

KA79L05AZ  
KA79L12AZ

KA79LXXA

LINEAR INTEGRATED CIRCUIT

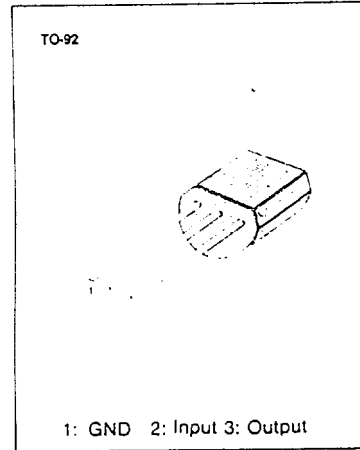
**3-TERMINAL 0.1A NEGATIVE VOLTAGE REGULATORS**

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

563-791

**FEATURES**

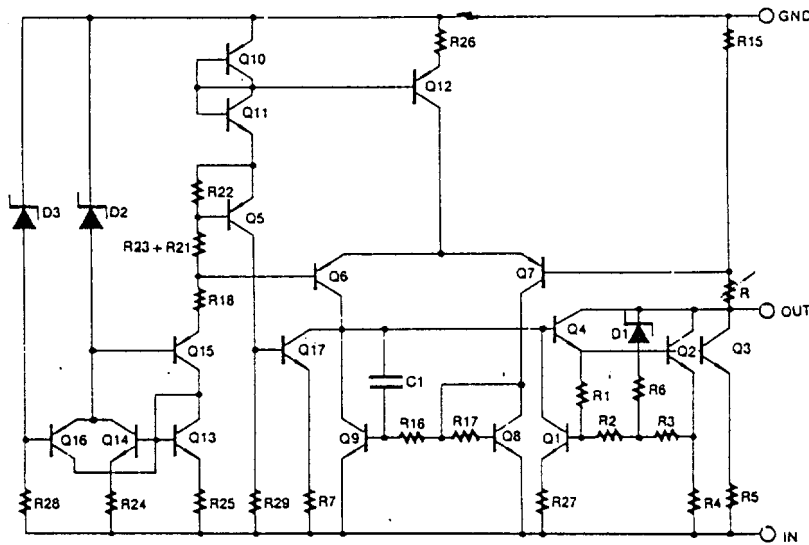
- Output current up to 100mA
- No external components
- Internal thermal over load protection
- Internal short circuit current limiting



**ORDERING INFORMATION**

Device	Package	Operating Temperature
KA79LXXAZ	TO-92	0 - 125°C

**SCHEMATIC DIAGRAM**



ELECTRONICS

**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

Characteristic	Symbol	Value	Unit
Input Voltage (-5V) (-12V to -18V) (-24V)	$V_i$	-30 -35 -40	$V_{DC}$
Operating Junction Temperature Range	$T_{OPR}$	0 ~ +125	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^\circ\text{C}$

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**KA79L05A ELECTRICAL CHARACTERISTICS**( $V_i = -10\text{V}$ ,  $I_o = 40\text{mA}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_0 = 0.1\mu\text{F}$ ,  $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$ , unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_J = 25^\circ\text{C}$	-4.8	-5.0	-5.2	V	
Line Regulation	$\Delta V_o$	$T_J = 25^\circ\text{C}$	$-7.0\text{V} \geq V_i \geq -20\text{V}$		15	150	mV
			$-8.0\text{V} \geq V_i \geq -20\text{V}$			100	
Load Regulation	$\Delta V_o$	$T_J = 25^\circ\text{C}$	$1.0\text{mA} \leq I_o \leq 100\text{mA}$		20	60	mV
			$1.0\text{mA} \leq I_o \leq 40\text{mA}$		10	30	
Output Voltage	$V_o$	$-7.0\text{V} > V_i > -20\text{V}$ , $1.0\text{mA} \leq I_o \leq 40\text{mA}$	-4.75		-5.25	V	
		$V_i = -1.0\text{V}$ , $1.0\text{mA} \leq I_o \leq 70\text{mA}$	-4.75		-5.25		
Quiescent Current	$I_o$	$T_J = +25^\circ\text{C}$		2.0	6.0	mA	
		$T_J = +125^\circ\text{C}$			5.5		
Quiescent Current Change	With Line	$\Delta I_o$	$-8\text{V} \geq V_i \geq -20\text{V}$ $1.0\text{mA} \leq I_o \leq 40\text{mA}$		1.5	mA	
	With Load				0.1		
Output Noise Voltage	$V_N$	$T_A = 25^\circ\text{C}$ , $10\text{Hz} \leq f \leq 100\text{KHz}$		30		$\mu\text{V}$	
Ripple Rejection	RR	$f = 120\text{Hz}$ , $-8.0 \geq V_i \geq -18\text{V}$ $T_J = 25^\circ\text{C}$	41	60		dB	
Dropout Voltage	$V_o$	$T_J = 25^\circ\text{C}$		1.7		V	

\* 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.

## KA79L12A ELECTRICAL CHARACTERISTICS

(V<sub>i</sub> = -19V, I<sub>o</sub> = 40mA, C<sub>i</sub> = 0.33μF, C<sub>o</sub> = 0.1μF, 0°C ≤ T<sub>J</sub> ≤ +125°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C	-11.5	-12.0	-12.5	V
Line Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	-14.5V ≥ V <sub>i</sub> ≥ -27V		250	mV
			-16V ≥ V <sub>i</sub> ≥ -27V		200	
Load Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	1.0mA ≤ I <sub>o</sub> ≤ 100mA		100	mV
			1.0mA ≤ I <sub>o</sub> ≤ 40mA		50	
Output Voltage	V <sub>o</sub>	-14.5V > V <sub>i</sub> > -27V, 1.0mA ≤ I <sub>o</sub> ≤ 40mA	-11.4		-12.6	V
		V <sub>i</sub> = -19V, 1.0mA ≤ I <sub>o</sub> ≤ 70mA	-11.4		-12.6	
Quiescent Current	I <sub>o</sub>	T <sub>J</sub> = +25°C			6.5	mA
		T <sub>J</sub> = +125°C			6.0	
Quiescent Current Change	With Line	ΔI <sub>o</sub>	-16V ≤ V <sub>i</sub> ≤ -27V			1.5
	With Load					
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = 25°C, 10Hz ≤ f ≤ 100KHz		80		μV
Ripple Rejection	RR	f = 120Hz, -15V ≤ V <sub>i</sub> ≤ -25V T <sub>J</sub> = 25°C	37	42		dB
Dropout Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C		1.7		V

\* Load and line regulation are specified at constant junction temperature. Change in V<sub>o</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## KA79L15A ELECTRICAL CHARACTERISTICS

(V<sub>i</sub> = -23V, I<sub>o</sub> = 40mA, C<sub>i</sub> = 0.33μF, C<sub>o</sub> = 0.1μF, 0°C ≤ T<sub>J</sub> ≤ +125°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C	-14.4	-15.0	-15.6	V
Line Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	-17.5V ≥ V <sub>i</sub> ≥ -30V		300	mV
			-27V ≥ V <sub>i</sub> ≥ -30V		250	
Load Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	1.0mA ≤ I <sub>o</sub> ≤ 100mA		150	mV
			1.0mA ≤ I <sub>o</sub> ≤ 40mA		75	
Output Voltage	V <sub>o</sub>	-17.5V > V <sub>i</sub> > -30V, 1.0mA ≤ I <sub>o</sub> ≤ 40mA	-14.25		-15.75	V
		V <sub>i</sub> = -23V, 1.0mA ≤ I <sub>o</sub> ≤ 70mA	-14.25		-15.75	
Quiescent Current	I <sub>o</sub>	T <sub>J</sub> = +25°C			6.5	mA
		T <sub>J</sub> = +125°C			6.0	
Quiescent Current Change	With Line	ΔI <sub>o</sub>	-20V ≤ V <sub>i</sub> ≤ -30V			1.5
	With Load					
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = 25°C, 10Hz ≤ f ≤ 100KHz		90		μV
Ripple Rejection	RR	f = 120Hz, -18.5V ≤ V <sub>i</sub> ≤ -28.5V T <sub>J</sub> = 25°C	34	39		dB
Dropout Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C		1.7		V

\* Load and line regulation are specified at constant junction temperature. Change in V<sub>o</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

**KA79L18A ELECTRICAL CHARACTERISTICS**(V<sub>i</sub> = -27V, I<sub>o</sub> = 40mA, C<sub>1</sub> = 0.33μF, C<sub>o</sub> = 0.1μF, 0°C ≤ T<sub>J</sub> ≤ +125°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C	-17.3	-18.0	-18.7	V
Line Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	-20.7V ≥ V <sub>i</sub> ≥ -33V		325	mV
			-21V ≥ V <sub>i</sub> ≥ -33V		275	
Load Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	1.0mA ≤ I <sub>o</sub> ≤ 100mA		170	mV
			1.0mA ≤ I <sub>o</sub> ≤ 40mA		85	
Output Voltage	V <sub>o</sub>	-20.7V > V <sub>i</sub> > -33V, 1.0mA ≤ I <sub>o</sub> ≤ 40mA	-17.1		-18.9	V
		V <sub>i</sub> = -27V, 1.0mA ≤ I <sub>o</sub> ≤ 70mA	-17.1		-18.9	
Quiescent Current	I <sub>o</sub>	T <sub>J</sub> = +25°C			6.5	mA
		T <sub>J</sub> = +125°C			6.0	
Quiescent Current Change	With Line	ΔI <sub>o</sub>	-21V ≤ V <sub>i</sub> ≤ -33V		1.5	mA
	With Load			1.0mA ≤ I <sub>o</sub> ≤ 40mA		
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = 25°C, 10Hz ≤ f ≤ 100KHz		150		μV
Ripple Rejection	RR	f = 120Hz, -23V ≤ V <sub>i</sub> ≤ -33V T <sub>J</sub> = 25°C	33	48		dB
Dropout Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C		1.7		V

\* Load and line regulation are specified at constant junction temperature. Change in V<sub>o</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

**KA79L24A ELECTRICAL CHARACTERISTICS**(V<sub>i</sub> = -33V, I<sub>o</sub> = 40mA, C<sub>1</sub> = 0.33μF, C<sub>o</sub> = 0.1μF, 0°C ≤ T<sub>J</sub> ≤ +125°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C	-23	-24	-25	V
Line Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	-27V ≥ V <sub>i</sub> ≥ -38V		350	mV
			-28V ≥ V <sub>i</sub> ≥ -38V		300	
Load Regulation	ΔV <sub>o</sub>	T <sub>J</sub> = 25°C	1.0mA ≤ I <sub>o</sub> ≤ 100mA		200	mV
			1.0mA ≤ I <sub>o</sub> ≤ 40mA		100	
Output Voltage	V <sub>o</sub>	-27V > V <sub>i</sub> > -38V, 1.0mA ≤ I <sub>o</sub> ≤ 40mA	-22.8		-25.2	V
		V <sub>i</sub> = -33V, 1.0mA ≤ I <sub>o</sub> ≤ 70mA	-22.8		-25.2	
Quiescent Current	I <sub>o</sub>	T <sub>J</sub> = +25°C			6.5	mA
		T <sub>J</sub> = +125°C			6.0	
Quiescent Current Change	With Line	ΔI <sub>o</sub>	-28V ≤ V <sub>i</sub> ≤ -38V		1.5	mA
	With Load			1.0mA ≤ I <sub>o</sub> ≤ 40mA		
Output Noise Voltage	V <sub>N</sub>	T <sub>A</sub> = 25°C, 10Hz ≤ f ≤ 100KHz		200		μV
Ripple Rejection	RR	f = 120Hz, -29V ≤ V <sub>i</sub> ≤ -35V T <sub>J</sub> = 25°C	31	47		dB
Dropout Voltage	V <sub>o</sub>	T <sub>J</sub> = 25°C		1.7		V

\* Load and line regulation are specified at constant junction temperature. Change in V<sub>o</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## TYPICAL APPLICATION

## Design Considerations

The KA79LXXA 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  $0.33\mu\text{F}$  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.

Fig. 1 POSITIVE AND NEGATIVE REGULATOR

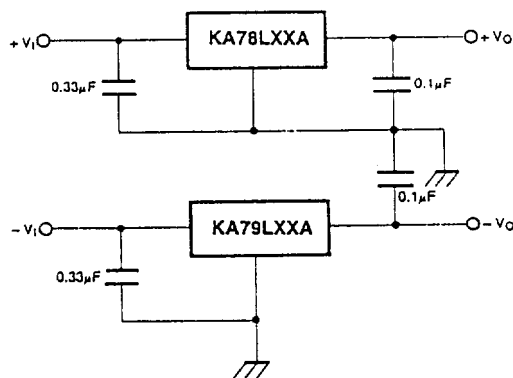
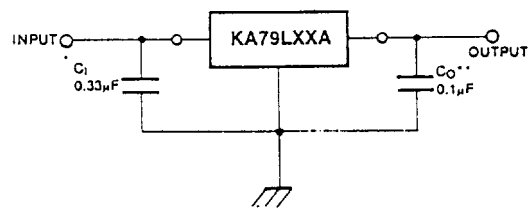


Fig. 2 TYPICAL APPLICATION



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.

- \* =  $C_1$  is required if regulator is located an appreciable distance from power supply filter.
- \*\* =  $C_0$  improves stability and transient response.