μA7800 SERIES
THREE-TERMINAL POSITIVE VOLTAGE REGULATORS
FAIRCHILD LINEAR INTEGRATED CIRCUITS

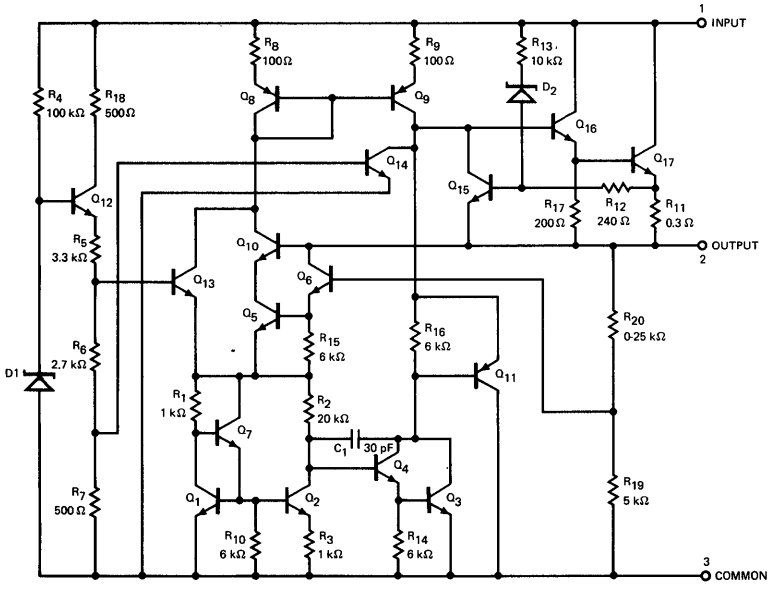
GENERAL DESCRIPTION – The μA7800 series of monolithic Three-Terminal Positive Voltage Regulators is constructed using the Fairchild Planar* epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A 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 and also as the power pass element in precision regulators.

- **OUTPUT CURRENT IN EXCESS OF 1 AMP**
- **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, 12, 15, 18, AND 24 VOLTS**

ABSOLUTE MAXIMUM RATINGS

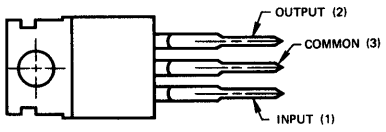
Input Voltage (5 V through 18 V)		35 V
(24 V)		40 V
Internal Power Dissipation (Note 1)		Internally Limited
Storage Temperature Range		−65°C to +150°C
Operating Junction Temperature Range (Note 2)	7800	−55°C to +150°C
	7800C	0°C to +125°C
Lead Temperature (Soldering, 60 second time limit)	TO-3 Package	300°C
(Soldering, 10 second time limit)	TO-220 Package	230°C

EQUIVALENT CIRCUIT



Notes on following pages.

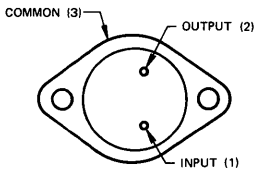
CONNECTION DIAGRAMS
TO-220 PACKAGE
(TOP VIEW)
PACKAGE OUTLINE GH



ORDER INFORMATION

OUTPUT VOLTAGE	TYPE	PART NO.
5 V	7805C	7805UC
6 V	7806C	7806UC
8 V	7808C	7808UC
12 V	7812C	7812UC
15 V	7815C	7815UC
18 V	7818C	7818UC
24 V	7824C	7824UC

TO-3 PACKAGE
(TOP VIEW)
PACKAGE OUTLINE GJ



ORDER INFORMATION

OUTPUT VOLTAGE	TYPE	PART NO.
5 V	7805	7805KM
6 V	7806	7806KM
8 V	7808	7808KM
12 V	7812	7812KM
15 V	7815	7815KM
18 V	7818	7818KM
24 V	7824	7824KM
5 V	7805C	7805KC
6 V	7806C	7806KC
8 V	7808C	7808KC
12 V	7812C	7812KC
15 V	7815C	7815KC
18 V	7818C	7818KC
24 V	7824C	7824KC

*Planar is a patented Fairchild process.

7805

ELECTRICAL CHARACTERISTICS (V_{IN} = 10 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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	50	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			40		μV
Long Term Stability						20	mV
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		V
Output Resistance		f = 1 kHz			17		mΩ
Short Circuit Current		T_J = 25°C			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 ≤ 150°C			−1.1		mV/°C

7805C

ELECTRICAL CHARACTERISTICS (V_{IN} = 10 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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
Long Term Stability						20	mV
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			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

NOTE 1: Thermal resistance of the packages (without a heat sink)

Junction to Case
- TO-3 Package . . . . . 4°C/W
- TO-220 Package . . . . . 2°C/W

Junction to Ambient
- TO-3 Package . . . . . 35°C/W
- TO-220 Package . . . . . 50°C/W

NOTE 2: Operating Ambient Temperature Range

7800 −55°C to +125°C
7800C 0°C to 85°C

7806

ELECTRICAL CHARACTERISTICS (V_{IN} = 11 V, I_{OUT} = 500 mA, −55° C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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	60	mV
			9 V ≤ V_{IN} ≤ 13 V		1.5	30	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		14	60	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	30	mV
Output Voltage		9 V ≤ V_{IN} ≤ 21 V 5 mA ≤ I_{OUT} ≤ 1.0 A P ≤ 15 W		5.65		6.35	V
Quiescent Current		T_J = 25°C			4.3	6.0	mA
Quiescent Current Change	with line	9 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			45		μV
Long Term Stability						24	mV
Ripple Rejection		f = 120 Hz, 9 V ≤ V_{IN} ≤ 19 V		65	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			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 ≤ 150°C			−0.8		mV/°C

7806C

ELECTRICAL CHARACTERISTICS (V_{IN} = 11 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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} ≤ 25 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
Long Term Stability						24	mV
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			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

7808

ELECTRICAL CHARACTERISTICS (V_{IN} = 14 V, I_{OUT} = 500 mA, −55° C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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	80	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, 19 Hz ≤ f ≤ 100 kHz			52		μV
Long Term Stability						32	mV
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		V
Output Resistance		f = 1 kHz			16		mΩ
Short Circuit Current		T_J = 25°C			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 ≤ 150°C			−0.8		mV/°C

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7808C

ELECTRICAL CHARACTERISTICS (V_{IN} = 14 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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
Long Term Stability						32	mV
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			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

7812

ELECTRICAL CHARACTERISTICS (V_{IN} = 19 V, I_{OUT} = 500 mA, −55° C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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			75		μV
Long Term Stability						48	mV
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		V
Output Resistance		f = 1 kHz			18		mΩ
Short Circuit Current		T_J = 25°C			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 ≤ 150°C			−1.0		mV/°C

7812C

ELECTRICAL CHARACTERISTICS (V_{IN} = 19 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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
Long Term Stability						48	mV
Ripple Rejection		f = 120 Hz, 15 ≤ 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			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

7815

ELECTRICAL CHARACTERISTICS (V_{IN} = 23 V, I_{OUT} = 500 mA, −55°C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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			90		μV
Long Term Stability						60	mV
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		V
Output Resistance		f = 1 kHz			19		mΩ
Short Circuit Current		T_J = 25°C			230		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 ≤ 150°C			−1.0		mV/°C

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7815C

ELECTRICAL CHARACTERISTICS (V_{IN} = 23 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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	150	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	75	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
Long Term Stability						60	mV
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			230		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

7818

ELECTRICAL CHARACTERISTICS (V_{IN} = 27 V, I_{OUT} = 500 mA, −55° C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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			110		μV
Long Term Stability						72	mV
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		mΩ
Short Circuit Current		T_J = 25°C			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 ≤ 150°C			−1.0		mV/°C

7818C

ELECTRICAL CHARACTERISTICS (V_{IN} = 27 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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
Long Term Stability						72	mV
Ripple Rejection		f = 120 Hz, 22 ≤ 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			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

7824

ELECTRICAL CHARACTERISTICS (V_{IN} = 33 V, I_{OUT} = 500 mA, −55° C ≤ T_J ≤ 150°C, unless otherwise specified)

PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
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			170		μV
Long Term Stability						96	mV
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		V
Output Resistance		f = 1 kHz			28		mΩ
Short Circuit Current		T_J = 25°C			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 ≤ 150°C			−1.5		mV/°C

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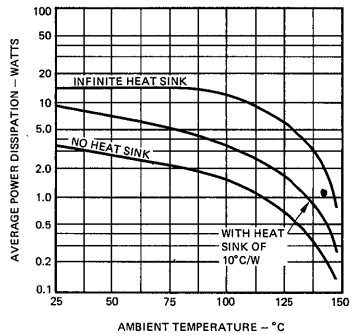
7824C

ELECTRICAL CHARACTERISTICS (V_{IN} = 33 V, I_{OUT} = 500 mA, 0°C ≤ T_J ≤ 125°C, unless otherwise specified)

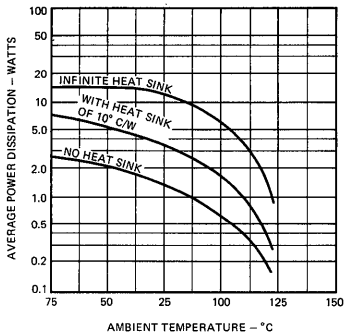
PARAMETER		CONDITIONS		MIN.	TYP.	MAX.	UNITS
Output Voltage		T_J = 25°C		23.0	24.0	25.0	V
Line Regulation		T_J = 25°C	27 V ≤ V_{IN} ≤ 38 V		18	480	mV
			30 V ≤ V_{IN} ≤ 36 V		6	240	mV
Load Regulation		T_J = 25°C	5 mA ≤ I_{OUT} ≤ 1.5 A		12	480	mV
			250 mA ≤ I_{OUT} ≤ 750 mA		4	240	mV
Output Voltage		27 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
Long Term Stability						96	mV
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			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 FOR 7800 SERIES

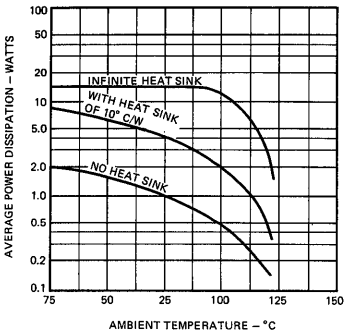
MAXIMUM AVERAGE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (TO-3, 7800)



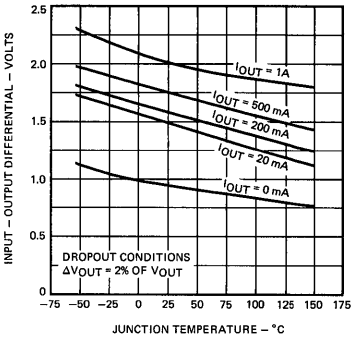
MAXIMUM AVERAGE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (TO-3, 7800C)



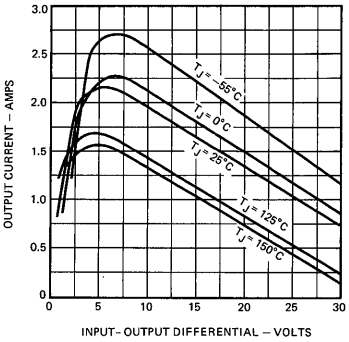
MAXIMUM AVERAGE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (TO-220, 7800C)



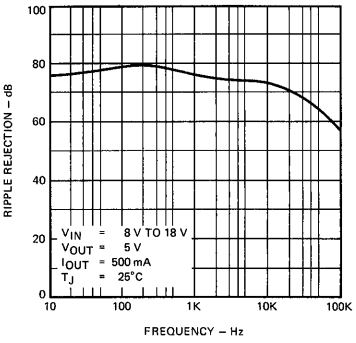
DROPOUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE



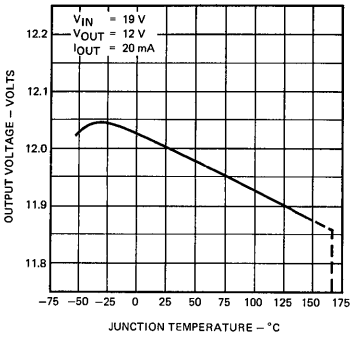
PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT/OUTPUT DIFFERENTIAL VOLTAGE



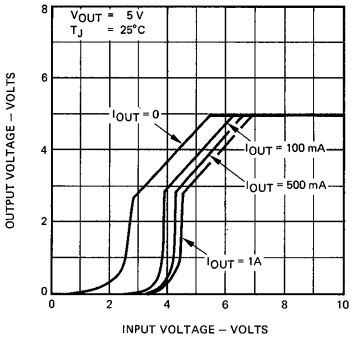
RIPPLE REJECTION AS A FUNCTION OF FREQUENCY



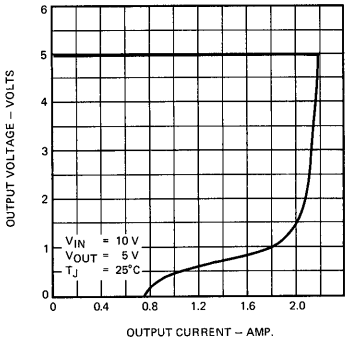
OUTPUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE



DROPOUT CHARACTERISTICS

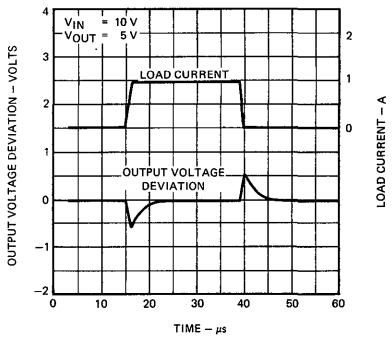


CURRENT LIMITING CHARACTERISTICS

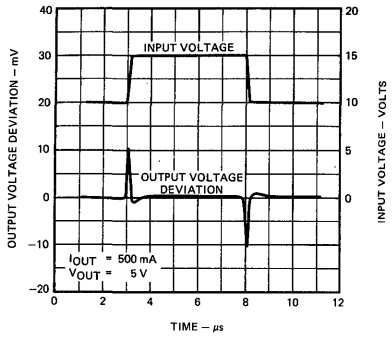


TYPICAL PERFORMANCE CURVES FOR 7800 SERIES (cont'd)

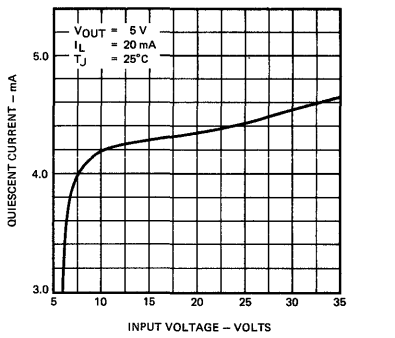
LOAD TRANSIENT RESPONSE



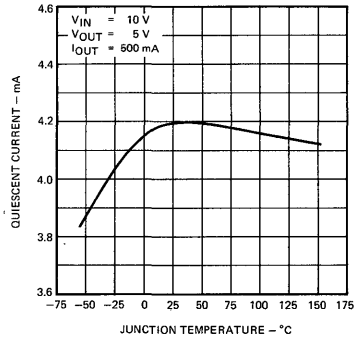
LINE TRANSIENT RESPONSE



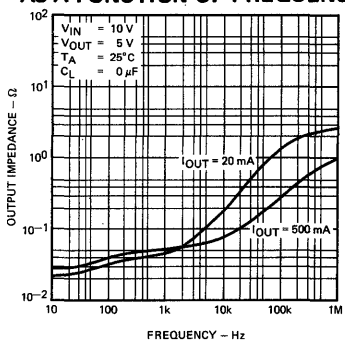
QUIESCENT CURRENT AS A FUNCTION OF INPUT VOLTAGE



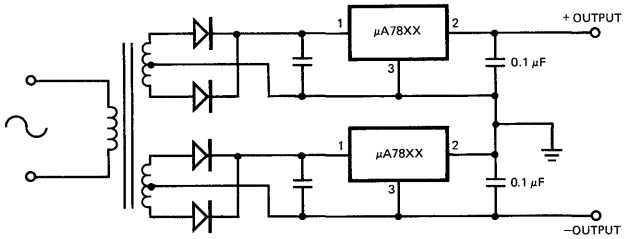
QUIESCENT CURRENT AS A FUNCTION OF TEMPERATURE



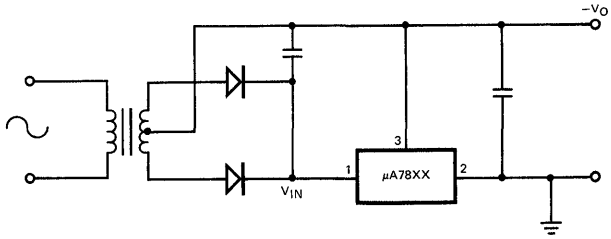
OUTPUT IMPEDANCE AS A FUNCTION OF FREQUENCY



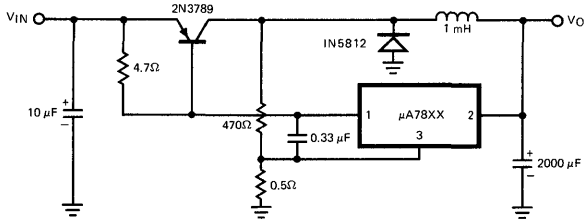
APPLICATIONS



POSITIVE AND NEGATIVE REGULATOR

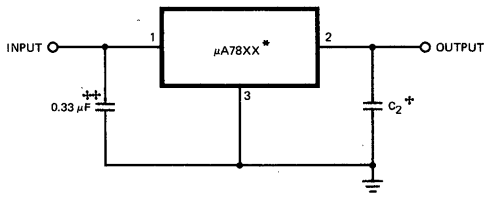


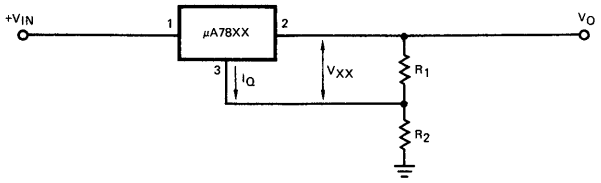
NEGATIVE OUTPUT VOLTAGE CIRCUIT



SWITCHING REGULATOR

APPLICATIONS (Cont'd)





NOTES:

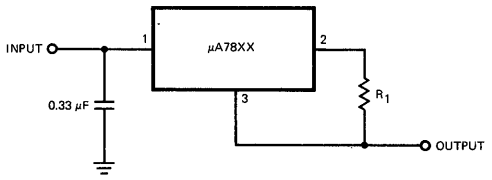
* To specify an output voltage, substitute voltage value for "XX".

\+ Although no output capacitor is needed for stability, it does improve transient response.

++ Required if regulator is located an appreciable distance from power supply filter.

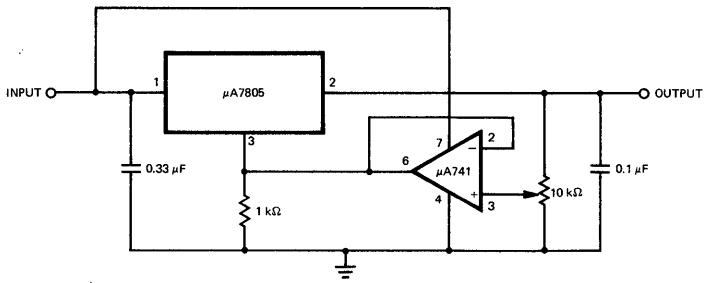
$$V_O = V_{XX}\left(1 + \frac{R_2}{R_1}\right) + I_Q R_2$$

FIXED OUTPUT REGULATOR

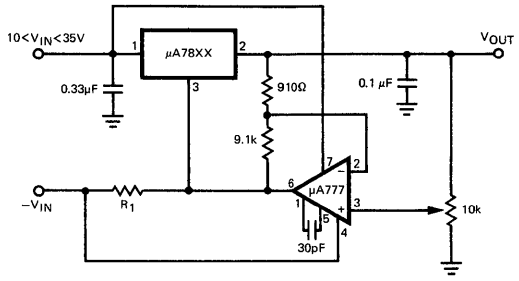


$$\text{Output Current} = \frac{V_{OUT}}{R_1}$$

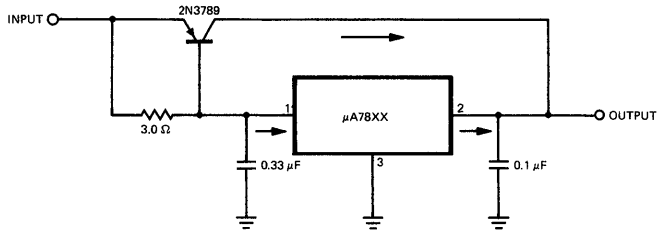
CIRCUIT FOR INCREASING OUTPUT VOLTAGE



CURRENT REGULATOR

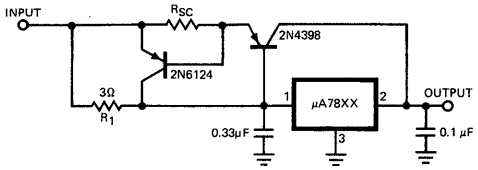


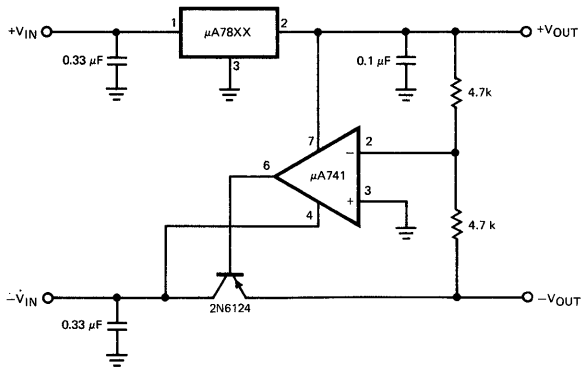
ADJUSTABLE OUTPUT REGULATOR, 7 to 30 VOLTS



VARIABLE OUTPUT VOLTAGE, 0.5 to 7 VOLTS

HIGH CURRENT VOLTAGE REGULATOR





HIGH OUTPUT CURRENT, SHORT CIRCUIT PROTECTED

± TRACKING VOLTAGE REGULATOR