10	10.8	9.6	10	10.4	V
	V_I = 13 V to 25 V, I_O = 1 mA to 40 mA	Full range§	9		11	9.5		10.5	
	I_O = 1 mA to 70 mA		9		11	9.5		10.5	
Input voltage regulation	V_I = 13 V to 25 V	25°C		51	225		51	175	mV
	V_I = 14 V to 25 V			42	175		42	125	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	25°C	36	44		37	44		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		20	90		20	90	mV
	I_O = 1 mA to 40 mA			11	40		11	40	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		62			62		μV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		4.2	6		4.2	6	mA
		125°C			5.5			5.5	
Bias current change	V_I = 14 V to 25 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 μA78L09C, μA78L09AC, μA78L10C, and μA78L10AC.

electrical characteristics at specified virtual junction temperature, V_I = 19 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	µA78L12C, µA78L12Q			µA78L12AC, µA78L12AQ			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	11.1	12	12.9	11.5	12	12.5	V
	V_I = 14 V to 27 V, I_O = 1 mA to 40 mA	Full range§	10.8		13.2	11.4		12.6	
	I_O = 1 mA to 70 mA		10.8		13.2	11.4		12.6	
Input voltage regulation	V_I = 14.5 V to 27 V	25°C		55	250		55	250	mV
	V_I = 16 V to 27 V			49	200		49	200	
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz	25°C	36	42		37	42		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		22	100		22	100	mV
	I_O = 1 mA to 40 mA			13	50		13	50	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		70			70		µV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		4.3	6.5		4.3	6.5	mA
		125°C			6			6	
Bias current change	V_I = 16 V to 27 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 µA78L12C, µA78L12AC, µA78L15C, and µA78L15AC.

electrical characteristics at specified virtual junction temperature, V_I = 23 V, I_O = 40 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J†	µA78L15C			µA78L15AC			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage‡		25°C	13.8	15	16.2	14.4	15	15.6	V
	V_I = 17.5 V to 30 V, I_O = 1 mA to 40 mA	Full range§	13.5		16.5	14.25		15.75	
	I_O = 1 mA to 70 mA		13.5		16.5	14.25		15.75	
Input voltage regulation	V_I = 17.5 V to 30 V	25°C		65	300		65	300	mV
	V_I = 20 V to 30 V			58	250		58	250	
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz	25°C	33	39		34	39		dB
Output voltage regulation	I_O = 1 mA to 100 mA	25°C		25	150		25	150	mV
	I_O = 1 mA to 40 mA			15	75		15	75	
Output noise voltage	f = 10 Hz to 100 kHz	25°C		82			82		µV
Dropout voltage		25°C		1.7			1.7		V
Bias current		25°C		4.6	6.5		4.6	6.5	mA
		125°C			6			6	
Bias current change	V_I = 10 V to 30 V	Full range§			1.5			1.5	mA
	I_O = 1 mA to 40 mA				0.2			0.1	

† Pulse-testing techniques maintain T_J as close to T_A 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 µA78L12C, µA78L12AC, µA78L15C, and µA78L15AC.

electrical characteristics at specified virtual junction temperature, V_I = 9 V, I_O = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L02Y MIN	μA78L02Y TYP	μA78L02Y MAX	UNIT
Output voltage‡			2.6		V
Input voltage regulation	V_I = 4.75 V to 20 V		20		mV
	V_I = 5 V to 20 V		16		
Ripple rejection	V_I = 6 V to 20 V, f = 120 Hz		51		dB
Output voltage regulation	I_O = 1 mA to 100 mA		12		mV
	I_O = 1 mA to 40 mA		6		
Output noise voltage	f = 10 Hz to 100 kHz		30		μV
Dropout voltage			1.7		V
Bias current			3.6		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L05Y MIN	μA78L05Y TYP	μA78L05Y MAX	UNIT
Output voltage‡			5		V
Input voltage regulation	V_I = 7 V to 20 V		32		mV
	V_I = 8 V to 20 V		26		
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz		49		dB
Output voltage regulation	I_O = 1 mA to 100 mA		15		mV
	I_O = 1 mA to 40 mA		8		
Output noise voltage	f = 10 Hz to 100 kHz		42		μV
Dropout voltage			1.7		V
Bias current			3.8		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 12 V, I_O = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L06Y MIN	μA78L06Y TYP	μA78L06Y MAX	UNIT
Output voltage‡			6.2		V
Input voltage regulation	V_I = 8.5 V to 20 V		35		mV
	V_I = 9 V to 20 V		29		
Ripple rejection	V_I = 10 V to 20 V, f = 120 Hz		48		dB
Output voltage regulation	I_O = 1 mA to 100 mA		16		mV
	I_O = 1 mA to 40 mA		9		
Output noise voltage	f = 10 Hz to 100 kHz		46		μV
Dropout voltage			1.7		V
Bias current			3.9		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L08Y			UNIT
		MIN	TYP	MAX	
Output voltage ‡			8		V
Input voltage regulation	V_I = 10.5 V to 23 V		42		mV
	V_I = 11 V to 23 V		36		
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz		46		dB
Output voltage regulation	I_O = 1 mA to 100 mA		18		mV
	I_O = 1 mA to 40 mA		10		
Output noise voltage	f = 10 Hz to 100 kHz		54		μV
Dropout voltage			1.7		V
Bias current			4		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 16 V, I_O = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L09Y			UNIT
		MIN	TYP	MAX	
Output voltage ‡			9		V
Input voltage regulation	V_I = 12 V to 24 V		45		mV
	V_I = 13 V to 24 V		40		
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz		45		dB
Output voltage regulation	I_O = 1 mA to 100 mA		19		mV
	I_O = 1 mA to 40 mA		11		
Output noise voltage	f = 10 Hz to 100 kHz		58		μV
Dropout voltage			1.7		V
Bias current			4.1		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L10Y			UNIT
		MIN	TYP	MAX	
Output voltage ‡			10		V
Input voltage regulation	V_I = 13 V to 25 V		51		mV
	V_I = 14 V to 25 V		42		
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz		44		dB
Output voltage regulation	I_O = 1 mA to 100 mA		20		mV
	I_O = 1 mA to 40 mA		11		
Output noise voltage	f = 10 Hz to 100 kHz		62		μV
Dropout voltage			1.7		V
Bias current			4.2		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L12Y			UNIT
		MIN	TYP	MAX	
Output voltage‡			12		V
Input voltage regulation	V_I = 14.5 V to 27 V		55		mV
	V_I = 16 V to 27 V		49		
Ripple rejection	V_I = 15 V to 25 V, f = 120 Hz		42		dB
Output voltage regulation	I_O = 1 mA to 100 mA		22		mV
	I_O = 1 mA to 40 mA		13		
Output noise voltage	f = 10 Hz to 100 kHz		70		μV
Dropout voltage			1.7		V
Bias current			4.3		mA

† Pulse-testing techniques maintain T_J as close to T_A 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 = 40 mA, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	μA78L15Y			UNIT
		MIN	TYP	MAX	
Output voltage‡			15		V
Input voltage regulation	V_I = 17.5 V to 30 V		65		mV
	V_I = 20 V to 30 V		58		
Ripple rejection	V_I = 18.5 V to 28.5 V, f = 120 Hz		39		dB
Output voltage regulation	I_O = 1 mA to 100 mA		25		mV
	I_O = 1 mA to 40 mA		15		
Output noise voltage	f = 10 Hz to 100 kHz		82		μV
Dropout voltage			1.7		V
Bias current			4.6		mA

† Pulse-testing techniques maintain T_J as close to T_A 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

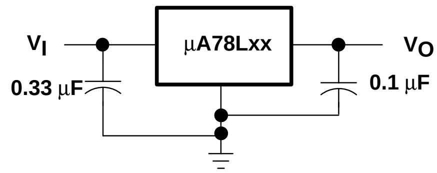


Figure 1. Fixed Output Regulator

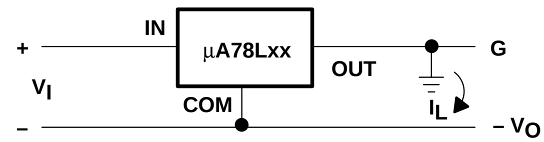


Figure 2. Positive Regulator in Negative Configuration (V_I Must Float)

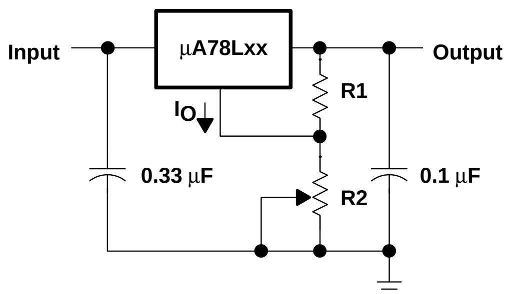


Figure 3. Adjustable Output Regulator

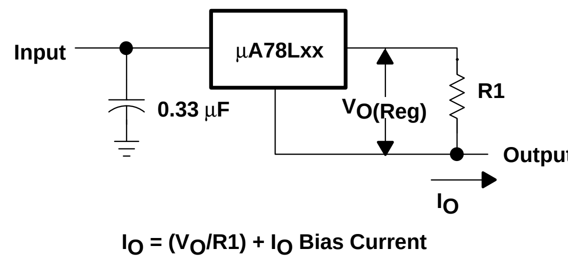


Figure 4. Current Regulator

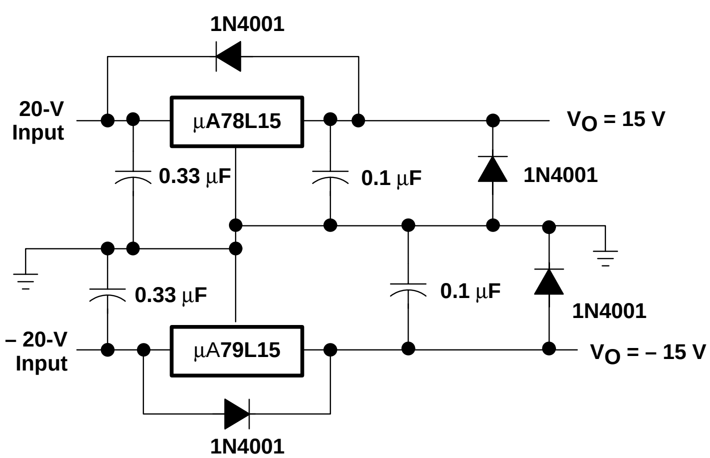


Figure 5. Regulated Dual Supply

APPLICATION INFORMATION

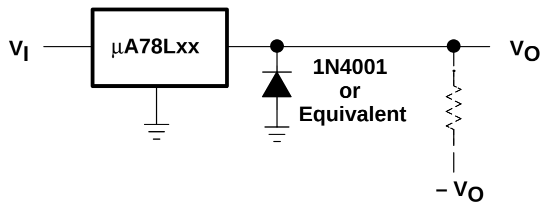


Figure 6. Output Polarity-Reversal Protection Circuit

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.

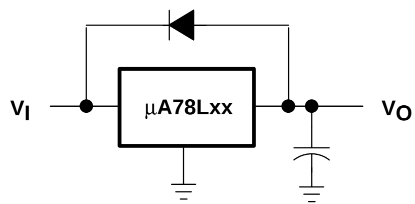


Figure 7. Reverse-Bias Protection Circuit

reverse-bias protection

Occasionally, there exists the possibility that the input voltage to the regulator can collapse faster than the output voltage. This could 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 employed as shown in Figure 7.

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