μPC7800H SERIES

Three Terminal Positive Voltage Regulators

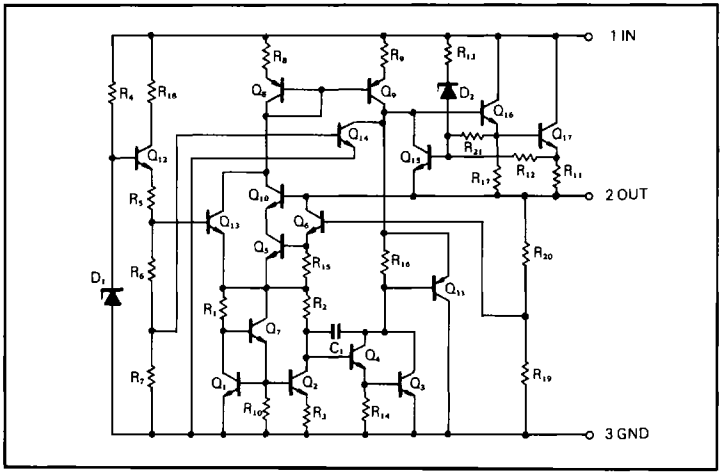
GENERAL DESCRIPTION

The μPC7800H series are monolithic three terminal positive regulators which employ internally current limiting, thermal shut down, and safe-area compensation, make them essentially indestructible. They are intended as fixed-voltage regulators in a wide range of application including local on card regulation for elimination of distribution problems associated with single point regulation.

FEATURES

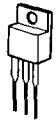
- Output current in excess of 1 A
- No external component required
- Internal thermal overload protection
- Internal short circuit current limiting
- Low output resistance 17 mΩ

EQUIVALENT CIRCUIT



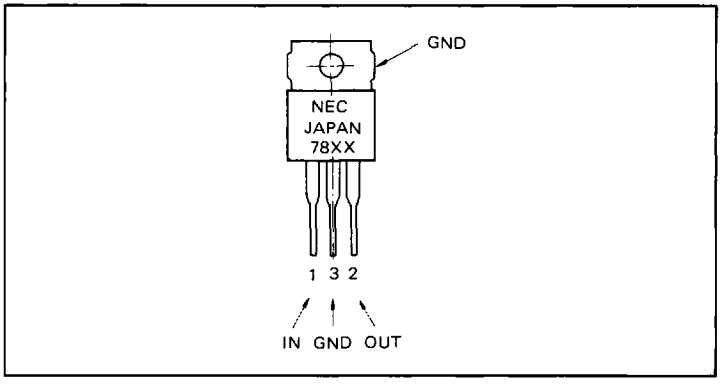
ORDERING INFORMATION

μPC7800H

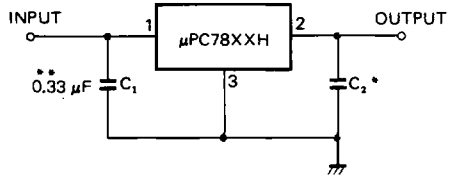


3 pin SIP
(Single In-Line Package)

CONNECTION DIAGRAM (Top View)



TYPICAL APPLICATION



Notes: * 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.

ABSOLUTE MAXIMUM RATINGS

Input Voltage	(μPC7805H/08H/12H/15H/18H)35	V
	(μPC7824H) 40	V
Internal Power Dissipation	Internally Limited	
Operating Temperature Range	−20 to +80	°C
Storage Temperature Range	−55 to +150	°C
Lead Temperature	Soldering 10 sec 230	°C
Operating Junction Temperature Range	0 to 125	°C (Continuous)
Operation Junction Temperature Range	0 to 200	°C (short term, 30 min. MAX.)

ELECTRICAL CHARACTERISTICS μPC7805H (V_{IN} = 10 V, Io = 500 mA, 0°C ≤ Tj ≤ 125°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	4.8	5.0	5.2	V	Tj = 25°C
		4.75		5.25		7 V≤V_{IN}≤20 V, 5 mA≤Io≤1.0A, P_T≤15 W
Line Regulation	REG_{IN}		3	100	mV	Tj = 25°C, 7 V ≤ V_{IN} ≤ 25 V
			1	50		Tj = 25°C, 8 V ≤ V_{IN} ≤ 12 V
Load Regulation	REG_L		15	100	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			5	50		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.2	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.3	mA	7 V ≤ V_{IN} ≤ 25 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		40		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		62	78		dB	f = 120 Hz, 8 V ≤ V_{IN} ≤ 18 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		17		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		750		mA	Tj = 25°C
Peak Output Current	Iopeak		2.2		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.1		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

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ELECTRICAL CHARACTERISTICS μPC7808H (V_{IN} = 14 V, I_O = 500 mA, 0°C < Tj < 125°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	7.7	8.0	8.3	V	Tj = 25°C
		7.6		8.4		10.5 V ≤ V_{IN} ≤ 23 V, 5 mA ≤ Io ≤ 1.0 A, P_T ≤ 15 W
Line Regulation	REG_{IN}		6.0	160	mV	Tj = 25°C, 10.5 V ≤ V_{IN} ≤ 25 V
			2.0	80		Tj = 25°C, 11 V ≤ V_{IN} ≤ 17 V
Load Regulation	REG_L		12	160	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			4.0	80		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.3	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.0	mA	10.5 V ≤ V_{IN} ≤ 25 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		52		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		56	72		dB	f = 120 Hz, 11.5 V ≤ V_{IN} ≤ 21.5 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		16		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		450		mA	Tj = 25°C
Peak Output Current	Iopeak		2.2		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−0.8		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

ELECTRICAL CHARACTERISITCS μPC7812H (V_{IN} = 19 V, I_O = 500 mA, 0°C < Tj < 125°)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	11.5	12.0	12.5	V	Tj = 25°C
		11.4		12.6		14.5 V ≤ V_{IN} ≤ 27 V, 5 mA ≤ Io ≤ 1.0 A, P_T ≤ 15 W
Line Regulation	REG_{IN}		10	240	mV	Tj = 25°C, 14.5 V ≤ V_{IN} ≤ 30 V
			3.0	120		Tj = 25°C, 16 V ≤ V_{IN} ≤ 22 V
Load Regulation	REG_L		12	240	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			4.0	120		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.3	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.0	mA	14.5 V ≤ V_{IN} ≤ 30 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		75		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		55	71		dB	f = 120 Hz, 15 V ≤ V_{IN} ≤ 25 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		18		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		350		mA	Tj = 25°C
Peak Output Current	Iopeak		2.2		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

ELECTRICAL CHARACTERISTICS μPC7815H (V_{IN} =23 V, I_o = 500 mA, 0°C ≤ Tj ≤ 125°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	14.4	15.0	15.6	V	Tj = 25°C
		14.25		15.75		17.5 V ≤ V_{IN} ≤ 30 V, 5 mA ≤ Io ≤ 1.0 A, P_T ≤ 15 W
Line Regulation	REG_{IN}		11	300	mV	Tj = 25°C, 17.5 ≤ V_{IN} ≤ 30 V
			3.0	150		Tj = 25°C, 20 V ≤ V_{IN} ≤ 26 V
Load Regulation	REG_L		12	300	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			4.0	150		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.4	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.0	mA	17.5 V ≤ V_{IN} ≤ 30 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		90		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		54	70		dB	f = 120 Hz, 18.5 V ≤ V_{IN} ≤ 28.5 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		19		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		230		mA	Tj = 25°C
Peak Output Current	Iopeak		2.1		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

ELECTRICAL CHARACTERISTICS μPC7818H (V_{IN} = 27 V, I_o = 500 mA, 0°C ≤ Tj ≤ 125°C)

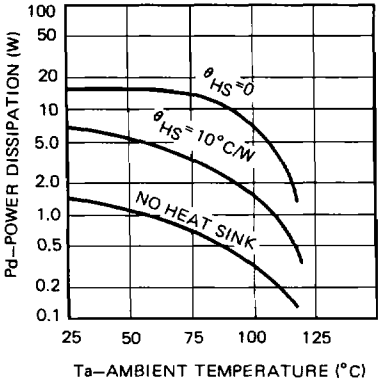
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	17.3	18.0	18.7	V	Tj = 25°C
		17.1		18.9		21 V ≤ V_{IN} ≤ 33 V, 5 mA ≤ Io ≤ 1.0 A, P_T ≤ 15 W
Line Regulation	REG_{IN}		15	360	mV	Tj = 25°C, 21 V ≤ V_{IN} ≤ 33 V
			5.0	180		Tj = 25°C, 24 V ≤ V_{IN} ≤ 30 V
Load Regulation	REG_L		12	360	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			4.0	180		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.5	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.0	mA	21 V ≤ V_{IN} ≤ 33 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		110		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		53	69		dB	f = 120 Hz, 22 V ≤ V_{IN} ≤ 32 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		22		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		200		mA	Tj = 25°C
Peak Output Current	Iopeak		2.1		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

ELECTRICAL CHARACTERISTICS μPC7824H (V_{IN} = 33 V, Io = 500 mA, 0°C ≤ Tj ≤ 125°C)

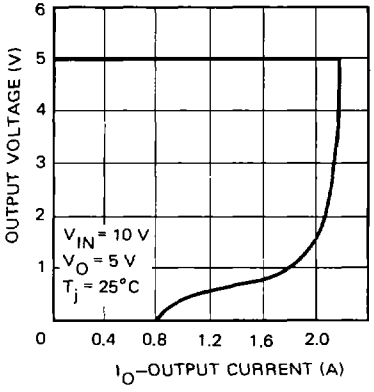
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	23.0	24.0	25.0	V	Tj = 25°C
		22.8		25.2		27V ≤ V_{IN} ≤ 38 V, 5 mA ≤ Io ≤ 1.0 A
Line Regulation	REG_{IN}		18	480	mV	Tj = 25°C, 27 V ≤ V_{IN} ≤ 38 V
			6	240		Tj = 25°C, 30 V ≤ V_{IN} ≤ 36 V
Load Regulation	REG_L		12	480	mV	Tj = 25°C, 5 mA ≤ Io ≤ 1.5 A
			4.0	240		Tj = 25°C, 250 mA ≤ Io ≤ 750 mA
Quiescent Current	I_{BIAS}		4.6	8.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			1.0	mA	27 V ≤ V_{IN} ≤ 38 V
				0.5		5 mA ≤ Io ≤ 1.0 A
Output Noise Voltage	N_L		170		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		50	66		dB	f = 120 Hz, 28 V ≤ V_{IN} ≤ 38 V
Dropout Voltage			2.0		V	Io = 1.0 A, Tj = 25°C
Output Resistance	Ro		28		mΩ	f = 1 kHz
Short Circuit Current	Ioshort		150		mA	Tj = 25°C
Peak Output Current	Iopeak		2.1		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.5		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

TYPICAL CHARACTERISTICS (Ta = 25°C)

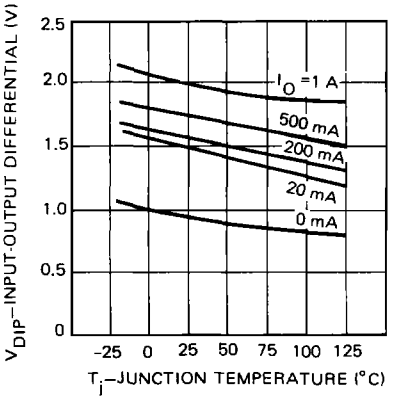
POWER DISSIPATION VS. AMBIENT TEMPERATURE



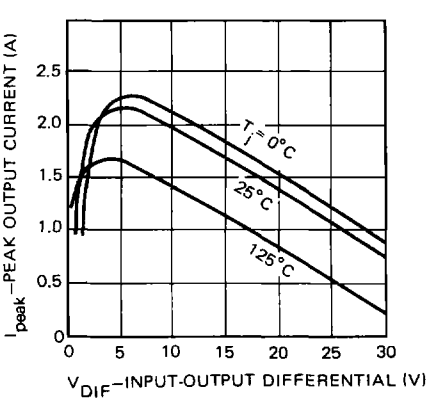
CURRENT LIMITING CHARACTERISTICS



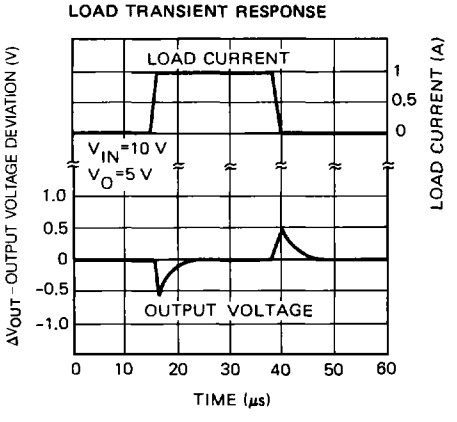
DROPOUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE



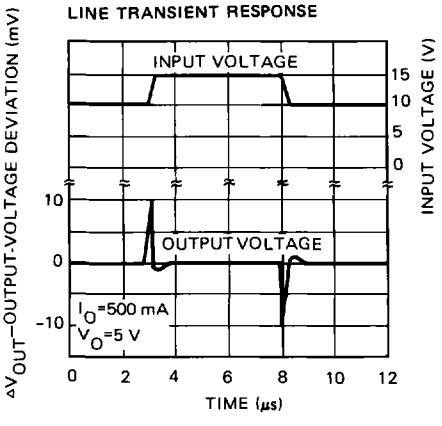
PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT/OUTPUT DIFFERENTIAL VOLTAGE



LOAD TRANSIENT RESPONSE



LINE TRANSIENT RESPONSE



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