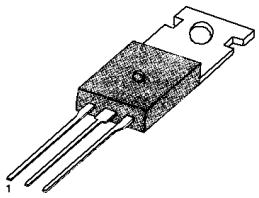
KA79XX FIXED VOLTAGE REGULATOR (NEGATIVE)

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.

TO-220



1: GND 2: Input 3: Output

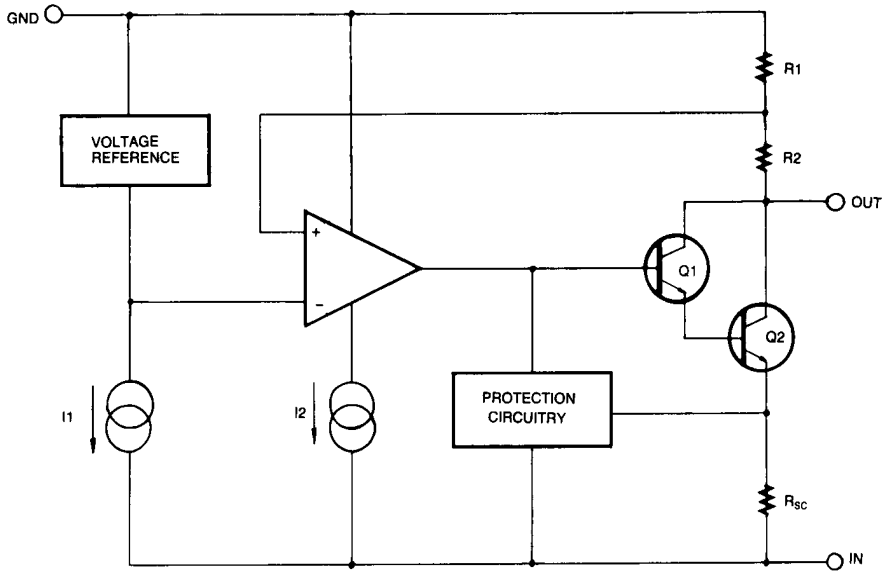
FEATURES

- 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℃

BLOCK DIAGRAM



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

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

KA7905A ELECTRICAL CHARACTERISTICS

(V_I = 10V, I_O = 500mA, 0℃ ≤ T_J ≤ 125℃, C_I =2.2 μF, C_O = 1 μF, unless otherwise specified.)

* 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.

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

KA7906 ELECTRICAL CHARACTERISTICS

(V_I = 11V, I_O = 500mA, 0℃ ≤ T_J ≤ 125℃, 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℃		- 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℃	V_I = - 8 to - 25V		10	120	mV
			V_I = - 9 to -12V		5	60	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A			10	120	mV
		T_J = 25℃ I_O = 250 to 750mA			3	60	
Quiescent Current	I_Q	T_J = 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 1A				0.5	mA
		V_I = -9 to -25V				1.3	
Temperature Coefficient of V_D	$\Delta V_O/\Delta T$	I_O = 5mA			-0.5		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃			130		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V		54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A			2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V			300		mA
Peak Current	I_{PK}	T_J = 25℃			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℃ ≤ T_J ≤ 125℃, 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℃	- 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℃, V_I = -10.5 to -25V		10	100	mV
		T_J = 25℃, V_I = -11 to -17V		5	80	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A		12	160	mV
		T_J = 25℃ I_O = 250 to 750mA		4	80	
Quiescent Current	I_Q	T_J = 25℃		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_D	$\Delta V_O/\Delta T$	I_O = 5mA		-0.6		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃		175		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V	54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A		2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V		300		mA
Peak Current	I_{PK}	T_J = 25℃		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.

KA7909 ELECTRICAL CHARACTERISTICS

(V_I = 14V, I_O = 500mA, 0℃ ≤ T_J ≤ 125℃, C_I =2.2μF, C_O = 1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	T_J = 25℃	- 8.7	- 9.0	- 9.3	V
		I_O = 5mA to 1A, P_O ≤ 15W V_I = -1.5 to -23V	- 8.6	- 9.0	- 9.4	
Line Regulation	ΔV_O	T_J = 25℃, V_I = -10.5 to -25V		10	180	mV
		T_J = 25℃, V_I = -11 to -17V		5	90	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A		12	180	mV
		T_J = 25℃ I_O = 250 to 750mA		4	90	
Quiescent Current	I_Q	T_J = 25℃		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_D	$\Delta V_O/\Delta T$	I_O = 5mA		-0.6		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃		175		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V	54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A		2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V		300		mA
Peak Current	I_{PK}	T_J = 25℃		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℃ ≤ T_J ≤ 125℃, C_I=2.2μF, C_O = 1μF, unless otherwise specified.)

Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	V_O	T_J = 25℃		-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℃	V_I = -14.5 to -30V		12	240	mV
			V_I= -16 to -22V		6	120	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A			12	240	mV
		T_J = 25℃ I_O = 250 to 750mA			4	120	
Quiescent Current	I_Q	T_J = 25℃			3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 1A			0.05	0.5	mA
		V_I = -15 to -30V			0.1	1	
Temperature Coefficient of V_D	$\Delta V_O/\Delta T$	I_O = 5mA			-0.8		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃			200		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V		54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A			2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V			300		mA
Peak Current	I_{PK}	T_J = 25℃			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℃ ≤ T_J ≤ 125℃, 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℃	-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℃, V_I = -17.5 to -30V		12	300	mV
		T_J = 25℃, V_I = -20 to -26V		6	150	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A		12	300	mV
		T_J = 25℃ I_O = 250 to 750mA		4	150	
Quiescent Current	I_Q	T_J = 25℃		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_D	$\Delta V_O/\Delta T$	I_O = 5mA		-0.9		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃		250		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V	54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A		2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V		300		mA
Peak Current	I_{PK}	T_J = 25℃		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℃ ≤ T_J ≤ 125℃, 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℃		-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℃	V_I = -21 to -33V		15	360	mV
			V_I= -24 to -30V		8	180	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A			15	360	mV
		T_J = 25℃ I_O = 250 to 750mA			5	180	
Quiescent Current	I_Q	T_J = 25℃			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_D	$\Delta V_O/\Delta T$	I_O = 5mA			-1		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃			300		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V		54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A			2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V			300		mA
Peak Current	I_{PK}	T_J = 25℃			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℃ ≤ T_J ≤ 125℃, 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℃	- 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℃, V_I = - 27 to - 38V		15	480	mV
		T_J = 25℃, V_I = - 30 to - 36V		8	180	
Load Regulation	ΔV_O	T_J = 25℃ I_O = 5mA to 1.5A		15	480	mV
		T_J = 25℃ I_O = 250 to 750mA		5	240	
Quiescent Current	I_Q	T_J = 25℃		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_D	$\Delta V_O/\Delta T$	I_O = 5mA		-1		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100Khz T_A = 25℃		400		μV
Ripple Rejection	RR	f = 120Hz ΔV_I = 10V	54	60		dB
Dropout Voltage	V_D	T_J= 25℃ I_O = 1A		2		V
Short Circuit Current	I_{SC}	T_J= 25℃, V_I = -35V		300		mA
Peak Current	I_{PK}	T_J = 25℃		2.2		A

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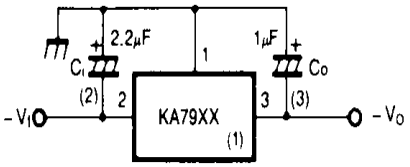
APPLICATION INFORMATION

Fig. 1 - Fixed output regulator



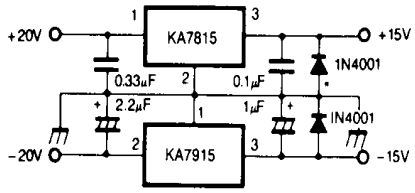
Notes:

(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 electrolitics are used, at least ten times value shown should be selected. C_i is required if regulator is located an appreciable distance from power supply filter.

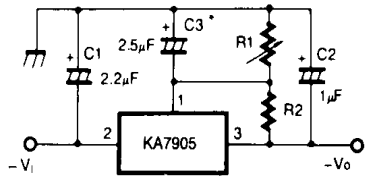
(3) To improve transient response. If large capacitors are used, a high current diode from input to output (1N400l or similar) should be introduced to protect the device from momentary input short circuit.

Fig. 2 - Split power supply (±15V/1A)



- Against potential latch-up problems.

Fig. 3 - Circuit for increasing output voltage



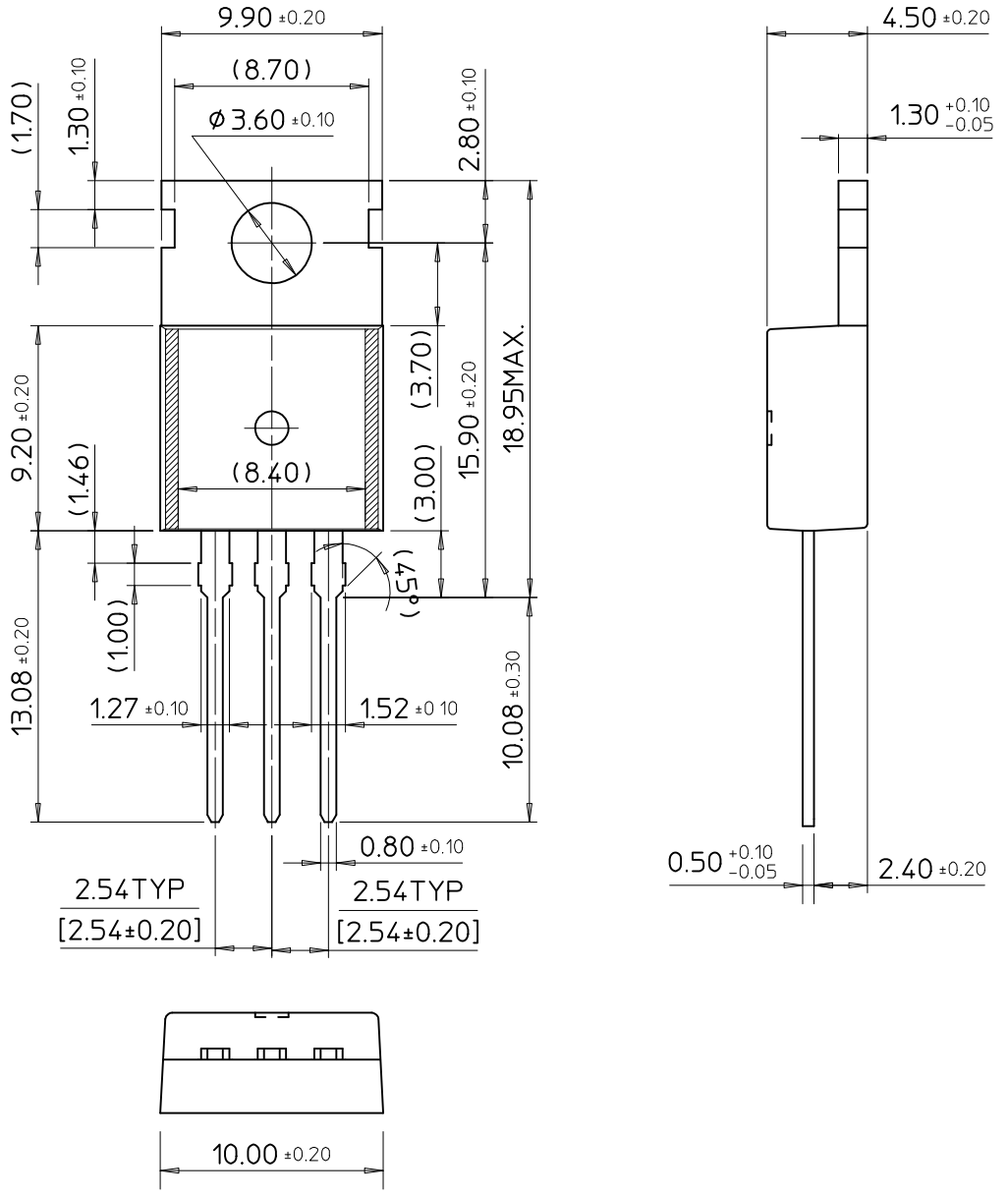
$$V_o = V_{xx} \cdot \frac{R_1 + R_2}{R_2}$$

$V_{xx}/R_2 > 3I_Q$

- C3 optional for improved transient response and ripple rejection.

TO–220

Dimensions in Milimeters



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