μPC78M00H SERIES

Three Terminal Positive Regulators

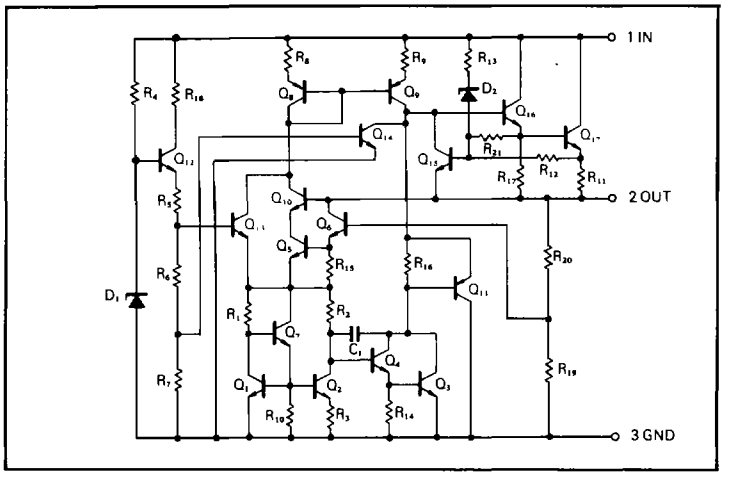
GENERAL DESCRIPTION

The μPC78M00H 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

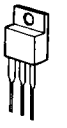
- Output current in excess of 0.5 A
- No external component required
- Internal thermal overload protection
- Internal short circuit current limiting

EQUIVALENT CIRCUIT



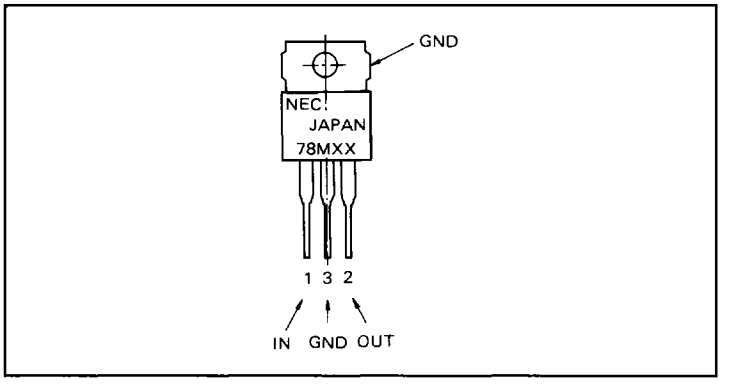
ORDERING INFORMATION

μPC78M00H

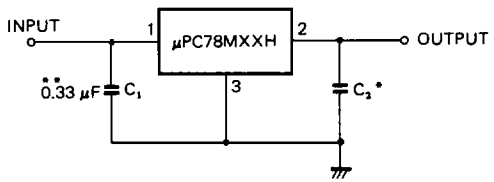


3 pin SIP
(Single In-Line Package)

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	(μPC78M05H/08H/12H/15H/18H)35	V
	(μPC78M24H) 40	V
Internal Power Dissipation	Internally Limited	
Operating Tempuerature 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)
Operating Junction Temperature Range	0 to 200	°C (short term, 30 min. MAX.)

ELECTRICAL CHARACTERISTICS μPC78M05H (V_{IN} = 10 V, Io = 350 mA, 0°C ≤ Tj ≤ 125°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	4.8	5.0	5.2	V	T_j = 25°C
		4.75		5.25		7 V ≤ V_{IN} ≤ 20 V, 5 mA ≤ Io ≤ 350 mA
Line Regulation	REG_{IN}		3	100	mV	T_j = 25°C, 7 V ≤ V_{IN} ≤ 25 V, Io = 200 mA
			1	50		T_j = 25°C, 8 V ≤ V_{IN} ≤ 25 V, Io = 200 mA
Load Regulation	REG_L		20	100	mV	T_j = 25°C, 5 mA ≤ Io ≤ 500 mA
			10	50		T_j = 25°C, 5 mA ≤ Io ≤ 200 mA
Quiescent Current	I_{BIAS}		4.5	6.0	mA	T_j = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	8 V ≤ V_{IN} ≤ 25 V, Io = 200 mA
				0.5		5 mA ≤ Io ≤ 350 mA
Output Noise Voltage	N_L		40		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		62	80		dB	T_j = 25°C, f = 120 Hz, 8 V ≤ V_{IN} ≤ 18 V, Io = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	T_j = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	T_j = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA

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ELECTRICAL CHARACTERISTICS μPC78M08H (V_{IN} = 14 V, Io = 350 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 ≤ 350 mA
Line Regulation	REG_{IN}		6.0	100	mV	Tj = 25°C, 10.5 V ≤ V_{IN} ≤ 25 V, Io = 200 mA
			2.0	50		Tj = 25°C, 11 V ≤ V_{IN} ≤ 25 V, I_o = 200 mA
Load Regulation	REG_L		25	160	mV	Tj = 25°C, 5 mA ≤ Io ≤ 500 mA
			10	80		Tj = 25°C, 5 mA ≤ Io ≤ 200 mA
Quiescent Current	I_{BIAS}		4.6	6.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	10.5 V ≤ V_{IN} ≤ 25 V, Io = 200 mA
				0.5		5 mA ≤ Io ≤ 350 mA
Output Noise Voltage	N_L		52		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		56	80		dB	Tj = 25°C, f = 120 Hz, 11.5V ≤ V_{IN} ≤ 21.5 V, I_o = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	Tj = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA

ELECTRICAL CHARACTERISTICS μPC78M12H (V_{IN} = 19 V, Io = 350 mA, 0°C ≤ Tj ≤ 125°C)

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 ≤ 350 mA
Line Regulation	REG_{IN}		8.0	100	mV	Tj = 25°C, 14.5 V ≤ V_{IN} ≤ 30 V, Io = 200 mA
			2.0	50		Tj = 25°C, 16 V ≤ V_{IN} ≤ 30 V, Io = 200 mA
Load Regulation	REG_L		25	240	mV	Tj = 25°C, 5 mA ≤ Io ≤ 500 mA
			10	120		Tj = 25°C, 5 mA ≤ Io ≤ 200 mA
Quiescent Current	I_{BIAS}		4.8	6.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	14.5 V ≤ V_{IN} ≤ 30 V, Io = 200 mA
				0.5		5 mA ≤ Io ≤ 350 mA
Output Noise Voltage	N_L		75		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz
Ripple Rejection		55	80		dB	Tj = 25°C, f = 120 Hz, 15 V ≤ V_{IN} ≤ 25 V, I_o = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	Tj = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA

ELECTRICAL CHARACTERISTICS μPC78M15H (V_{IN} = 23 V, Io = 350 mA, 0°C ≤ Tj ≤ 125°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	14.4	15	15.6	V	Tj = 25°C
		14.25		15.75		17.5 V≤V_{IN}≤30 V, 5 mA≤Io≤350 mA
Line Regulation	REG_{IN}		10	100	mV	Tj = 25°C, 17.5≤V_{IN}≤30 V, Io = 200 mA
			3.0	50		Tj = 25°C, 20≤V_{IN}≤30 V, Io = 200 mA
Load Regulation	REG_L		25	300	mV	Tj = 25°C, 5 mA≤Io≤500 mA
			10	150		Tj = 25°C, 5 mA≤Io≤200 mA
Quiescent Current	I_{BIAS}		4.8	6.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	17.5 V≤V_{IN}≤30 V, Io = 200 mA
				0.5		5 mA≤Io≤350 mA
Output Noise Voltage	N_L		90		μV	Ta = 25°C, 10 Hz≤f≤100 kHz
Ripple Rejection		54	70		dB	Tj = 25°C, f = 120 Hz, 18.5 V≤V_{IN}≤28.5 V, Io = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	Tj = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA

ELECTRICAL CHARACTERISTICS μPC78M18H (V_{IN} = 27 V, Io = 350 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≤350 mA
Line Regulation	REG_{IN}		10	100	mV	Tj = 25°C, 21 V≤V_{IN}≤33 V, Io=200 mA
			4.0	50		Tj = 25°C, 24 V≤V_{IN}≤30 V
Load Regulation	REG_L		30	360	mV	Tj = 25°C, 5 mA≤Io≤500 mA
			10	180		Tj = 25°C, 5 mA≤Io≤200 mA
Quiescent Current	I_{BIAS}		4.8	6.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	27 V≤V_{IN}≤38 V
				0.5		5 mA≤Io≤350 mA
Output Noise Voltage	N_L		100		μV	Ta = 25°C, 10 Hz≤f≤100 kHz
Ripple Rejection		53	70		dB	Tj = 25°C, f = 120 Hz, 22 V≤V_{IN}≤32 V Io = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	Tj = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.0		mV/°C	Io = 5 mA

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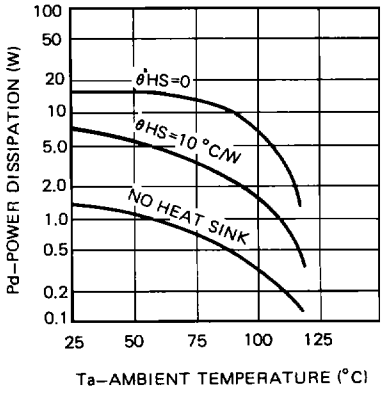
ELECTRICAL CHARACTERISTICS μPC78M24H (V_{IN} = 33 V, Io = 350 mA, 0°C ≤ Tj ≤ 125°C)

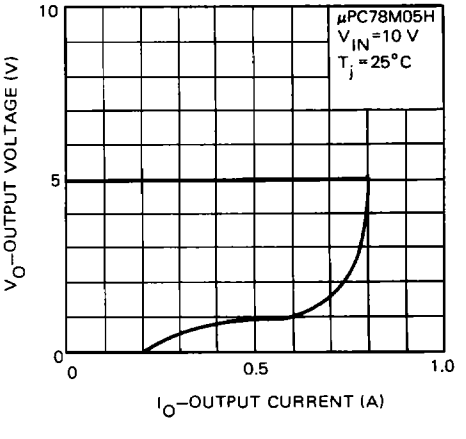
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	Vo	23	24	25	V	Tj = 25°C
		22.8		25.2		27 V≤V_{IN}≤38 V, 5 mA≤Io≤350 mA
Line Regulation	REG_{IN}		10	100	mV	Tj=25°C, 27 V≤V_{IN}≤38 V, Io = 200 mA
			5.0	50		Tj=25°C, 28 V≤V_{IN}≤38 V, Io = 200 mA
Load Regulation	REG_L		30	480	mV	Tj = 25°C, 5 mA ≤ Io ≤ 500 mA
			10	240		Tj = 25°C, 5 mA ≤ Io ≤ 200 mA
Quiescent Current	I_{BIAS}		5.0	6.0	mA	Tj = 25°C
Quiescent Current Change	ΔI_{BIAS}			0.8	mA	27 V ≤ V_{IN} ≤ 38 V, Io = 200 mA
				0.5		5 mA ≤ Io ≤ 350 mA
Output Noise Voltage	N_L		170		μV	Ta = 25°C, 10 Hz ≤ f ≤ 100 Hz
Ripple Rejection		50	70		dB	Tj = 25°C, f = 120 Hz, 28 V ≤ V_{IN} ≤ 38 V Io = 300 mA
Dropout Voltage			2.0		V	Ta = 25°C
Short Circuit Current	Io short		250		mA	Tj = 25°C, V_{IN} = 35 V
Peak Output Current	Io peak		1.0		A	Tj = 25°C
Temperature Coefficient of Output Voltage	ΔVo/ΔT		−1.2		mV/°C	Io = 5 mA, 0°C ≤ Tj ≤ 125°C

TYPICAL CHARACTERISTICS (Ta = 25°C)

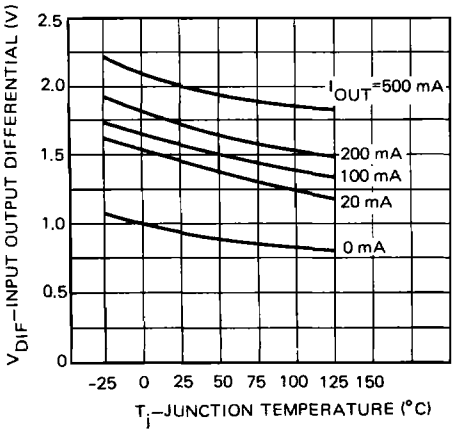
POWER DISSIPATION vs. AMBIENT TEMPERATURE



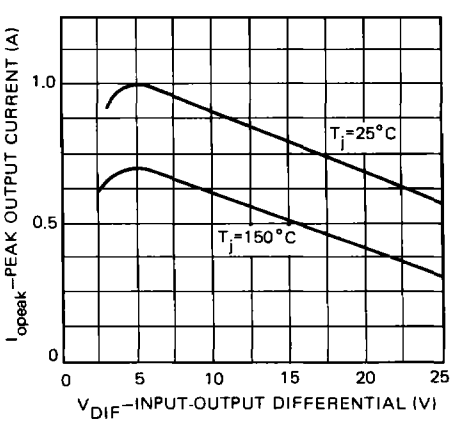
CURRENT LIMITING CHARACTERISTICS



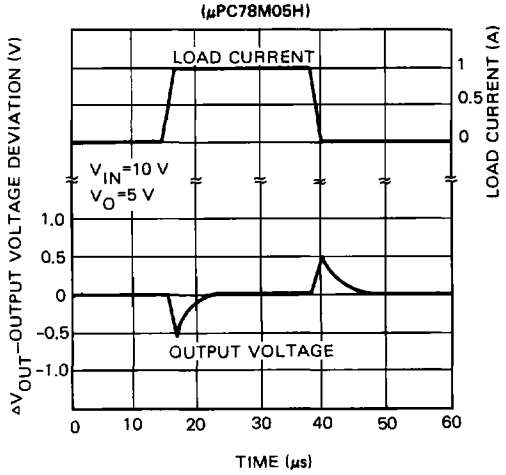
DROPOUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE



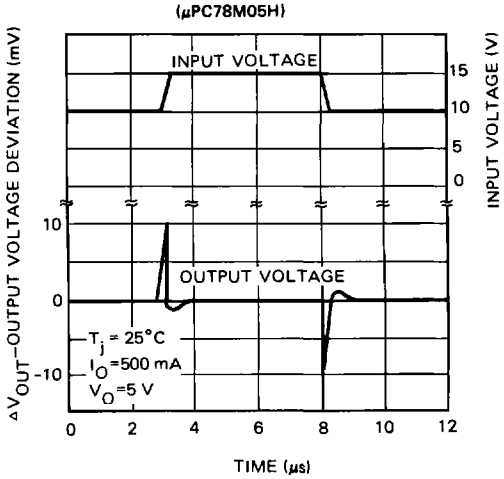
PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT/OUTPUT DIFFERENTIAL VOLTAGE



LOAD TRANSIENT RESPONSE (μPC78M05H)



LINE TRANSIENT RESPONSE (μPC78M05H)



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