

MC79LXXA/LM79LXXA

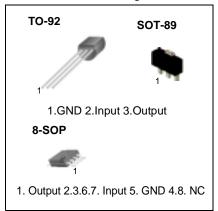
3-Terminal 0.1A Negative Voltage Regulator

Features

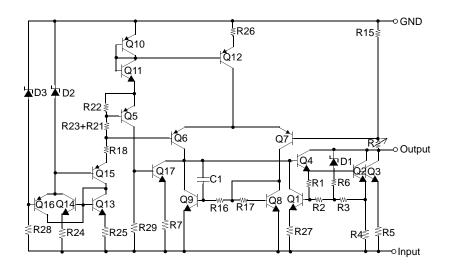
- Output Current up to 100mA
- No External Components
- Internal Thermal Over Load Protection
- Internal Short Circuit Current Limiting
- Output Voltage Offered in ±5% Tolerance
- Output Voltage of -5V, -8V, -12V, -15V, -18V, -24V

Description

These regulators employ internal current limiting and thermal shutdown, making them essentially indestructible.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage (for $V_0 = -5V$ to $-8V$) (for $V_0 = -12V$ to $-18V$) (for $V_0 = -24V$)	VI	-30 -35 -40	V
Operating Temperature Range	TOPR	0 ~ +125	°C
Storage Temperature Range	TSTG	-65 ~ +150	°C

Electrical Characteristics(MC79L05A/LM79L05A)

(VI = -10V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \leq TJ \leq +125^{\circ}C$, unless otherwise specified)

Parameter	Parameter Symbol Conditions		Min.	Тур.	Max.	Unit		
Output Voltage		Vo	T _J = +25°C		-4.8	-5.0	-5.2	V
			_	-7.0V ≥ V _I ≥ -20V	-	15	150	mV
Line Regulation (No	te1)	ΔVΟ	TJ =+25°C -8V ≥ V _I ≥ -20V	-	-	100	mV	
Load Regulation (No	oto 1 \	ΔVο	T.J =+25°C	$1.0\text{mA} \le I_{O} \le 100\text{mA}$	-	20	60	mV
Load Regulation (Note1)		ΔνΟ	1J =+25 C	1.0mA ≤ I _O ≤ 40mA	-	10	30	mV
Output Voltage		Vo	$-7.0V \ge V_I \ge -20V$, $1.0mA \le I_O \le 40mA$		-4.75	-	-5.25	V
Output Voltage		٧٥	$V_I = -10V, 1.0 \text{mA} \le I_O \le 70 \text{mA}$		-4.75	-	-5.25	V
Quiescent Current		lo	T _J =+25°C		-	2.0	5.5	mA
Quiescent Current		IQ	T _J = +125°C		-	-	6.0	111/
Quiescent Current	With Line	ΔlQ	-8V ≥ V _I ≥ -20V		-	-	1.5	mΑ
Change	With Load	ΔlQ	1.0mA ≤ IO ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	T _A = +25°C,10Hz ≤ f ≤ 100kHz		-	30	-	μV
Ripple Rejection		RR	$f = 120Hz, -8V \ge V_I \ge -18V$ $T_J = +25^{\circ}C$		41	60	-	dB
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in VO due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (MC79L08A) (Continued)

(VI = -14V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \le TJ \le +125^{\circ}C$, unless otherwise specified)

Parameter Symbol		Co	nditions	Min.	Тур.	Max.	Unit	
Output Voltage		Vo	T _J = +25°C		-7.7	-8.0	-8.3	V
	_		_	-10.3V ≥ V _I ≥ -23V	-	-	175	mV
Line Regulation(Note	e1)	ΔVO	T _J = +25°C	-12V ≥ V _I ≥ -23V	-	-	125	mV
Load Regulation (No	sto1)	۸۷/۵	T,j = +25°C	$1.0\text{mA} \le I_0 \le 100\text{mA}$	-	-	80	mV
Load Regulation (NC	ne i)	ΔVO	1J = +25 C	$1.0\text{mA} \le I_0 \le 40\text{mA}$	-	-	40	mV
Output Voltage		Vo	$-10.3V \ge V_1 \ge -23V$, $1.0mA \le I_0 \le 40mA$		-7.6	-	-8.4	V
Output voltage	Output Voltage		$V_I = -14V$, $1.0mA \le I_0 \le 70mA$		-7.6	-	-8.4	'
Quiescent Current		l	$T_j = +25^{\circ}C$		-	-	6.0	mA
Quiescent Current		Iq	T _j = +125°C		-	-	5.5	IIIA
Quiescent Current	With Line	AIO.	-11.7V ≥ V _I ≥ -23V		-	-	1.5	mA
Change With Load		ΔlQ	1.0mA ≤ I ₀ ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	$T_j = +25^{\circ}C,10Hz \le f \le 100kHz$		-	50	-	μV
Ripple Rejection		RR	$f = 120Hz, -11V \ge V_1 \ge -21V$ $T_j = +25$ °C		39	55	-	dB
Dropout Voltage		VD	Tj = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L12A) (Continued)

(VI = -19V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \leq TJ \leq +125^{\circ}C$, unless otherwise specified)

Parameter		Symbol	I Conditions		Min.	Тур.	Max.	Unit
Output Voltage		Vo	T _J = +25°C		-11.5	-12.0	-12.5	V
			_	-14.5V ≥ V _I ≥ -27V	-	-	250	mV
Line Regulation (No	te1)	ΔVO	$T_J = +25^{\circ}C$ $-16V \ge V_I \ge -27V$	-	-	200	mV	
Load Population (No	oto1)	ΔVΩ	T,j = +25°C	$1.0\text{mA} \le I_{O} \le 100\text{mA}$	-	-	100	mV
Load Regulation (No	ne i)	ΔνΟ	1J = +25 C	1.0mA ≤ I _O ≤ 40mA	-	-	50	mV
Output Voltage		Vo	-14.5V > V _I > -27V, 1.0mA ≤ I _O ≤ 40mA		-11.4	-	-12.6	V
Output voltage	Output Voltage		V _I = -19V, 1.0mA ≤ I _O ≤ 70mA		-11.4	-	-12.6	V
Quiescent Current		Io	T _J = +25°C		-	-	6.0	mA
Quiescent Current		IQ	TJ = +125°C		-	-	6.5	111/4
Quiescent Current	With Line	ΔlQ	-16V ≥ V _I ≥ -27V		-	-	1.5	mΑ
Change	e With Load ΔIQ 1.0mA $\leq IO \leq 40$ mA		-	-	0.1	mA		
Output Noise Voltage		VN	$T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		-	80	-	μV
Ripple Rejection		RR	f = 120Hz, -15V≥ V _I ≥ -25V T _J = +25°C		37	42	-	dB
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in Vo due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L15A) (Continued)

(VI = -23V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \le TJ \le +125^{\circ}C$, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Тур.	Max.	Unit
Output Voltage		Vo	T _J = +25°C		-14.4	-15.0	-15.6	V
	_			-17.5V ≥ V _I ≥ -30V	-	-	300	mV
Line Regulation (No	te1)	ΔVΟ	$T_J = +25^{\circ}C$ $-20V \ge V_I \ge -30V$		-	-	250	mV
Load Population (No	oto1)	۸\/٥	T _J = +25°C	$1.0\text{mA} \le I_O \le 100\text{mA}$	-	-	150	mV
Load Regulation (Note1)		ΔVο	1J = +25 C	1.0mA ≤ I _O ≤ 40mA	-	-	75	mV
Output Voltage		Vo	$-17.5V \ge V_I \ge -30V, 1.0mA \le I_O \le 40mA$		-14.25	-	-15.75	V
Output Voltage	Output Voltage		V _I = -23V, 1.0mA ≤ I _O ≤ 70mA		-14.25	-	-15.75	V
Quiescent Current		Io	T _J = +25°C		-	-	6.0	mA
Quiescent Current		IQ	T _J = +125°C		-	-	6.5	111/4
Quiescent Current	With Line	ΔlQ	-20V ≥ V _I ≥ -30	V	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ IO ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	T _A = +25°C,10Hz ≤ f ≤ 100kHz		-	90	-	μV
Ripple Rejection		RR	$f = 120Hz, -18.5V \ge V_I \ge -28.5V$ $T_J = +25^{\circ}C$		34	39	-	dB
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L18A) (Continued)

(VI = -27V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \le TJ \le +125^{\circ}C$, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Тур.	Max.	Unit
Output Voltage		Vo	T _J = +25°C		-17.3	-18.0	-18.7	V
				-20.7V ≥ V _I ≥ -33V	-	-	325	mV
Line Regulation (No	te1)	ΔVΟ	$T_J = +25^{\circ}C$ $-21V \ge V_I \ge -33V$		-	-	275	mV
Load Regulation (No	oto1)	۸\/٥	T,j = +25°C	1.0mA ≤ I _O ≤ 100mA	-	-	170	mV
Load Negulation (NC	ile i)	ΔVO	1J = +23 C	1.0mA ≤ I _O ≤ 40mA	-	-	85	mV
Output Voltage		Vo	$-20.7V > V_I > -33V, 1.0 \text{mA} \le I_0$		-17.1	-	-18.9	V
Output voltage	Output Voltage		V _I = -27V, 1.0mA ≤ I _O ≤ 70mA		-17.1	-	-18.9	V
Quiescent Current		lo.	T _J = +25°C		-	-	6.5	m Λ
Quiescent Current		IQ	T _J = +125°C		-	-	6.0	- mA
Quiescent Current	With Line	ΔlQ	-21V ≥ V _I ≥ -33'	V	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I _O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	T _A =+25°C,10Hz ≤ f ≤ 100kHz		-	150	-	μV
Ripple Rejection		RR	$f = 120Hz, -23V \ge V_I \ge -33V$ $T_J = +25^{\circ}C$		33	48	-	dB
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in Vo due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L24A) (Continued)

(VI = -33V, IO = 40mA, CI = $0.33\mu F$, CO = $0.1\mu F$, $0^{\circ}C \le TJ \le +125^{\circ}C$, unless otherwise specified)

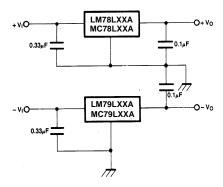
Parameter		Symbol	Conditions		Min.	Тур.	Max.	Unit
Output Voltage		Vo	T _J = +25°C		-23	-24	-25	V
				-27V ≥ V _I ≥ -38V	-	-	350	mV
Line Regulation (No	te1)	ΔVΟ	$T_J = +25^{\circ}C$ $-28V \ge V_I \ge -38V$		-	-	300	mV
Load Regulation (No	oto1)	۸\/۵	T,j = +25°C	$1.0\text{mA} \le I_{O} \le 100\text{mA}$	-	-	200	mV
Load Regulation (NC	ne i)	ΔVO	1J = +25 C	1.0mA ≤ I _O ≤ 40mA	-	-	100	mV
Output Voltage		Vo	-27V ≥ V _I ≥ -38V, 1.0mA ≤ I _O ≤ 40mA		-22.8	-	-25.2	V
Output voltage		٧٥	$V_I = -33V$, $1.0mA \le I_O \le 70mA$		-22.8	-	-25.2	V
Quiescent Current		lo.	T _J = +25°C		-	-	6.5	mA
Quiescent Current		IQ	T _J = +125°C		-	-	6.0	IIIA
Quiescent Current	With Line	ΔlQ	-28V ≥ V _I ≥ -38	3V	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ IO ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	$T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		-	200	-	μV
I RIDDIE REIECTION I RR I		f = 120Hz, -29 T _J = +25°C	V ≥ V _I ≥ -35V	31	47	-	dB	
Dropout Voltage		VD	T _J = +25°C		-	1.7	-	V

^{1.} Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Typical Application

Design Considerations

The MC79LXXA/LM79LXXA Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition. Internal Short Circuit Protection that limits the maximum current the circuit will pass. In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A $0.33\mu F$ or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.



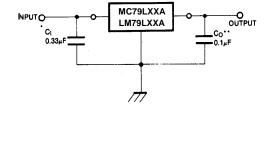


Figure 1. Positive And Negative Regulator

Figure 2. Typical Application

A common ground is required between the Input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

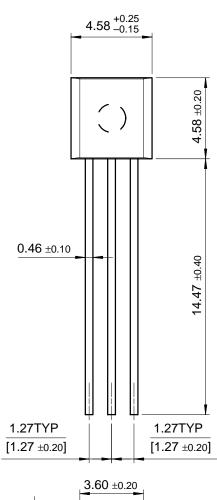
- * C1 is required if regulator is located an appreciable distance from power supply filter.
- * Co improves stability and transient response.

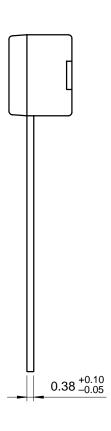
Mechanical Dimensions

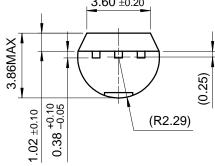
Package

Dimensions in millimeters

TO-92





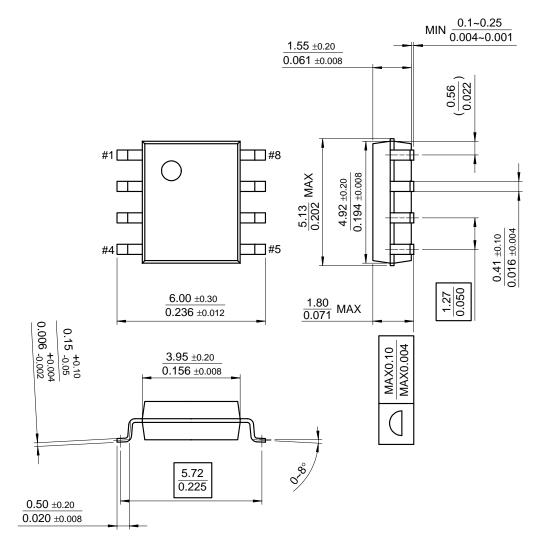


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-SOP

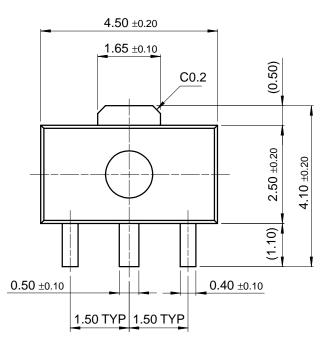


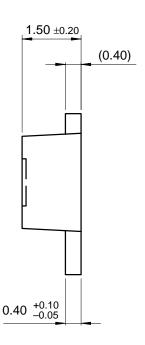
Mechanical Dimensions (Continued)

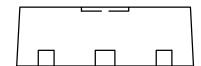
Package

Dimensions in millimeters

SOT-89







Ordering Information

Product Number	Package	Operating Temperature
LM79L05ACZ	TO-92	0 ~ +125°C
Product Number	Package	Operating Temperature
MC79L05ACP		
MC79L08ACP		
MC79L12ACP	TO-92	
MC79L15ACP	10-92	
MC79L18ACP		0 ~ +125°C
MC79L24ACP		
MC79L05ACD	8-SOP	
MC79L15ACD	0-30P	
MC79L05ACH	SOT-89	

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