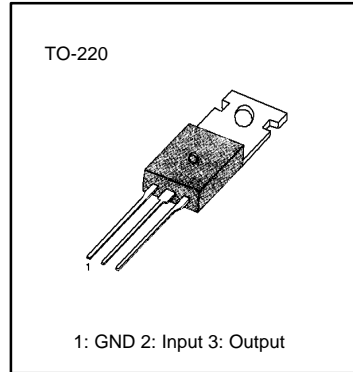


3-TERMINAL 1A NEGATIVE VOLTAGE REGULATORS

The MC79XX 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

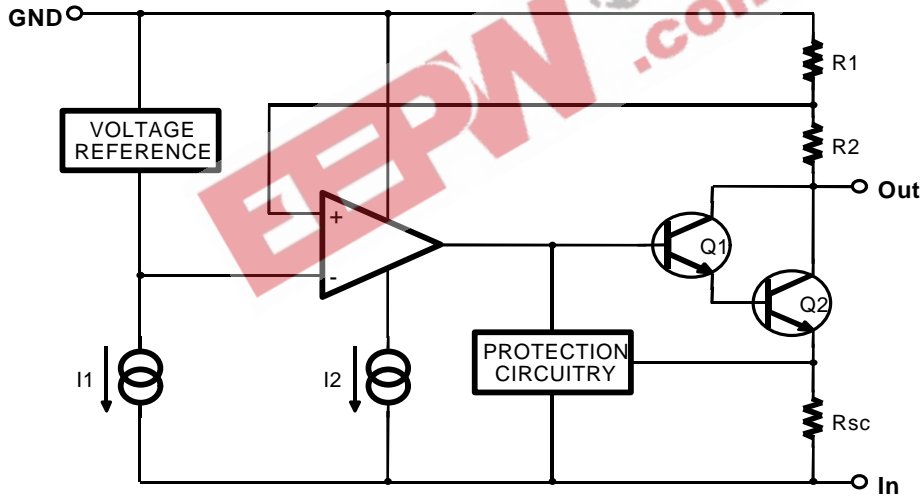
- Output Current in Excess of 1A
- Output Voltages of -5, -6, -8, -12, -15, -18, -24V
- Internal Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe-Area Compensation



ORDERING INFORMATION

Device	Output Voltage Tolerance	Package	Operating Temperature
MC79XXCT (LM79XXCT) (KA79XX)	± 4%	TO-220	0 ~+125°C
KA79XXA	± 2%		

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	$^{\circ}\text{C} / \text{W}$
Junction-Air	$R_{\theta JA}$	65	$^{\circ}\text{C} / \text{W}$
Operating Temperature Range	T_{OPR}	0 ~ +125	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	- 65 ~ +150	$^{\circ}\text{C}$

LM7905 ELECTRICAL CHARACTERISTICS

($V_i = 10\text{V}$, $I_o = 500\text{mA}$, $0^{\circ}\text{C} \leq T_J \leq +125^{\circ}\text{C}$, $C_i = 2.2\mu\text{F}$, $C_o = 1\mu\text{F}$, 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
		$I_o = 5\text{mA}$ to 1A, $P_o = 15\text{W}$ $V_i = -7$ to -20V	- 4.75	- 5.0	- 5.25	
Line Regulation	ΔV_o	$T_J = +25^{\circ}\text{C}$ $V_i = -7$ to -20V $I_o = 1\text{A}$		5	50	mV
		$V_i = -8$ to -12V $I_o = 1\text{A}$		2	25	
		$V_i = -7.5$ to -25V		7	50	
		$V_i = -8$ to -12V $I_o = 1\text{A}$		7	50	
Load Regulation	ΔV_o	$I_o = 5\text{mA}$ to 1.5A		10	100	mV
		$T_J = +25^{\circ}\text{C}$ $I_o = 250$ to 750mA		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 1A		0.05	0.5	mA
		$V_i = -8$ to -25V		0.1	0.8	
Temperature Coefficient of V_D	$\Delta V_o / \Delta T$	$I_o = 5\text{mA}$		- 0.4		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz}$ to 100KHz $T_A = +25^{\circ}\text{C}$		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

* 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.

LM7906 ELECTRICAL CHARACTERISTICS(V_I = 11V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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 _Q	T _J = + 25°C		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	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.

LM7908 ELECTRICAL CHARACTERISTICS(V_I = 14V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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		10	100	mV
		V _I = -10.5 to -25V V _I = -11 to -17V		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 _D	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.

LM7909 ELECTRICAL CHARACTERISTICS(V_I = 14V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°C	-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°C		10	180	mV
		V _I = -10.5 to -25V V _I = -11 to -17V		5	90	
Load Regulation	ΔV _O	T _J = +25°C I _O = 5mA to 1.5A		12	180	mV
		T _J = +25°C I _O = 250 to 750mA		4	90	
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 _D	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.

LM7912 ELECTRICAL CHARACTERISTICS(V_I = 18V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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		12	240	mV
		V _I = -14.5 to -30V V _I = -16 to -22V		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 _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 = -15 to -30V		0.1	1	
Temperature Coefficient of V _D	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.

LM7915 ELECTRICAL CHARACTERISTICS(V_I = 23V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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	12	300	mV
			V _I = -20 to -26V	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 _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 = -18.5 to -30V		0.1	1	
Temperature Coefficient of V _D	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.

LM7918 ELECTRICAL CHARACTERISTICS(V_I = 27V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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	15	360	mV
			V _I = -24 to -30V	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 _O	T _J = +25°C		3	6	mA
Quiescent Current Change	ΔI _O	I _O = 5mA to 1A			0.5	mA
		V _I = -22 to -33V			1	
Temperature Coefficient of V _D	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.

LM7924 ELECTRICAL CHARACTERISTICS(V_I = 33V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°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		15	480	mV
		V _I = - 27 to - 38V V _I = - 30 to - 36V		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.

LM7905A ELECTRICAL CHARACTERISTICS(V_I = 10V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°C	-4.9	-5.0	-5.1	V
		I _O = 5mA to 1A, P _O 15W V _I = -7 to -20V	-4.8	-5.0	-5.2	
Line Regulation	ΔV _O	V _I = -7 to -20V I _O = 1A T _J = +25°C		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°C I _O = 250 to 750mA		3	50	
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 = -8 to -25V		0.1	0.8	
Temperature Coefficient of V _D	ΔV _O /ΔT	I _O = 5mA		-0.4		mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100KHz T _A = +25°C		40		μV
Ripple Rejection	RR	f = 120Hz, I _O = -35V 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.

LM7912A ELECTRICAL CHARACTERISTICS(V_I = 18V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°C	-11.75	-12	-12.25	V
		I _O = 5mA to 1A, P _O = 15W V _I = -15.5 to -27V	-11.5	-12	-12.5	
Line Regulation	ΔV _O	T _J = +25°C		12	240	mV
		V _I = -14.5 to -30V V _I = -16 to -22V		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 _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 = -15 to -30V		0.1	1	
Temperature Coefficient of V _D	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.

LM7915A ELECTRICAL CHARACTERISTICS(V_I = 23V, I_O = 500mA, 0°C ≤ T_J ≤ +125°C, 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°C	-14.7	-15	-15.3	V
		I _O = 5mA to 1A, P _O 15W V _I = -18 to -30V	-14.4	-15	-15.6	
Line Regulation	ΔV _O	T _J = +25°C	V _I = -17.5 to -30V	12	300	mV
			V _I = -20 to -26V	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 _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 = -18.5 to -30V		0.1	1	
Temperature Coefficient of V _D	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.

TYPICAL PERFORMANCE CHARACTERISTICS

Fig.1 Output Voltage

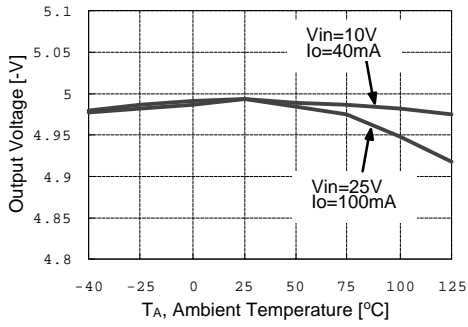


Fig. 2 Load Regulation

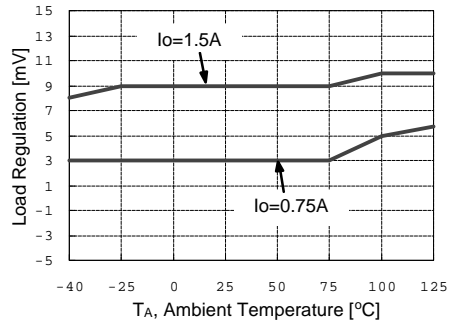


Fig.3 Quiescent Current

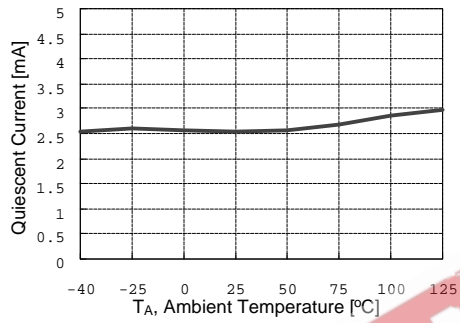


Fig. 4 Dropout Voltage

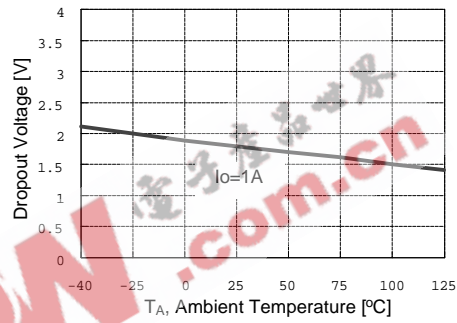
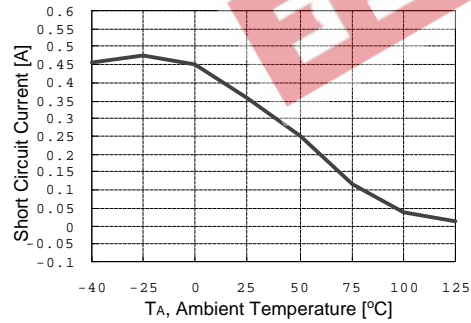
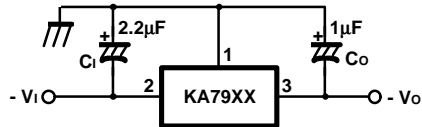


Fig.5 Short Circuit Current



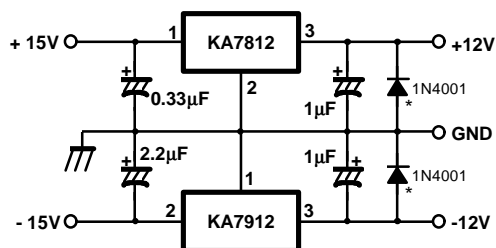
TYPICAL APPLICATIONS

Fig. 6 Negative 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 aluminum electronics 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 (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

Fig. 7 Split power supply ($\pm 12V/1A$)

*: Against potential latch-up problems.

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