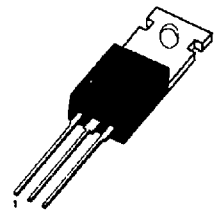
3-TERMINAL 0.5A NEGATIVE VOLTAGE REGULATORS

The KA79MXX series of 3-Terminal medium current negative voltage regulators are monolithic integrated circuits designed as fixed voltage regulators. These regulators employ internal current limiting, thermal shutdown and safe-area compensation making them essentially in destructible.

TO-220



1: GND 2: Input 3: Output

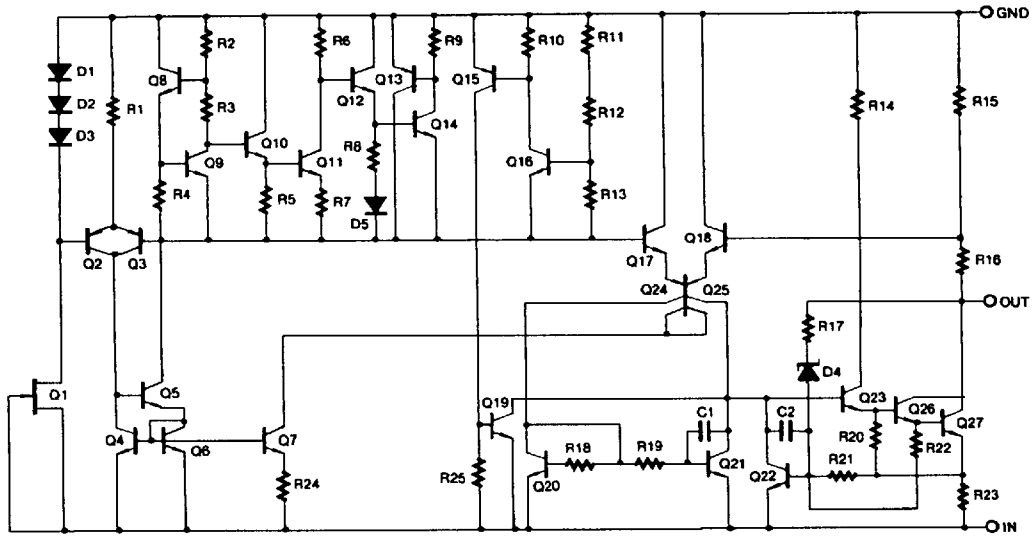
FEATURES

- No external components required
- Output current in excess of 0.5A
- Internal thermal-overload protection
- Internal short circuit current limiting
- Output transistor safe-area compensation

ORDERING INFORMATION

Device	Package	Operating Temperature
KA79MXX	TO-220	0~ 125℃

SCHEMATHIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_A = 25℃, unless otherwise specified)

Characteristic	Symbol	Value	Unit
Input Voltage(for V_O = -5V to -18V) (for V_O = -24V)	V_I V_I	-35 -40	V V
Thermal Resistance Junction-Cases	$R_{\theta JC}$	5	℃/W
Thermal Resistance Junction-Air	$R_{\theta JA}$	65	℃/W
Operating Temperature Range	T_{OPR}	0~ +125	℃
Storage Temperature Range	T_{STG}	65~ + 125	℃

KA79MO5 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, $0 \leq T_J \leq 125$, I_O =350mA, V_I =10V,unless otherwise specified,C_I =0.33μF,C_O=0.1μF)

Characteristic	Symbol	Test condition		MIN	TYP	MAX	Unit
Output Voltage	V_O	T_J= 25℃		-4.8	-5	-5.2	V
		I_O = 5 to 350mA V_I = -7 to -25V		-4.75	-5	-5.25	
Line Regulation	ΔV_O	T_J= 25℃	V_I= -7 to -25V		7.0	50	mV
			V_I= -8 to -25V		2.0	30	
Load Regulation	ΔV_O	I_O = 5mA to 500mA T_J = 25℃			30	100	mV
Quiescent Current	I_Q	T_J= 25℃			3.0	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		I_O = 200mA V_I = -8V to -25V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			-0.2		mV/℃
Output Noise Voltage	V_N	f = 10Hz, 100Khz T_J = 25℃			40		uV
Ripple Rejection	RR	f = 120Hz V_I = -8 to -18V		54	60		dB
Dropout Voltage	V_D	T_J = 25℃, I_O = 500mA			1.1		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

- 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.

KA79MO6 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = -11V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		-5.75	-6.0	-6.25	V
		I_O = 5 to 350mA V_I = -8.0 to -25V		-5.7	-6.0	-6.3	
Line Regulation	ΔV_O	T_J= 25℃	V_I = -8 to -25V		7.0	60	mV
			V_I = -9 to -19V		2.0	40	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	120	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		V_I = -8V to -25V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			0.4		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			50		μV
Ripple Rejection	RR	f = 120Hz,VI = -9 to -19V		54	60		dB
Dropout Voltage	V_D	I_O = 500mA, T_j = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_j = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

KA79MO8 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = -14V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		-7.7	-8.0	-8.3	V
		I_O = 5 to 350mA V_I = -10.5 to -25V		-7.6	-8.0	-8.4	
Line Regulation	ΔV_O	T_J= 25℃	V_I = -10.5 to -25V		7.0	80	mV
			V_I = -11 to -21V		2.0	50	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	160	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		V_I = -8V to -25V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			0.4		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			59		μV
Ripple Rejection	RR	f = 120Hz,VI = -9 to -19V		54	60		dB
Dropout Voltage	V_D	I_O = 500mA, T_J = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

KA79M12 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = - 19V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		-11.5	-12	-12.5	V
		I_O = 5 to 350mA V_I = -14.5 to -30V		-11.4	-1.2	-12.6	
Line Regulation	ΔV_O	T_J = 25℃	V_I = -14.5 to -30V		8.0	80	mV
			V_I = -15 to -25V		3.0	50	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	240	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		V_I = -14.5V to -30V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			-0.8		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			75		μV
Ripple Rejection	RR	f = 120Hz,V_I = -15 to -25V		54	60		dB
Dropout Voltage	V_D	I_O = 500mA, T_J = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

KA79M15 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = - 23V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		- 14.4	- 15	- 15.6	V
		I_O = 5 to 350mA V_I = -17.5 to -30V		- 14.25	- 15	- 15.75	
Line Regulation	ΔV_O	T_J = 25℃	V_I = -17.5 to -30V		9.0	80	mV
			V_I = -18 to -28V		5.0	50	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	240	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		V_I = -17.5V to -28V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			-1.0		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			90		μV
Ripple Rejection	RR	f = 120Hz,V_I = -18.5 to -28.5V		54	59		dB
Dropout Voltage	V_D	I_O = 500mA, T_J = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

KA79M18 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = - 27V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		- 17.3	- 18	- 18.7	V
		I_O = 5 to 350mA V_I = -21 to -33V		- 17.1	- 18	- 18.9	
Line Regulation	ΔV_O	T_J = 25℃	V_I = -21 to -33V		9.0	80	mV
			V_I = -24 to -30V		5.0	80	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	360	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5 to 350mA				0.4	mA
		V_I = -21V to -33V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			-1.0		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			110		μV
Ripple Rejection	RR	f = 120Hz,V_I = -22 to -32V		54	59		dB
Dropout Voltage	V_D	I_O = 500mA, T_J = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

KA79M24 ELECTRICAL CHARACTERISTICS

(Refer to test circuit, 0℃ ≤ T_J ≤ 125℃, I_O =350mA, V_I = - 33V,unless otherwise specified)

Characteristic	Symbol	Test condition		Min	Typ	Max	Unit
Output Voltage	V_O	T_J= 25℃		- 23	- 24	- 25	V
		I_O = 5 to 350mA V_I = -27 to -38V		- 22.8	- 24	- 25.2	
Line Regulation	ΔV_O	T_J = 25℃	V_I = -27 to -38V		9.0	80	mV
			V_I = -30 to -36V		5.0	70	
Load Regulation	ΔV_O	T_J= 25℃	I_O = 5.0mA to 500mA		30	300	mV
Quiescent Current	I_Q	T_J= 25℃			3	6	mA
Quiescent Current Change	ΔI_O	I_O = 5 to 350mA				0.4	mA
		V_I = -27V to -38V				0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA			-1.0		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz,T_A = 25℃			180		μV
Ripple Rejection	RR	f = 120Hz,V_I = -28 to -38V		54	58		dB
Dropout Voltage	V_D	I_O = 500mA, T_J = 25℃			1.1		V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = 25℃			140		mA
Peak Current	I_{PK}	T_J= 25℃			650		mA

TYPICAL APPLICATIONS

Bypass capacitors are recommended for stable operation of the KA79MXX series of regulators over the input voltage and output current ranges. Output bypass capacitors will improve the transient response of the regulator.
The bypass capacitors, (2μF on the input, 1μF on the output) should be ceramic or solid tantalum which have good high frequency characteristics. If aluminum electrolytics are used, their values should be 10μF or larger. The bypass capacitors should be mounted with the shortest shortest leads, and if possible, directly across the regulator terminals.

Fig. 1 Fixed Output Regulator

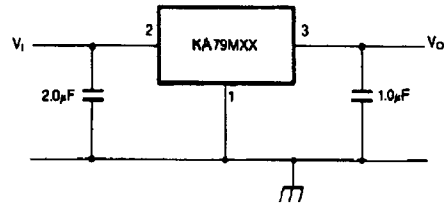
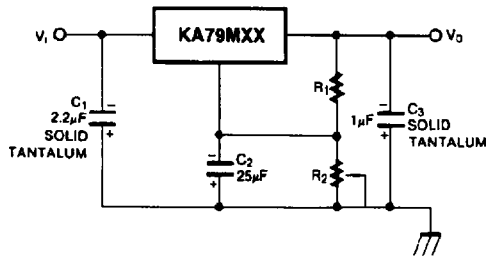


Fig. 2 Variable Output



Note

1. Required for stability. For value given, capacitor must be solid tantalum. 25μF aluminum electrolytic may be substituted.
2. C_2 improves transient response and ripple rejection. Do not increase beyond 50μF.

$$V_{OUT} = V_{SET} \left(\frac{R_1 + R_2}{R_1}\right)$$

Select R_2 as follows

KA79M 05 :300Ω, KA79M12: 750Ω, KA79M15: 11Ω

Dimensions in Milimeters