M5F79MXX

FIXED NEGATIVE OUTPUT 3-TERMINAL REGULATOR SERIES

DESCRIPTION

M5F79MXX is a semiconductor integrated circuit designed for 3 terminal regulator which is available for maximum load current 500mA class negative output.

A current limiting circuit, heat protection circuit and ASO protection circuit are included.

The device is suitable for a wide range of general power supply applications such as microcomputers, due to the variety of output voltage ranks.

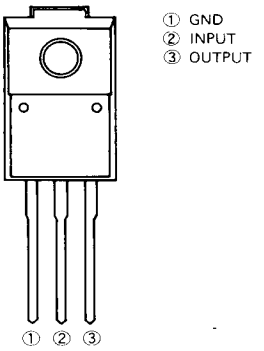
FEATURES

- No need for external connecting parts
- Input stability 0.01%/V
- Load stability 0.1%
- Variety of output voltage ranks
  (–5V, –6V, –7V, –8V, –9V, –10V, –12V, –15V, –18V, –20V, –24V)

APPLICATION

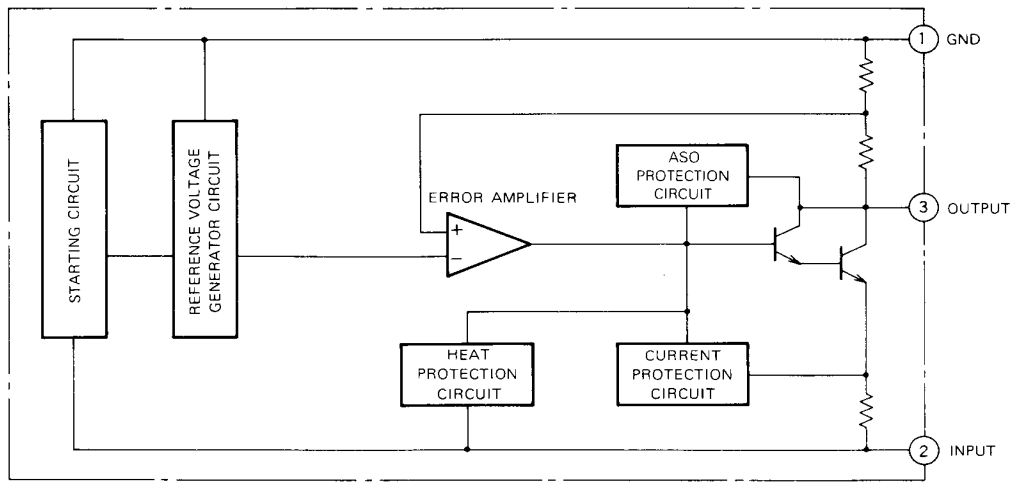
For general power supply of various types of electronic equipment such as VCR, CD

PIN CONFIGURATION (TOP VIEW)



Outline 3P9

BLOCK DIAGRAM



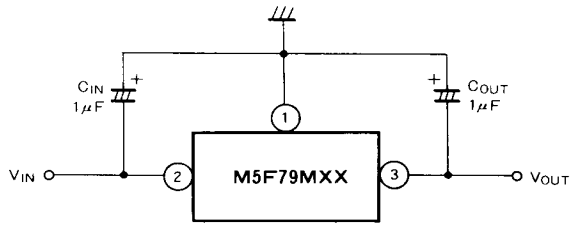
FIXED NEGATIVE OUTPUT 3-TERMINAL REGULATOR SERIES

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{IN}	Input voltage		35/40*	V
Pd	Power dissipation		2 (no heat sink)	W
			20 (with infinite heat sink)	
Ta	Operating temperature		−20 ~ +85	℃
T_j	Junction temperature		−20 ~ +150	℃
Tstg	Storage temperature		−55 ~ +150	℃

* M5F79M24

STANDARD CONNECTION



ELECTRIC CHARACTERISTICS

M5F79M05 (V_{IN} = −10V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−5.2	−5.0	−4.8	V
		−25V ≦ V_{IN} ≦ −7V, 5mA ≦ I_O ≦ 350mA	−5.25		−4.75	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −7V		6	50	mV
		T_j = 25℃, −18V ≦ V_{IN} ≦ −8V		2	30	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		8	100	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		4	60	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −8V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 10Hz ~ 100kHz		50		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −18V ≦ V_{IN} ≦ −8V	62	80		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		2		V
R_O	Output resistance	f = 1kHz		10		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		0.2		mV/℃

FIXED NEGATIVE OUTPUT 3-TERMINAL REGULATOR SERIES

M5F79M06 (V_{IN} = −11V, I_O = 350mA, 0℃ ≦ T_J ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−6.25	−6.0	−5.75	V
		−25V ≦ V_{IN} ≦ −8V, 5mA ≦ I_O ≦ 350mA	−6.3		−5.7	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −8V		7	60	mV
		T_j = 25℃, −19V ≦ V_I ≦ −9V		2	40	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		9	120	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		5	60	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −9V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		60		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −19V ≦ V_{IN} ≦ −9V	60	78		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		10		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.2		mV/℃

M5F79M07 (V_{IN} = −12V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−7.3	−7.0	−6.7	V
		−25V ≦ V_{IN} ≦ −9V, 5mA ≦ I_O ≦ 350mA	−7.35		−6.65	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −9V		8	70	mV
		T_j = 25℃, −20V ≦ V_{IN} ≦ −10V		3	45	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		11	140	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		5	70	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −10V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		70		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −20V ≦ V_{IN} ≦ −10V	60	77		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		10		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.3		mV/℃

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M5F79M08 (V_{IN} = −14V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−8.3	−8.0	−7.7	V
		−25V ≦ V_{IN} ≦ −10.5V, 5mA ≦ I_O ≦ 350mA	−8.4		−7.6	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −10.5V		8	80	mV
		T_j = 25℃, −21V ≦ V_{IN} ≦ −11V		3	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		13	160	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		7	80	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −10.5V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		80		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −21.5V ≦ V_{IN} ≦ −11.5V	60	76		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		10		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.3		mV/℃

M5F79M09 (V_{IN} = −15V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−9.35	−9.0	−8.65	V
		−25V ≦ V_{IN} ≦ −11.5V, 5mA ≦ I_O ≦ 350mA	−9.45		−8.55	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −11.5V		8	80	mV
		T_j = 25℃, −22V ≦ V_{IN} ≦ −12V		4	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		14	180	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		7	90	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −11.5V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		90		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −22.5V ≦ V_{IN} ≦ −12.5V	59	75		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		10		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.4		mV/℃

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M5F79M10 (V_{IN} = −16V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−10.4	−10	−9.6	V
		−25V ≦ V_{IN} ≦ −12.5V, 5mA ≦ I_O ≦ 350mA	−10.5		−9.5	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −25V ≦ V_{IN} ≦ −12.5V		9	80	mV
		T_j = 25℃, −23V ≦ V_{IN} ≦ −13V		4	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		16	200	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		8	100	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−25V ≦ V_{IN} ≦ −12.5V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		100		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −23.5V ≦ V_{IN} ≦ −13.5V	59	74		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		12		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.4		mV/℃

M5F79M12 (V_{IN} = −19V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−12.5	−12	−11.5	V
		−30V ≦ V_{IN} ≦ −14.5V, 5mA ≦ I_O ≦ 350mA	−12.6		−11.4	
$\triangle V_O$ Line	Input stability	T_j = 25℃, −30V ≦ V_{IN} ≦ −14.5V		9	80	mV
		T_j = 25℃, −25V ≦ V_{IN} ≦ −15V		5	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		19	240	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		10	120	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−30V ≦ V_{IN} ≦ −14.5V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		120		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −25V ≦ V_{IN} ≦ −15V	58	72		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		12		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.5		mV/℃

FIXED NEGATIVE OUTPUT 3-TERMINAL REGULATOR SERIES

M5F79M15 (V_{IN} = −23V, I_O = 350mA, 0℃ ≦ T_J ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_J = 25℃	−15.6	−15	−14.4	V
		−30V ≦ V_{IN} ≦ −17.5V, 5mA ≦ I_O ≦ 350mA	−15.75		−14.25	
$\triangle V_O$ Line	Input stability	T_J = 25℃, −30V ≦ V_{IN} ≦ −17.5V		9	80	mV
		T_J = 25℃, −28V ≦ V_{IN} ≦ −18V		5	50	
$\triangle V_O$ Load	Load stability	T_J = 25℃, 5mA ≦ I_O ≦ 500mA		24	240	mV
		T_J = 25℃, 5mA ≦ I_O ≦ 350mA		12	120	
I_{CC}	Operating current	T_J = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−30V ≦ V_{IN} ≦ −17.5V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_J = 25℃, 10Hz ~ 100kHz		150		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −28.5V ≦ V_{IN} ≦ −18.5V	58	70		dB
V_{DROP}	Input output voltage difference	T_J = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		14		mΩ
I_{OS}	Output short current	T_J = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_J = 25℃		0.7		A
$\triangle V_O/\triangle T_J$	Output voltage temperature coefficient	I_O = 5mA		−0.6		mV/℃

M5F79M18 (V_{IN} = −27V, I_O = 350mA, 0℃ ≦ T_J ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_J = 25℃	−18.7	−18	−17.3	V
		−33V ≦ V_{IN} ≦ −21V, 5mA ≦ I_O ≦ 350mA	−18.9		−17.1	
$\triangle V_O$ Line	Input stability	T_J = 25℃, −33V ≦ V_{IN} ≦ −21V		11	80	mV
		T_J = 25℃, −30V ≦ V_{IN} ≦ −24V		8	50	
$\triangle V_O$ Load	Load stability	T_J = 25℃, 5mA ≦ I_O ≦ 500mA		29	300	mV
		T_J = 25℃, 5mA ≦ I_O ≦ 350mA		14	150	
I_{CC}	Operating current	T_J = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−33V ≦ V_{IN} ≦ −21V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_J = 25℃, 10Hz ~ 100kHz		180		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −32V ≦ V_{IN} ≦ −22V	57	69		dB
V_{DROP}	Input output voltage difference	T_J = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		14		mΩ
I_{OS}	Output short current	T_J = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_J = 25℃		0.7		A
$\triangle V_O/\triangle T_J$	Output voltage temperature coefficient	I_O = 5mA		−0.7		mV/℃

FIXED NEGATIVE OUTPUT 3-TERMINAL REGULATOR SERIES

M5F79M20 (V_{IN} = −30V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−20.8	−20	−19.2	V
		−35V ≦ V_{IN} ≦ −23V, 5mA ≦ I_O ≦ 350mA	−21		−19	
$\triangle V_O$ Line	input stability	T_j = 25℃, −35V ≦ V_{IN} ≦ −23V		12	80	mV
		T_j = 25℃, −34V ≦ V_{IN} ≦ −24V		10	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		32	300	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		16	150	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−35V ≦ V_{IN} ≦ −23V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 100kHz		200		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −34V ≦ V_{IN} ≦ −24V	56	68		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		16		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−0.8		mV/℃

M5F79M24 (V_{IN} = −33V, I_O = 350mA, 0℃ ≦ T_j ≦ 125℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{OUT}	Output voltage	T_j = 25℃	−25	−24	−23	V
		−38V ≦ V_{IN} ≦ −27V, 5mA ≦ I_O ≦ 350mA	−25.2		−22.8	
$\triangle V_O$ Line	input stability	T_j = 25℃, −38V ≦ V_{IN} ≦ −27V		12	80	mV
		T_j = 25℃, −38V ≦ V_{IN} ≦ −28V		12	50	
$\triangle V_O$ Load	Load stability	T_j = 25℃, 5mA ≦ I_O ≦ 500mA		38	300	mV
		T_j = 25℃, 5mA ≦ I_O ≦ 350mA		19	150	
I_{CC}	Operating current	T_j = 25℃		3	5	mA
$\triangle I_{CC}$	Operating current change	−38V ≦ V_{IN} ≦ −27V			0.5	mA
		5mA ≦ I_O ≦ 350mA			0.4	
V_N	Output noise voltage	T_j = 25℃, 10Hz ~ 10Hz ~ 100kHz		240		μVrms
R.R	Ripple rejection ratio	f = 120Hz, −38V ≦ V_{IN} ≦ −28V	54	66		dB
V_{DROP}	Input output voltage difference	T_j = 25℃		1.1		V
R_O	Output resistance	f = 1kHz		20		mΩ
I_{OS}	Output short current	T_j = 25℃, V_{IN} = −35V		200		mA
I_{OP}	Output peak current	T_j = 25℃		0.7		A
$\triangle V_O/\triangle T_j$	Output voltage temperature coefficient	I_O = 5mA		−1.0		mV/℃