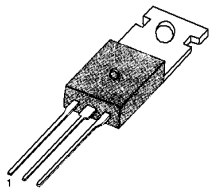
3-TERMINAL 1A NEGATIVE VOLTAGE REGULATORS

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.

TO-220



1: GND 2: Input 3: Output

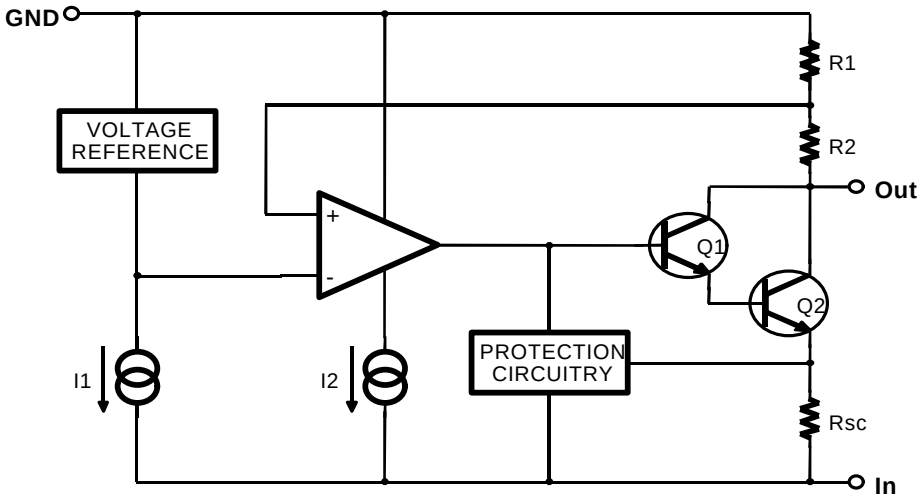
FEATURES

- 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	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°C, 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	°C / W °C /W
Operating Temperature Range	T_{OPR}	0 ~ +125	°C
Storage Temperature Range	T_{STG}	- 65 ~ +150	°C

LM7905 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	- 4.8	- 5.0	- 5.2	V
		I_O = 5mA to 1A, P_O 15W V_I = -7 to -20V	- 4.75	-5.0	- 5.25	
Line Regulation	ΔV_O	T_J =25°C, V_I = -7 to -20V, I_O=1A		5	50	mV
		T_J =25°C, 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	$\Delta V_O/\Delta T$	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.

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
		T_J = 25°C, 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	$\Delta V_O/\Delta T$	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, V_I = -10.5 to -25V		10	100	mV
		T_J = 25°C, 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	$\Delta V_O/\Delta T$	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, V_I = -10.5 to -25V		10	180	mV
		T_J = 25°C, 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	$\Delta V_O/\Delta T$	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, V_I = -14.5 to -30V		12	240	mV
		T_J = 25°C, 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_O	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	$\Delta V_O/\Delta T$	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_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_D	$\Delta V_O/\Delta T$	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
		T_J = 25°C, 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_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_D	$\Delta V_O/\Delta T$	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	V_I = - 27 to - 38V		15	480	mV
			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_D	$\Delta V_O/\Delta T$	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	T_J =+25°C, V_I = -7 to -20V, I_O=1A		5	50	mV
		T_J =+25°C, 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	$\Delta V_O/\Delta T$	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, V_I = -14.5 to -30V		12	240	mV
		T_J =+25°C, 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_O	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	$\Delta V_O/\Delta T$	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
		T_J =+25°C, 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_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_D	$\Delta V_O/\Delta T$	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

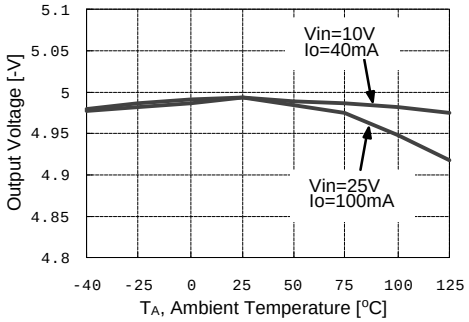


Fig. 2 Load Regulation

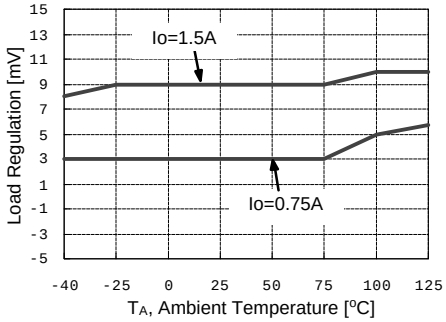


Fig.3 Quiescent Current

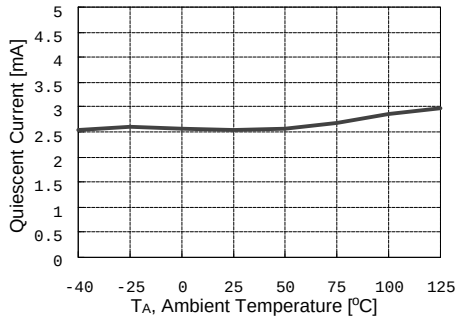


Fig. 4 Dropout Voltage

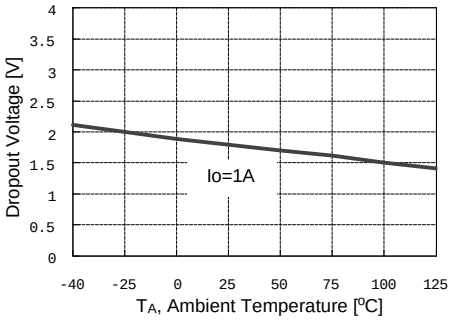
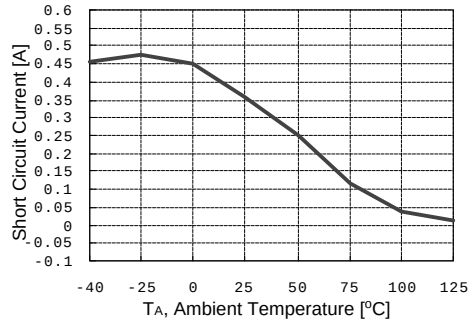
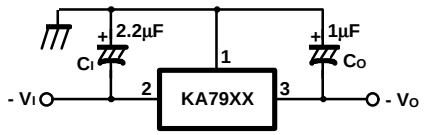


Fig.5 Short Circuit Current



TYPICAL APPLICATIONS

Fig. 6 Negative Fixed output regulator



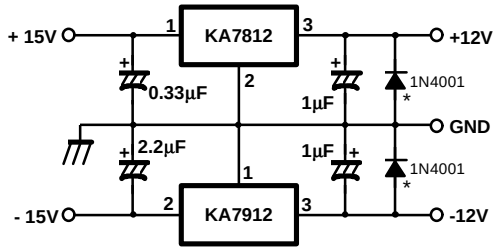
Notes:

(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 (1N400l or similar) should be introduced to protect the device from momentary input short circuit.

Fig. 7 Split power supply (±12V/1A)



*: Against potential latch-up problems.

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