

# KA79LXXA

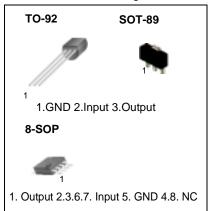
# 3-Terminal 0.1A Negative Voltage Regulator

#### **Features**

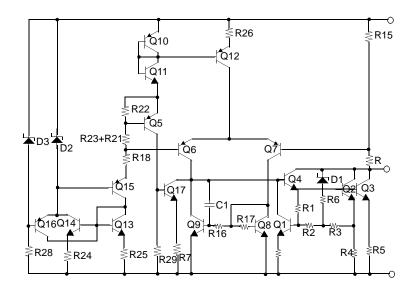
- Output Current up to 100mA
- No External Components
- Internal Thermal Over Load Protection
- Internal Short Circuit Current Limiting
- Output Voltage Offered in ±5% Tolerance
- Output Voltage of -5V, -8V, -12V, -15V, -18V and -24V

### **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(KA79L05A)**

(VI = -10V, 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 <sub>J</sub> = +25°C		-4.8	-5.0	-5.2	V
Line Regulation (Not	-01)	ΔVΩ	T,j =+25°C	-7.0V ≥ V <sub>I</sub> ≥ -20V	-	15	150	mV
Line Regulation (Not	le i)	ΔνΟ	1J =+25 C	-8V ≥ V <sub>I</sub> ≥ -20V	-	-	100	mV
Load Regulation (No	sto1)	4)/0	T,j =+25°C	1.0mA ≤ I <sub>O</sub> ≤ 100mA	-	20	60	mV
Load Regulation (No	ne i)	ΔVO	1J =+25 C	1.0mA ≤ I <sub>O</sub> ≤ 40mA	-	10	30	mV
Outrast Valtage		Vo	$-7.0V \ge V_I \ge -20V$ , $1.0mA \le I_O \le 40mA$		-4.75	-	-5.25	V
Output Voltage	Output Voltage		V <sub>I</sub> = -10V, 1.0mA≤ I <sub>O</sub> ≤ 70mA		-4.75	-	-5.25	V
Quiescent Current	Out a sent Ourset		TJ =+25°C		-	2.0	5.5	mA
Quiescent Current		lQ	T <sub>J</sub> = +125°C		-	-	6.0	IIIA
Quiescent Current	With Line	ΔlQ	-8V ≥ V <sub>I</sub> ≥ -20V		-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I <sub>O</sub> ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		VN	$T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		-	30	-	μV
Ripple Rejection		RR	$f = 120Hz, -8V \ge V_I \ge -18V, T_J = +25^{\circ}C$		41	60	-	dB
Dropout Voltage		VD	T <sub>J</sub> = +25°C		-	1.7	-	٧

<sup>1.</sup> 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 (KA79L08A) (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 Conditions		Min.	Тур.	Max.	Unit	
Output Voltage		Vo	T <sub>J</sub> = +25°C		-7.7	-8.0	-8.3	V
Line Regulation (Not	01)	ΔVΩ	TJ =+25°C	-10.3V ≥ V <sub>I</sub> ≥ -23V	-	-	175	mV
Line Regulation (Not	G1)	ΔνΟ	1J = <del>1</del> 23 C	-12V ≥ V <sub>I</sub> ≥ -23V	-	-	125	mV
Load Regulation (No	to1)	ΔVΩ	TJ =+25°C	$1.0 mA \leq I_0 \leq 100 mA$	-	-	80	mV
Load Negulation (No	( <del>C</del> 1)	ΔνΟ	1J = <del>1</del> 23 C	$1.0mA \le I_0 \le 40mA$	-	-	40	mV
Output Valtage		Vo	-10.3V ≥ V <sub>I</sub> ≥ -23V, 1.0mA ≤		-7.6	-	-8.4	V
Output Voltage		٧٥	$V_I = -14V$ , 1.0mA $\leq I_0 \leq 70$ mA		-7.6	-	-8.4	'
Quiescent Current		lo	T <sub>j</sub> =+25°C		-	-	6.0	mA
Quiescent Current		lQ	T <sub>j</sub> = +125°C			-	5.5	IIIA
Quiescent Current	With Line	ΔIO	-11.7V ≥ V <sub>I</sub> ≥ -23	BV	-	-	1.5	mA
Change	With Load	ΔlQ	$1.0mA \le I_0 \le 40mA$		-	-	0.1	mA
Output Noise Voltage		VN	$T_j = +25^{\circ}C,10Hz \le f \le 100kHz$		-	50	-	μV
Ripple Rejection		RR	$f = 120Hz$ , $-11V \ge VI \ge -21V$ , $T_j = +25^{\circ}C$		39	55	-	dB
Dropout Voltage		VD	Tj = +25°C		-	1.7	-	V

<sup>1.</sup> 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(KA79L12A) (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	rameter Symbol Conditions		Min.	Тур.	Max.	Unit		
Output Voltage		Vo	T <sub>J</sub> = +25°C		-11.5	-12.0	-12.5	V
Line Regulation (Not	to1)	4)/0	TJ = +25°C	-14.5V ≥ V <sub>I</sub> ≥ -27V	-	-	250	mV
Line Regulation (Not	le i)	ΔVO	1J = +25 C	-16V ≥ V <sub>I</sub> ≥ -27V	-	-	200	mV
Load Population (No	sto1)	4)/0	T.ı = +25°C	1.0mA ≤ I <sub>O</sub> ≤ 100mA	-	-	100	mV
Load Regulation (No	ne i)	ΔVO	1J = +25 C	$1.0\text{mA} \le I_{O} \le 40\text{mA}$	-	-	50	mV
Output Voltage		Vo	-14.5V >V <sub>I</sub> > -27V, 1.0mA ≤ I <sub>O</sub> ≤ 40mA		-11.4	-	-12.6	V
Output Voltage		٧٥	$V_I = -19V, 1.0 \text{mA} \le I_O \le 70 \text{mA}$		-11.4	-	-12.6	V
Quiescent Current		lo	T <sub>J</sub> = +25°C		-	-	6.0	mA
Quiescent Current		IQ	TJ = +125°C		-	-	6.5	
Quiescent Current	With Line	ΔlQ	-16V ≥ V <sub>I</sub> ≥ -27V		-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I <sub>O</sub> ≤ 40mA		-	-	0.1	mA
Output Noise Voltage V <sub>N</sub>		VN	$T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		-	80	-	μV
Ripple Rejection		RR $f = 120Hz, -15V \ge V_I \ge -25V$ $T_J = +25^{\circ}C$		37	42	-	dB	
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	٧

<sup>1.</sup> 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.

## Electrical Characteristics(KA79L15A) (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 <sub>J</sub> = +25°C		-14.4	-15.0	-15.6	V
Line Regulation (No	to1)	ΔVο	T <sub>J</sub> = +25°C	-17.5V ≥ V <sub>I</sub> ≥ -30V	-	-	300	mV
Line Regulation (No	le i)	200	1J = +25 C	-20V ≥ V <sub>I</sub> ≥ -30V	-	-	250	mV
Load Population (No	oto 1)	4)/0	T <sub>J</sub> = +25°C	1.0mA ≤ I <sub>O</sub> ≤ 100mA	-	-	150	mV
Load Regulation (No	ne i)	ΔVO	1J = +25°C	1.0mA ≤ I <sub>O</sub> ≤ 40mA	-	-	75	mV
Output Voltage		Vo	$-17.5V \ge V_I \ge -30V$ , $1.0mA \le IO \le 40mA$		-14.25	-	-15.75	V
Output voltage	Output Voltage		$V_I = -23V$ , $1.0mA \le I_O \le 70mA$		-14.25	-	-15.75	V
Quiescent Current		lo.	T <sub>J</sub> = +25°C		-	-	6.0	mA
Quiescent Current		lQ	T <sub>J</sub> = +125°C		-	-	6.5	111/
Quiescent Current	With Line	ΔlQ	-20V ≥ V <sub>I</sub> ≥ -30	V	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I <sub>O</sub> ≤ 40mA		-	-	0.1	mA
Output Noise Voltag	Output Noise Voltage V <sub>N</sub> T <sub>A</sub> = +25°C,10Hz ≤ f ≤ 100kHz		-	90	-	μV		
Ripple Rejection		RR	$f = 120Hz, -18.5V \ge V_I \ge -28.5V$ $T_J = +25^{\circ}C$		34	39	-	dB
Dropout Voltage		VD	T <sub>J</sub> = +25°C		ı	1.7	-	V

<sup>1.</sup> 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(KA79L18A) (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 <sub>J</sub> = +25°C		-17.3	-18.0	-18.7	V
Line Regulation (Not	-01)	4)/0	T <sub>J</sub> = +25°C	-20.7V ≥ V <sub>I</sub> ≥ -33V	-	-	325	mV
Line Regulation (Not	le i)	ΔVO	1J = +25 C	-21V ≥ V <sub>I</sub> ≥ -33V	-	-	275	mV
Load Population (No	sto1)	4)/0	T.ı = +25°C	1.0mA ≤ I <sub>O</sub> ≤ 100mA	-	-	170	mV
Load Regulation (No	ne i)	ΔVO	1J = +25 C	1.0mA ≤ I <sub>O</sub> ≤ 40mA	-	-	85	mV
Output Voltage		Vo	-20.7V > V <sub>I</sub> > -33V, 1.0mA ≤ I <sub>O</sub> ≤ 40mA		-17.1	-	-18.9	V
Output Voltage		٧٥	$V_I = -27V, 1.0 \text{mA} \le I_O \le 70 \text{mA}$		-17.1	-	-18.9	V
Quiescent Current		lo	T <sub>J</sub> = +25°C		-	-	6.5	mA
Quiescent Current		IQ	T <sub>J</sub> = +125°C		-	-	6.0	111/
Quiescent Current	With Line	ΔlQ	-21V ≥ V <sub>I</sub> ≥ -33	V	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I <sub>O</sub> ≤ 40mA		-	-	0.1	mA
Output Noise Voltag	ut Noise Voltage $V_N$ $T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		-	150	-	μV		
Ripple Rejection		RR	f = 120Hz, -23V ≥ V <sub>I</sub> ≥ -33V T <sub>J</sub> = +25°C		33	48	-	dB
Dropout Voltage		VD	T <sub>J</sub> = +25°C		-	1.7	ı	V

<sup>1.</sup> 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(KA79L24A) (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)

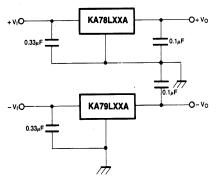
Parameter		Symbol	Conditions		Min.	Тур.	Max.	Unit
Output Voltage		Vo	T <sub>J</sub> = +25°C		-23	-24	-25	V
Line Regulation (Not	to1)	4)/0	TJ = +25°C	-27V ≥ V <sub>I</sub> ≥ -38V	-	-	350	mV
Line Regulation (Not	le i)	ΔVO	1J = +25 C	-28V ≥ V <sub>I</sub> ≥ -38V	-	-	300	mV
Load Population (No	sto1)	4)/0	T.ı = +25°C	1.0mA ≤ I <sub>O</sub> ≤100mA	-	-	200	mV
Load Regulation (No	ne i)	ΔVO	1J = +25 C	1.0mA ≤ I <sub>O</sub> ≤ 40mA	-	-	100	mV
Output Voltage		Vo	$-27V \ge V_I \ge -38V$ , 1.0mA $\le I_O \le 40$ mA		-22.8	-	-25.2	V
Output Voltage		٧٥	$V_I = -33V$ , 1.0mA $\leq I_O \leq 70$ mA		-22.8	-	-25.2	V
Quiescent Current		lo	T <sub>J</sub> = +25°C		-	-	6.5	mA
Quiescent Current		lQ	T <sub>J</sub> = +125°C		-	-	6.0	шА
Quiescent Current	With Line	ΔlQ	-28V ≥ V <sub>I</sub> ≥ -38	BV	-	-	1.5	mA
Change	With Load	ΔlQ	1.0mA ≤ I <sub>O</sub> ≤ 40mA		-	-	0.1	mA
Output Noise Voltage $V_N$ $T_A = +25^{\circ}C,10Hz \le f \le 100kHz$		Hz≤f≤100kHz	-	200	-	μV		
Ripple Rejection		RR	$f = 120Hz, -29V \ge VI \ge -35V$ $T_J = +25^{\circ}C$		31	47	-	dB
Dropout Voltage		VD	TJ = +25°C		-	1.7	-	٧

<sup>1.</sup> 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  $0.33\mu F$  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.



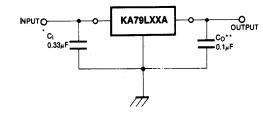


Figure 1. Positive And Negative Regulator

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.

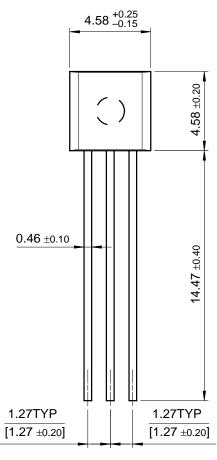
- \* C1 is required if regulator is located an appreciable distance from power supply filter.
- \* CO improves stability and transient response.

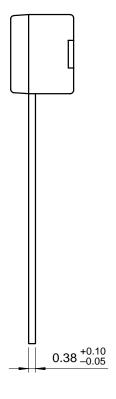
### **Mechanical Dimensions**

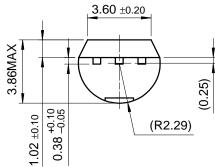
### Package

### **Dimensions in millimeters**

**TO-92** 





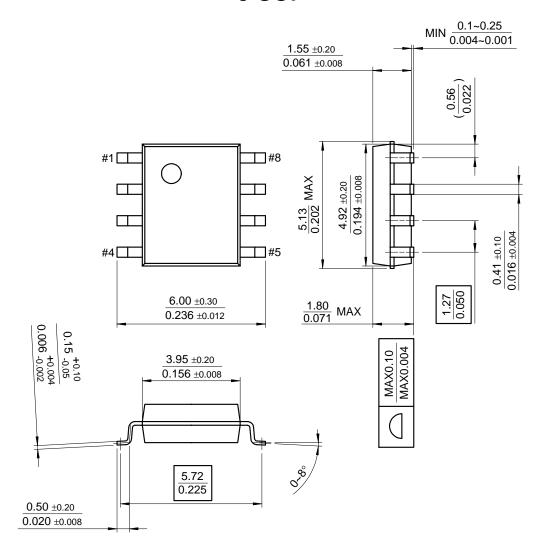


### **Mechanical Dimensions** (Continued)

### **Package**

### **Dimensions in millimeters**

## 8-SOP

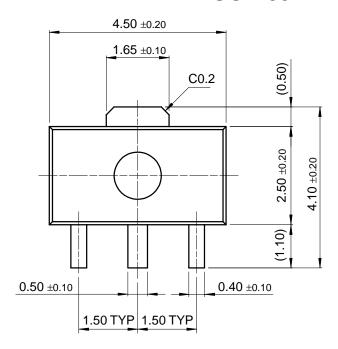


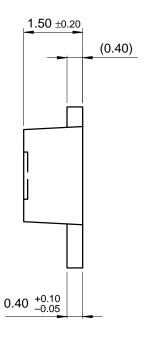
### **Mechanical Dimensions** (Continued)

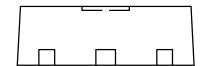
### Package

### **Dimensions in millimeters**

**SOT-89** 







### **Ordering Information**

Product Number	Package	Operating Temperature
KA79L05AZ		
KA79L08AZ		
KA79L12AZ	TO-92	
KA79L15AZ		0 ~ +125°C
KA79L18AZ		0 ~ +123 C
KA79L24AZ		
KA79L05AD	8-SOP	
KA79L05AM	SOT-89	

#### **DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

#### **LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
- A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com