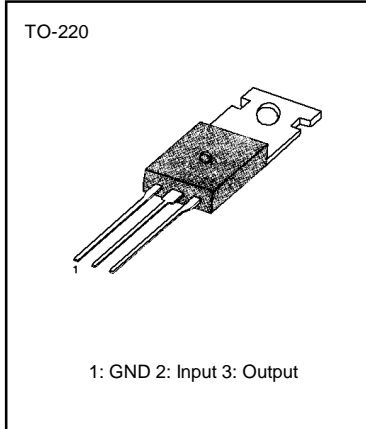


3-TERMINAL 1A NEGATIVE VOLTAGE REGULATORS

The KA79XX series of three-terminal negative regulators are available in TO-220 package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible.



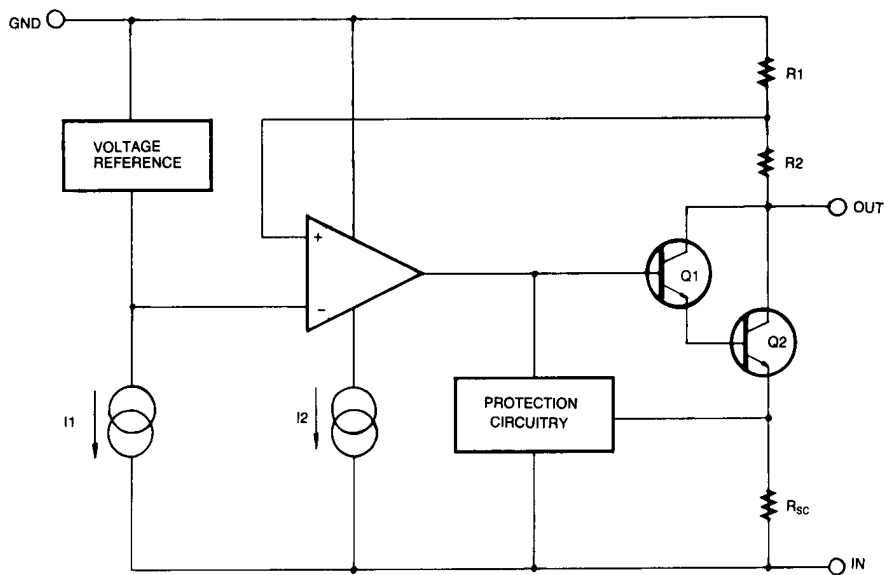
FEATURES

- Output Current in Excess of 1A
- Output Voltages of -5, -6, -8, -12, -15, -18, -24V
- Internal Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe-Area Compensation

ORDERING INFORMATION

Device	Package	Operating Temperature
KA79XX	TO-220	0 ~ 125 °C

BLOCK DIAGRAM



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

Characteristic	Symbol	Value	Unit
Input Voltage	V_I	-35	V
Thermal Resistance Junction-Cases	$R_{\theta JC}$	5	$^\circ\text{C/W}$
Junction-Air	$R_{\theta JA}$	65	$^\circ\text{C/W}$
Operating Temperature Range	T_{OPR}	0 ~ +125	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ +150	$^\circ\text{C}$

KA7905A ELECTRICAL CHARACTERISTICS

($V_I = 10\text{V}$, $I_O = 500\text{mA}$, $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$, $C_1 = 2.2\ \mu\text{F}$, $C_O = 1\ \mu\text{F}$, unless otherwise specified.)

* Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit	
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-4.9	-5	-5.1	V	
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = -7\text{ to } -20\text{V}$	-4.8	-5	-5.2		
Line Regulation	ΔV_O	$T_J = 25^\circ\text{C}$	$V_I = -7\text{ to } -20\text{V}$ $I_O = 1\text{A}$		5	50	mV
			$V_I = -8\text{ to } -12\text{V}$ $I_O = 1\text{A}$		2	25	
		$V_I = -7.5\text{ to } -25\text{V}$		7	50		
		$V_I = -8\text{ to } -12\text{V}$ $I_O = 1\text{A}$		7	50		
Load Regulation	ΔV_O	$I_O = 5\text{mA to } 1.5\text{A}$		10	100	mV	
		$T_J = 25^\circ\text{C}$ $I_O = 250\text{ to } 750\text{mA}$		3	50		
Quiescent Current	I_Q	$T_J = 25^\circ\text{C}$		3	6	mA	
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1\text{A}$		0.05	0.5	mA	
		$V_I = -8\text{ to } -25\text{V}$		0.1	0.8		
Temperature Coefficient of V_O	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-0.4		mV/ $^\circ\text{C}$	
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{KHz}$ $T_A = 25^\circ\text{C}$		40		μV	
Ripple Rejection	RR	$f = 120\text{Hz}$, $I_O = -35\text{V}$ $\Delta V_I = 10\text{V}$	54	60		dB	
Dropout Voltage	V_D	$T_J = 25^\circ\text{C}$ $I_O = 1\text{A}$		2		V	
Short Circuit Current	I_{SC}	$T_J = 25^\circ\text{C}$, $V_I = -35\text{V}$		300		mA	
Peak Current	I_{PK}	$T_J = 25^\circ\text{C}$		2.2		A	

into account separately. Pulse testing with low duty is used.

KA7906 ELECTRICAL CHARACTERISTICS(V_I = 11V, I_o = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	- 5.75	- 6	- 6.25	V
		I _o = 5mA to 1A, P _O ≤ 15W V _I = - 9 to - 21V	- 5.7	- 6	- 6.3	
Line Regulation	ΔV _O	T _J = 25°C	V _I = - 8 to - 25V	10	120	mV
			V _I = - 9 to -12V	5	60	
Load Regulation	ΔV _O	T _J = 25°C I _o = 5mA to 1.5A		10	120	mV
		T _J = 25°C I _o = 250 to 750mA		3	60	
Quiescent Current	I _o	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _o	I _o = 5mA to 1A			0.5	mA
		V _I = -9 to -25V			1.3	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _o = 5mA		-0.5		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100Khz T _A = 25°C		130		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _o = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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

KA7908 ELECTRICAL CHARACTERISTICS(V_I = 14V, I_O = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	- 7.7	- 8	- 8.3	V
		I _O = 5mA to 1A, P _O ≤ 15W V _I = -1.5 to -23V	- 7.6	- 8	- 8.4	
Line Regulation	ΔV _O	T _J = 25°C V _I = -10.5 to -25V V _I = -11 to -17V		10	100	mV
				5	80	
Load Regulation	ΔV _O	T _J = 25°C I _O = 5mA to 1.5A		12	160	mV
		T _J = 25°C I _O = 250 to 750mA		4	80	
Quiescent Current	I _Q	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1A		0.05	0.5	mA
		V _I = -11.5 to -25V		0.1	1	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _O = 5mA		-0.6		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100KHz T _A = 25°C		175		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _O = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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



KA79XX

FIXED VOLTAGE REGULATOR (NEGATIVE)

($V_I = 14V$, $I_O = 500mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_1 = 2.2 \mu F$, $C_O = 1 \mu F$, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	$T_J = 25^\circ C$	- 8.7	- 9.0	- 9.3	V
		$I_O = 5mA$ to 1A, $P_O \leq 15W$ $V_I = -1.5$ to -23V	- 8.6	- 9.0	- 9.4	
Line Regulation	ΔV_O	$T_J = 25^\circ C$		10	180	mV
		$V_I = -10.5$ to -25V $V_I = -11$ to -17V		5	90	
Load Regulation	ΔV_O	$T_J = 25^\circ C$ $I_O = 5mA$ to 1.5A		12	180	mV
		$T_J = 25^\circ C$ $I_O = 250$ to 750mA		4	90	
Quiescent Current	I_Q	$T_J = 25^\circ C$		3	6	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to 1A		0.05	0.5	mA
		$V_I = -11.5$ to -25V		0.1	1	
Temperature Coefficient of V_O	$\Delta V_O / \Delta T$	$I_O = 5mA$		-0.6		mV/ $^\circ C$
Output Noise Voltage	V_N	$f = 10Hz$ to 100KHz $T_A = 25^\circ C$		175		μV
Ripple Rejection	RR	$f = 120Hz$ $\Delta V_I = 10V$	54	60		dB
Dropout Voltage	V_D	$T_J = 25^\circ C$ $I_O = 1A$		2		V
Short Circuit Current	I_{SC}	$T_J = 25^\circ C$, $V_I = -35V$		300		mA
Peak Current	I_{PK}	$T_J = 25^\circ C$		2.2		A

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

KA7912 ELECTRICAL CHARACTERISTICS(V_I = 18V, I_O = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	-11.5	-12	-12.5	V
		I _O = 5mA to 1A, P _O ≤ 15W V _I = -15.5 to -27V	-11.4	-12	-12.6	
Line Regulation	ΔV _O	T _J = 25°C V _I = -14.5 to -30V V _I = -16 to -22V		12	240	mV
				6	120	
Load Regulation	ΔV _O	T _J = 25°C I _O = 5mA to 1.5A		12	240	mV
		T _J = 25°C I _O = 250 to 750mA		4	120	
Quiescent Current	I _O	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _O	I _O = 5mA to 1A		0.05	0.5	mA
		V _I = -15 to -30V		0.1	1	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _O = 5mA		-0.8		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100KHz T _A = 25°C		200		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _O = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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

KA7915 ELECTRICAL CHARACTERISTICS(V_I = 23V, I_O = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	-14.4	-15	-15.6	V
		I _O = 5mA to 1A, P _O ≤ 15W V _I = -18 to -30V	-14.25	-15	-15.75	
Line Regulation	ΔV _O	T _J = 25°C V _I = -17.5 to -30V V _I = -20 to -26V		12	300	mV
				6	150	
Load Regulation	ΔV _O	T _J = 25°C I _O = 5mA to 1.5A		12	300	mV
		T _J = 25°C I _O = 250 to 750mA		4	150	
Quiescent Current	I _Q	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1A		0.05	0.5	mA
		V _I = -18.5 to -30V		0.1	1	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _O = 5mA		-0.9		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100Khz T _A = 25°C		250		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _O = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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

KA7918 ELECTRICAL CHARACTERISTICS(V_I = 27V, I_O = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	-17.3	-18	-18.7	V
		I _O = 5mA to 1A, P _O ≤ 15W V _I = -22.5 to -33V	-17.1	-18	-18.9	
Line Regulation	ΔV _O	T _J = 25°C V _I = -21 to -33V V _I = -24 to -30V		15	360	mV
				8	180	
Load Regulation	ΔV _O	T _J = 25°C I _O = 5mA to 1.5A		15	360	mV
		T _J = 25°C I _O = 250 to 750mA		5	180	
Quiescent Current	I _Q	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1A			0.5	mA
		V _I = -22 to -33V			1	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _O = 5mA		-1		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100Khz T _A = 25°C		300		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _O = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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

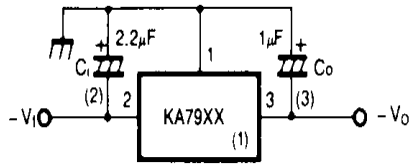
KA7924 ELECTRICAL CHARACTERISTICS(V_I = 33V, I_O = 500mA, 0°C ≤ T_J ≤ 125°C, C_I = 2.2 μF, C_O = 1 μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	- 23	- 24	- 25	V
		I _O = 5mA to 1A, P _O ≤ 15W V _I = -27 to -38V	- 22.8	- 24	- 25.2	
Line Regulation	ΔV _O	T _J = 25°C V _I = - 27 to - 38V V _I = - 30 to - 36V		15	480	mV
				8	180	
Load Regulation	ΔV _O	T _J = 25°C I _O = 5mA to 1.5A		15	480	mV
		T _J = 25°C I _O = 250 to 750mA		5	240	
Quiescent Current	I _Q	T _J = 25°C		3	6	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1A			0.5	mA
		V _I = -27 to -38V			1	
Temperature Coefficient of V _O	ΔV _O /ΔT	I _O = 5mA		-1		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100Khz T _A = 25°C		400		μV
Ripple Rejection	RR	f = 120Hz ΔV _I = 10V	54	60		dB
Dropout Voltage	V _D	T _J = 25°C I _O = 1A		2		V
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = -35V		300		mA
Peak Current	I _{PK}	T _J = 25°C		2.2		A

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

APPLICATION INFORMATION

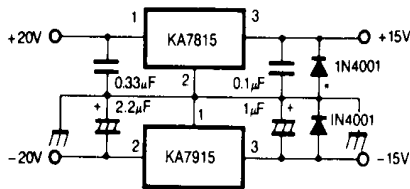
Fig. 1 - Fixed output regulator



Notes:

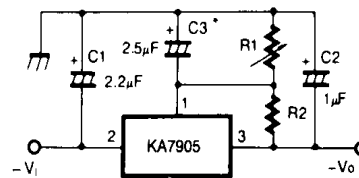
- (1) To specify an output voltage, substitute voltage value for "XX"
- (2) Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytics are used, at least ten times value shown should be selected. C₁ is required if regulator is located an appreciable distance from power supply filter.
- (3) To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

Fig. 2 - Split power supply (± 15V/1A)



- Against potential latch-up problems.

Fig. 3 - Circuit for increasing output voltage



$$V_o = V_{XX} \cdot \frac{R_1 + R_2}{R_2}$$

$$V_{XX}/R_2 > 3I_o$$

- C₃ optional for improved transient response and ripple rejection.