FAIRCHILD
A Schlumberger Company

μA7800 Series 3-Terminal Positive Voltage Regulators

Linear Products

Description

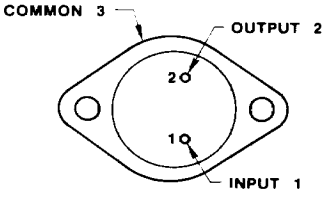
The μA7800 series of monolithic 3-Terminal Positive Voltage Regulators is constructed using the Fairchild Planar epitaxial process. These regulators employ internal current-limiting, thermal-shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

- **OUTPUT CURRENT IN EXCESS OF 1 A**
- **NO EXTERNAL COMPONENTS**
- **INTERNAL THERMAL OVERLOAD PROTECTION**
- **INTERNAL SHORT CIRCUIT CURRENT LIMITING**
- **OUTPUT TRANSISTOR SAFE-AREA COMPENSATION**
- **AVAILABLE IN THE TO-220 AND THE TO-3 PACKAGE**
- **OUTPUT VOLTAGES OF 5, 6, 8, 8.5, 12, 15, 18, AND 24 V**

Absolute Maximum Ratings

Input Voltage (5 V through 18 V)	35 V
(24 V)	40 V
Internal Power Dissipation	Internally Limited
Storage Temperature Range	−65°C to +150°C
Operating Junction Temperature Range	
μA7800	−55°C to +150°C
μA7800C	0°C to +125°C
Pin Temperature	
Soldering, 60s time limit	
TO-3 Package	300°C
Soldering, 10s time limit	
TO-220 Package	230°C

Connection Diagram
TO-3 Package

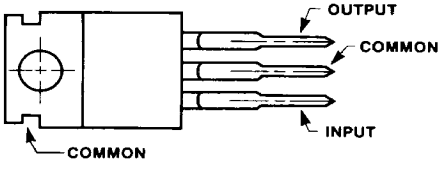


(Top View)

Order Information

Type	Package	Code	Part No.
μA7805	Metal	HJ	μA7805KM
μA7806	Metal	HJ	μA7806KM
μA7808	Metal	HJ	μA7808KM
μA7812	Metal	HJ	μA7812KM
μA7815	Metal	HJ	μA7815KM
μA7818	Metal	HJ	μA7818KM
μA7824	Metal	HJ	μA7824KM
μA7805C	Metal	HJ	μA7805KC
μA7806C	Metal	HJ	μA7806KC
μA7808C	Metal	HJ	μA7808KC
μA7812C	Metal	HJ	μA7812KC
μA7815C	Metal	HJ	μA7815KC
μA7818C	Metal	HJ	μA7818KC
μA7824C	Metal	HJ	μA7824KC

Connection Diagram
To-220 Package

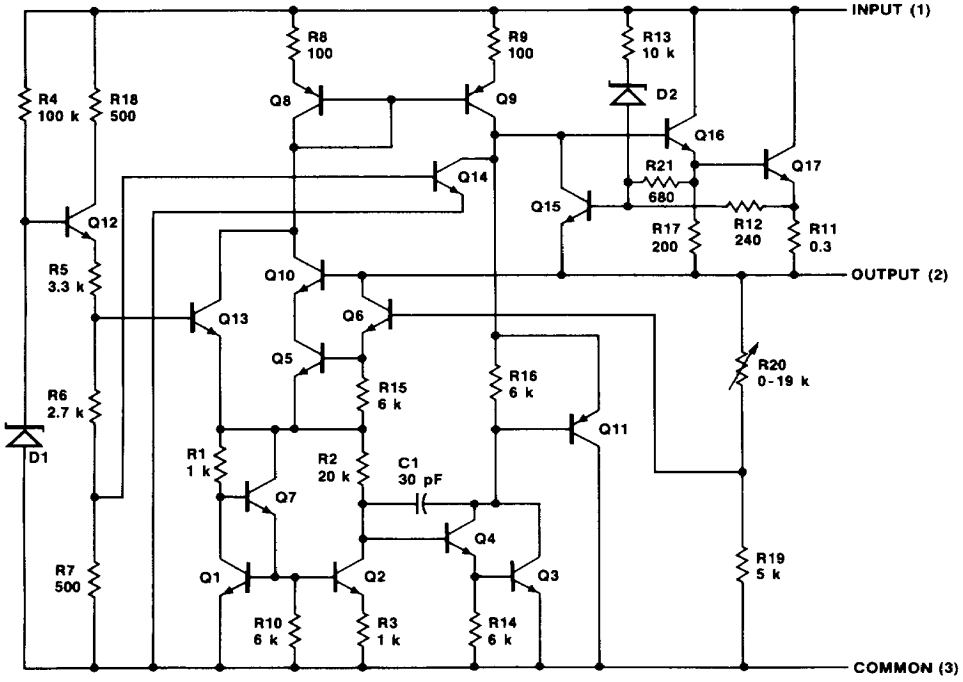


(Side View)

Order Information

Type	Package	Code	Part No.
μA7805C	Molded Power Pack	GH	μA7805UC
μA7806C	Molded Power Pack	GH	μA7806UC
μA7808C	Molded Power Pack	GH	μA7808UC
μA7885C	Molded Power Pack	GH	μA7885UC
μA7812C	Molded Power Pack	GH	μA7812UC
μA7815C	Molded Power Pack	GH	μA7815UC
μA7818C	Molded Power Pack	GH	μA7818UC
μA7824C	Molded Power Pack	GH	μA7824UC

Equivalent Circuit



μA7805
Electrical Characteristics V_{IN} = 10 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		4.8	5.0	5.2	V
Line Regulation		T_J = 25°C	7 V ≤ V_{IN} ≤ 25 V		3	50	mV
			8 V ≤ V_{IN} ≤ 12 V		1	25	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		15	100	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		5	25	mV
Output Voltage		8.0 V ≤ V_{IN} ≤ 20 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		4.65		5.35	V
Quiescent Current		T_J = 25°C			4.2	6.0	mA
Quiescent Current Change	with line	8 V ≤ V_{IN} ≤ 25 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 8 V ≤ V_{IN} ≤ 18 V		68	78		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0	2.5	V
Output Resistance		f = 1 kHz			17		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75	1.2	A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	−55° C ≤ T_J ≤ +25°C			0.4	mV/°C/ V_{OUT}
			+25°C ≤ T_J ≤ +150°C			0.3	

μA7805C
Electrical Characteristics V_{IN} = 10 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		4.8	5.0	5.2	V
Line Regulation		T_J = 25°C	7 V ≤ V_{IN} ≤ 25 V		3	100	mV
			8 V ≤V_{IN} ≤ 12 V		1	50	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		15	100	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		5	50	mV
Output Voltage		7 V ≤ V_{IN} ≤ 20 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		4.75		5.25	V
Quiescent Current		T_J = 25°C			4.2	8.0	mA
Quiescent Current Change	with line	7 V ≤ V_{IN} ≤ 25 V				1.3	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			40		μV
Ripple Rejection		f = 120 Hz, 8 V ≤ V_{IN} ≤ 18 V		62	78		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			17		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			750		mA
Peak Output Current		T_J = 25°C			2.2		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 125°C			1.1		mV/°C

μA7806C
Electrical Characteristics V_{IN} = 11 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		5.75	6.0	6.25	V
Line Regulation		T_J = 25°C	8 V ≤ V_{IN} ≤ 25 V		5	120	mV
			9 V ≤ V_{IN} ≤ 13 V		1.5	60	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		14	120	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	60	mV
Output Voltage		8 V ≤ V_{IN} ≤ 21 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		5.7		6.3	V
Quiescent Current		T_J = 25°C			4.3	8.0	mA
Quiescent Current Change	with line	8 V ≤ V_{IN} ≤ 25 V				1.3	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			45		μV
Ripple Rejection		f = 120 Hz, 9 V ≤ V_{IN} ≤ 19 V		59	75		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			19		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			550		mA
Peak Output Current		T_J = 25°C			2.2		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 125°C			0.8		mV/°C

Note
1. For all tables, all characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (t_w ≤ 10 ms, duty cycle ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

μA7808
Electrical Characteristics V_{IN} = 14 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		7.7	8.0	8.3	V
Line Regulation		T_J = 25°C	10.5 V ≤ V_{IN} ≤ 25 V		6.0	80	mV
			11 V ≤ V_{IN} ≤ 17 V		2.0	40	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	100	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	40	mV
Output Voltage		11.5 V ≤ V_{IN} ≤ 23 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		7.6		8.4	V
Quiescent Current		T_J = 25°C			4.3	6.0	mA
Quiescent Current Change	with line	11.5 V ≤ V_{IN} ≤ 25 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 11.5 V ≤ V_{IN} ≤ 21.5 V		62	72		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0	2.5	V
Output Resistance		f = 1 kHz			16		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75	1.2	A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	−55°C ≤ T_J ≤ +25°C			0.4	mV/°C/V_{OUT}
			+25°C ≤ T_J ≤ 150°C			0.3	

μA7808C
Electrical Characteristics V_{IN} = 14 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		7.7	8.0	8.3	V
Line Regulation		T_J = 25°C	10.5 V ≤ V_{IN} ≤ 25 V		6.0	160	mV
			11 V ≤ V_{IN} ≤ 17 V		2.0	80	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	160	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	80	mV
Output Voltage		10.5 V ≤ V_{IN} ≤ 23 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		7.6		8.4	V
Quiescent Current		T_J = 25°C			4.3	8.0	mA
Quiescent Current Change	with line	10.5 V ≤ V_{IN} ≤ 25 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			52		μV
Ripple Rejection		f = 120 Hz, 11.5 V ≤ V_{IN} ≤ 21.5 V		56	72		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			16		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			450		mA
Peak Output Current		T_J = 25°C			2.2		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 125°C			0.8		mV/°C

μA7885C
Electrical Characteristics V_{IN} = 15 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		8.15	8.5	8.85	V
Line Regulation		T_J = 25°C	10.5 V ≤ V_{IN} ≤ 25 V		6.0	170	mV
			11 V ≤ V_{IN} ≤ 17 V		2.0	85	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	170	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	85	mV
Output Voltage		11 V ≤ V_{IN} ≤ 23.5 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		8.1		8.9	V
Quiescent Current		T_J = 25°C			4.3	8.0	mA
Quiescent Current Change	with line	10.5 V ≤ V_{IN} ≤ 25 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			55		μV
Ripple Rejection		f = 120 Hz, 11.5 V ≤ V_{IN} ≤ 21.5 V		56	70		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			16		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			450		mA
Peak Output Current		T_J = 25°C			2.2		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 125°C			0.8		mV/°C

Note
1. For all tables, all characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (t_w ≤ 10 ms, duty cycle ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

μA7812

Electrical Characteristics V_{IN} = 19 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		11.5	12.0	12.5	V
Line Regulation		T_J = 25°C	14.5 V ≤ V_{IN} ≤ 30 V		10	120	mV
			16 V ≤ V_{IN} ≤ 22 V		3.0	60	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	120	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	60	mV
Output Voltage		15.5 V ≤ V_{IN} ≤ 27 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		11.4		12.6	V
Quiescent Current		T_J = 25°C			4.3	6.0	mA
Quiescent Current Change	with line	15 V ≤ V_{IN} ≤ 30 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 15 V ≤ V_{IN} ≤ 25 V		61	71		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0	2.5	V
Output Resistance		f = 1 kHz			18		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75	1.2	A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	−55°C ≤ T_J ≤ +25°C			0.4	mV/°C/ V_{OUT}
			+25°C ≤ T_J ≤ 150°C			0.3	

μA7812C

Electrical Characteristics V_{IN} = 19 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		11.5	12.0	12.5	V
Line Regulation		T_J = 25°C	14.5 V ≤ V_{IN} ≤ 30 V		10	240	mV
			16 V ≤ V_{IN} ≤ 22 V		3.0	120	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	240	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	120	mV
Output Voltage		14.5 V ≤ V_{IN} ≤ 27 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		11.4		12.6	V
Quiescent Current		T_J = 25°C			4.3	8.0	mA
Quiescent Current Change	with line	14.5 V ≤ V_{IN} ≤ 30 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			75		μV
Ripple Rejection		f = 120 Hz, 15 V ≤ V_{IN} ≤ 25 V		55	71		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			18		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			350		mA
Peak Output Current		T_J = 25°C			2.2		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 125°C			1.0		mV/°C

μA7815

Electrical Characteristics V_{IN} = 23 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		14.4	15.0	15.6	V
Line Regulation		T_J = 25°C	17.5 V ≤ V_{IN} ≤ 30 V		11	150	mV
			20 V ≤ V_{IN} ≤ 26 V		3	75	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	150	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	75	mV
Output Voltage		18.5 V ≤ V_{IN} ≤ 30 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		14.25		15.75	V
Quiescent Current		T_J = 25°C			4.4	6.0	mA
Quiescent Current Change	with line	18.5 V ≤ V_{IN} ≤ 30 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 18.5 V ≤ V_{IN} ≤ 28.5 V		60	70		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0	2.5	V
Output Resistance		f = 1 kHz			19		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75		A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	−55° C ≤ T_J ≤ +25°C			0.4	mV/°C/V_{OUT}
			+25°C ≤ T_J ≤ +150°C			0.3	

μA7815C

Electrical Characteristics V_{IN} = 23 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		14.4	15.0	15.6	V
Line Regulation		T_J = 25°C	17.5 V ≤ V_{IN} ≤ 30 V		11	300	mV
			20 V ≤ V_{IN} ≤ 26 V		3	150	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	300	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	150	mV
Output Voltage		17.5 V ≤ V_{IN} ≤ 30 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		14.25		15.75	V
Quiescent Current		T_J = 25°C			4.4	8.0	mA
Quiescent Current Change	with line	17.5 V ≤ V_{IN} ≤ 30 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			90		μV
Ripple Rejection		f = 120 Hz, 18.5 V ≤ V_{IN} ≤ 28.5 V		54	70		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			19		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			230		A
Peak Output Current		T_J = 25°C			2.1		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤125°C			1.0		mV/°C

μA7818
Electrical Characteristics V_{IN} = 27 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		17.3	18.0	18.7	V
Line Regulation		T_J = 25°C	21 V ≤ V_{IN} ≤ 33 V		15	180	mV
			24 V ≤ V_{IN} ≤ 30 V		5.0	90	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	180	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	90	mV
Output Voltage		22 V ≤ V_{IN} ≤ 33 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		17.1		18.9	V
Quiescent Current		T_J = 25°C			4.5	6.0	mA
Quiescent Current Change	with line	22 V ≤ V_{IN} ≤ 33 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 22 V ≤ V_{IN} ≤ 32 V		59	69		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			22	2.5	mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75	1.2	A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	+25° C ≤ T_J ≤ +150°C			0.4	mV/°C/ V_{OUT}
			−55°C ≤ T_J ≤ +25°C			0.3	

μA7818C
Electrical Characteristics V_{IN} = 27 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		17.3	18.0	18.7	V
Line Regulation		T_J = 25°C	21 V ≤ V_{IN} ≤ 33 V		15	360	mV
			24 V ≤ V_{IN} ≤ 30 V		5.0	180	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	360	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4.0	180	mV
Output Voltage		21 V ≤ V_{IN} ≤ 33 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		17.1		18.9	V
Quiescent Current		T_J = 25°C			4.5	8.0	mA
Quiescent Current Change	with line	21 V ≤ V_{IN} ≤ 33 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			110		μV
Ripple Rejection		f = 120 Hz, 22 V ≤ V_{IN} ≤ 32 V		53	69		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			22		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			200		mA
Peak Output Current		T_J = 25°C			2.1		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤125°C			1.0		mV/°C

μA7824
Electrical Characteristics V_{IN} = 33 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

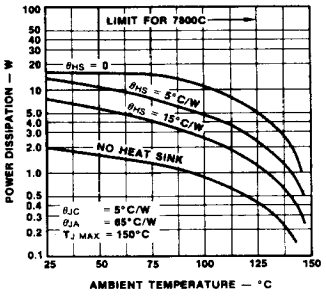
Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		23.0	24.0	25.0	V
Line Regulation		T_J = 25°C	27 V ≤ V_{IN} ≤ 38 V		18	240	mV
			30 V ≤ V_{IN} ≤ 36 V		6	120	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	240	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	120	mV
Output Voltage		28 V ≤ V_{IN} ≤ 38 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		22.8		25.2	V
Quiescent Current		T_J = 25°C			4.6	6.0	mA
Quiescent Current Change	with line	28 V ≤ V_{IN} ≤ 38 V				0.8	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			8	40	μV/V_{OUT}
Ripple Rejection		f = 120 Hz, 28 V ≤ V_{IN} ≤ 38 V		56	66		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0	2.5	V
Output Resistance		f = 1 kHz			28		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			0.75	1.2	A
Peak Output Current		T_J = 25°C		1.3	2.2	3.3	A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA	−55° C ≤ T_J ≤ +25°C			0.4	mV/°C/ V_{OUT}
			+25°C ≤ T_J ≤ +150°C			0.3	

μA7824C
Electrical Characteristics V_{IN} = 33 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, unless otherwise specified.

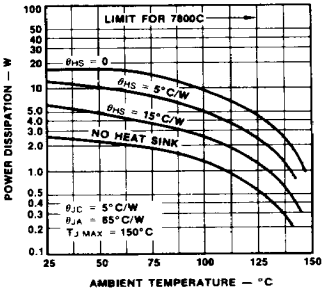
Characteristic		Condition (Note)		Min	Typ	Max	Unit
Output Voltage		T_J = 25°C		23.0	24.0	25.0	V
Line Regulation		T_J = 25°C	27 V ≤ V_{IN} ≤ 38 V		18	480	mV
			30 V ≤ V_{IN} ≤ 36 V		6	240	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	480	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	240	mV
Output Voltage		27 V ≤ V_{IN} ≤ 38 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		22.8		25.2	V
Quiescent Current		T_J = 25°C			4.6	8.0	mA
Quiescent Current Change	with line	27 V ≤ V_{IN} ≤ 38 V				1.0	mA
	with load	5 mA ≤ I_{OUT} ≤ 1.0 A				0.5	mA
Output Noise Voltage		T_A = 25°C, 10 Hz ≤ f ≤ 100 kHz			170		μV
Ripple Rejection		f = 120 Hz, 28 V ≤ V_{IN} ≤ 38 V		50	66		dB
Dropout Voltage		I_{OUT} = 1.0 A, T_J = 25°C			2.0		V
Output Resistance		f = 1 kHz			28		mΩ
Short-Circuit Current		T_J = 25°C, V_{IN} = 35 V			150		mA
Peak Output Current		T_J = 25°C			2.1		A
Average Temperature Coefficient of Output Voltage		I_{OUT} = 5 mA, 0°C ≤ T_J ≤125°C			1.5		mV/°C

Typical Performance Curves

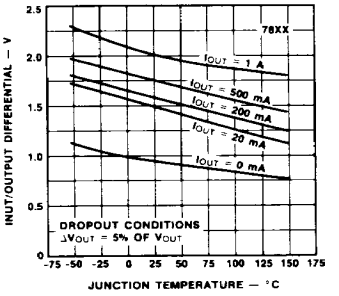
Worst Case Power Dissipation Versus Ambient Temperature (TO-3)



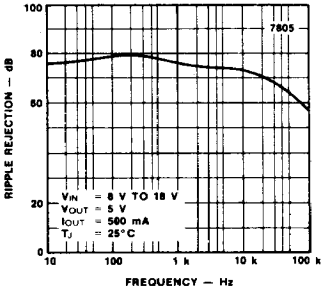
Worst Case Power Dissipation Versus Ambient Temperature (TO-220)



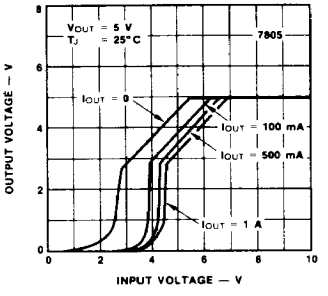
Dropout Voltage as a Function of Junction Temperature



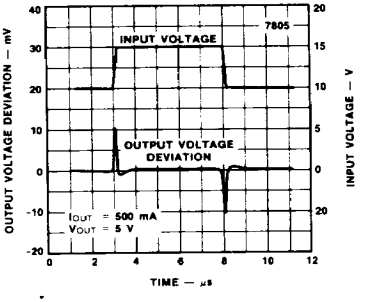
Ripple Rejection as a Function of Frequency



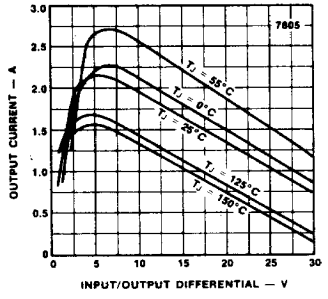
Dropout Characteristics



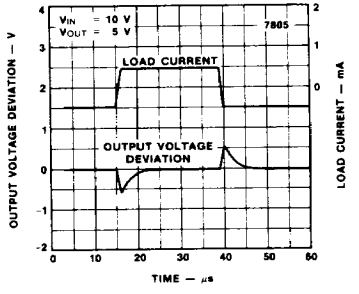
Line Transient Response



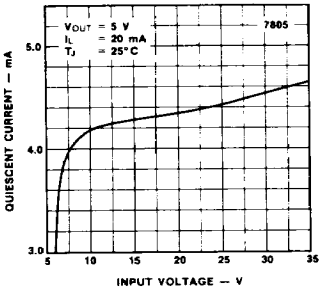
Peak Output Current as a Function of Input/Output Differential Voltage



Load Transient Response

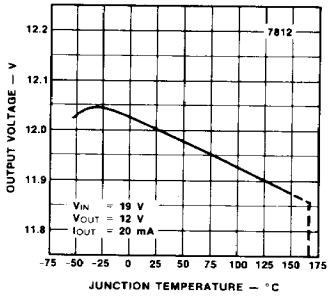


Quiescent Current as a Function of Input Voltage

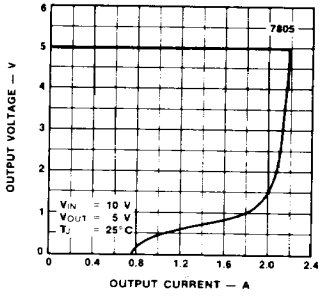


Typical Performance Curves (Cont.)

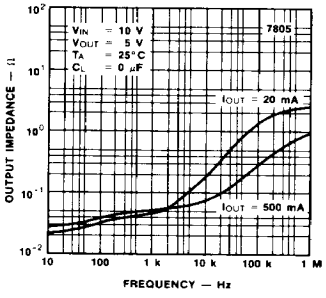
Output Voltage as a Function of Junction Temperature



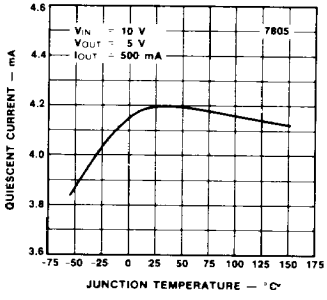
Current Limiting Characteristics



Output Impedance as a Function of Frequency

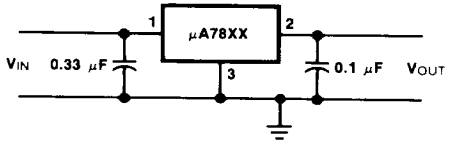


Quiescent Current as a Function of Temperature



Note
The other μA7800 series devices have similar curves.

DC Parameter Test Circuit



Design Considerations

The μA7800 fixed voltage regulator series has thermal-overload protection from excessive power dissipation, internal short circuit protection which limits the regulator's maximum current, and output transistor safe area-compensation for reducing the output current as the voltage across the pass transistor is increased.

Although the internal power dissipation is limited, the junction temperature must be kept below the maximum specified temperature (150°C for 7800, 125°C for 7800C) in order to meet data sheet specifications. To calculate the maximum junction temperature or heat sink required, the following thermal resistance values should be used:

Package	Typ θ_{JC} °C/W	Max θ_{JC} °C/W	Typ θ_{JA} °C/W	Max θ_{JA} °C/W
TO-3	3.5	5.5	40	45
TO-220	3.0	5.0	60	65

$$P_{D(MAX)} = \frac{T_{J(Max)} - T_A}{\theta_{JC} + \theta_{CA}} \text{ or } \frac{T_{J(Max)} - T_A}{\theta_{JA}}$$

(Without heat sink)

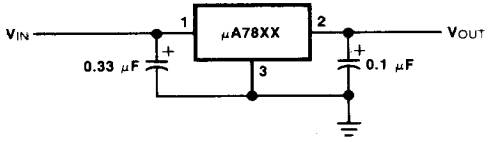
$\theta_{CA} = \theta_{CS} + \theta_{SA}$

solving for T_J: $T_J = T_A + P_D (\theta_{JC} + \theta_{CA})$
or $T_A + P_D\theta_{JA}$ (Without heat sink)

where T_J = Junction Temperature
T_A = Ambient Temperature
P_D = Power Dissipation
θ_{JC} = Junction-to-case-thermal resistance
θ_{CA} = Case-to-ambient thermal resistance
θ_{CS} = Case-to-heat sink to thermal resistance
θ_{SA} = Heat sink-to-ambient thermal resistance
θ_{JA} = Junction-to-ambient thermal resistance

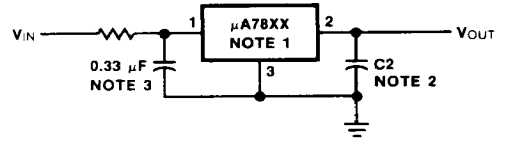
Typical Applications

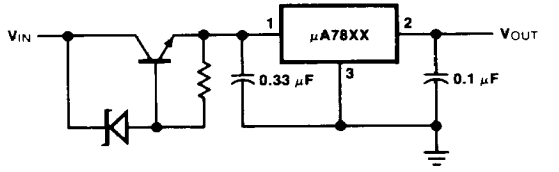
Fixed Output Regulator



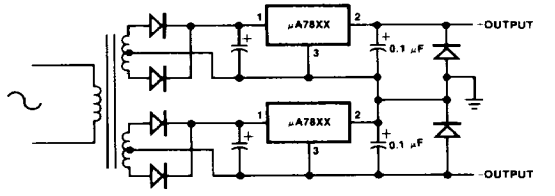
Notes
1. To specify an output voltage, substitute voltage value for "XX."
2. Bypass capacitors are recommended for optimum stability and transient response, and should be located as close as possible to the regulator.

High Input Voltage Circuits

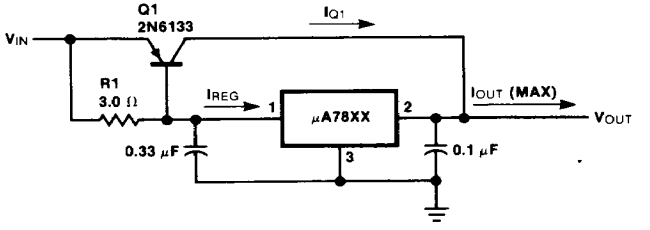




Positive and Negative Regulator



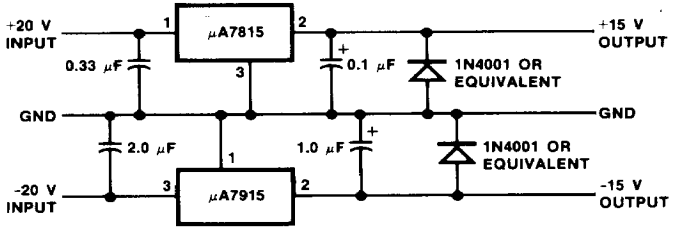
High Current Voltage Regulator



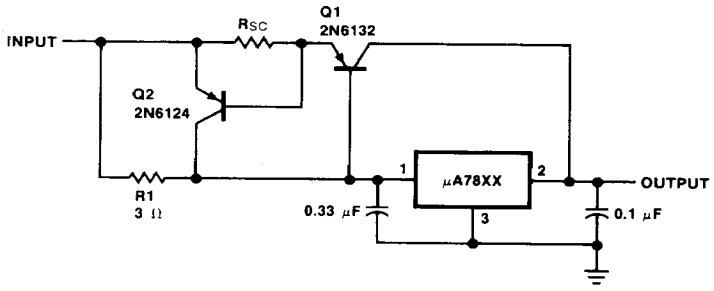
$$\beta(Q1) \geq \frac{I_{OUT(Max)}}{I_{REG(Max)}}$$

$$R1 = \frac{0.9}{I_{REG}} = \frac{\beta(Q1)\, V_{BE(Q1)}}{I_{REG(Max)}\,(\beta + 1) - I_{OUT(Max)}}$$

Dual Supply
Operational Amplifier Supply (± 15 V @ 1.0 A)



**High Output Current,
Short Circuit Protected**



$$R_{SC} = \frac{0.8}{I_{SC}}$$

$$R1 = \frac{\beta V_{BE(Q1)}}{I_{REG(Max)}\,(\beta + 1) - I_{OUT(Max)}}$$

Positive and Negative Regulator