Replacement of
µA7900

1.5 A Negative Voltage Regulator

MIK7900

October 1994-revised September 2002

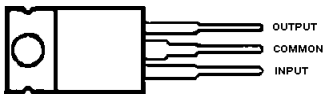
Description

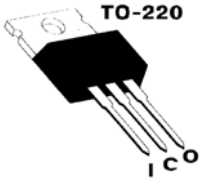
This series of fixed-negative-voltage monolithic integrated-circuit voltage regulators is designed to complement Series MIK7800 in a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single point regulation. Each of these regulators can deliver up to 1.5 amperes of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and current and also as the power pass element in precision regulators.

Features

- 3-Terminal Regulators
- Output Current Up to 1.5 A
- No External Components
- Internal Thermal Overload Protection
- High Power Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe Area Compensation

Package information





Package TO-220
(top view)

Typical application data 1.5 A regulator

When using a negative regulator, bypass capacitors are a must on both the input and output. Recommended values are 2 µF on the input and 1 µF on the output. It is considered good practice to include a 0.1 µF capacitor on the output to improve the transient response (Fig. 1). These capacitors may mylar, ceramic, or tantalum, provided that they have good high frequency characteristics.

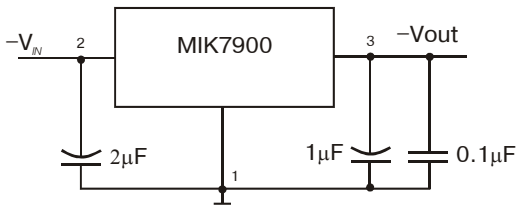


Figure 1. Negative Regulator

Absolute maximum ratings

over operating temperature range (unless otherwise noted)

Parameter		Maximum	Units
Input voltage	MIK7924	-40	V
	All others	-35	
Continuous total dissipation at 25 °C free-air temperature		2	W
Continuous total dissipation at (or bellow) 25 °C case temperature		15	
Operating free-air, case, or virtual junctions temperature range		0 to 150	°C
Storage temperature range		-65 to 150	
Lead temperature 3.2 mm (1/8 inch) from case for 10 seconds		260	

Recommended operating conditions

Parameter		Min	Max	Units
Input voltage V_I	MIK7905	-7	-25	V
	MIK7906	-8	-25	
	MIK7908	-10.5	-25	
	MIK7912	-14.5	-30	
	MIK7915	-17.5	-30	
	MIK7918	-21	-33	
	MIK7924	-27	-38	
Output current, I_O			1.5	A
Operating virtual junction temperature, T_J		0	125	°C

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Device Selection Guide

Device	Output Voltage
MIK7905	-5V
MIK7906	-6V
MIK7908	-8V
MIK7912	-12V
MIK7915	-15V
MIK7918	-18V
MIK7924	-24V

Electrical characteristics MIK7905

Electrical characteristics at specified virtual junction temperature, V_I= -10V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7905			Units
			Min	Typ	Max	
Output voltage**		25°C	-4.8	-5	-5.2	V
	I_O= 5mA to 1A, V_I= -7V to -20V, P≤15W	0°C to 125°C	-4.75	-5	-5.25	
Input regulation	V_I= -7V to -25V	25°C		12.5	50	mV
	V_I= -8V to -12V			4	15	
Ripple rejection	V_I= -8V to -18V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		15	100	mV
	I_O= 250mA to 750mA			5	50	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-0.4		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		125		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	V_I= -7V to -25V	0°C to 125°C		0.15	0.5	
	I_O= 5mA to 1A			0.08	0.5	
Peak output current		25°C		2.1		A

Electrical characteristics MIK7906

Electrical characteristics at specified virtual junction temperature, V_I= -11V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7906			Units
			Min	Typ	Max	
Output voltage**		25°C	-5.75	-6	-6.25	V
	I_O= 5mA to 1A, V_I= -8V to -21V, P≤15W	0°C to 125°C	-5.7	-6	-6.3	
Input regulation	V_I= -8V to -25V	25°C		12.5	120	mV
	V_I= -9V to -13V			4	60	
Ripple rejection	V_I= -9V to -19V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		15	120	mV
	I_O= 250mA to 750mA			5	60	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-0.4		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		150		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	V_I= -8V to -25V	0°C to 125°C		0.15	1.3	
	I_O= 5mA to 1A			0.08	0.5	
Peak output current		25°C		2.1		A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

Electrical characteristics MIK7908

Electrical characteristics at specified virtual junction temperature, V_I= -14V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7908			Units
			Min	Typ	Max	
Output voltage**		25°C	-7.7	-8	-8.3	V
	I_O= 5mA to 1A, V_I= -10.5V to -23V, P≤15W	0°C to 125°C	-7.6	-8	-8.4	
Input regulation	V_I= -10.5V to -25V	25°C		12.5	160	mV
	V_I= -11V to -17V			4	80	
Ripple rejection	V_I= -11.5V to -21.5V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		15	160	mV
	I_O= 250mA to 750mA			5	80	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-0.6		mV/°C
Output noise voltage	f= 10Hz to 100 KHz	25°C		200		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		1.5	2	mA
Bias current change	V_I= -10.5V to -25V	0°C to 125°C		0.15	1	
	I_O= 5mA to 1A			0.08	0.5	
Peak output current		25°C		2.1		A

Electrical characteristics MIK7912

Electrical characteristics at specified virtual junction temperature, V_I= -19V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7912			Units
			Min	Typ	Max	
Output voltage**		25°C	-11.5	-12	-12.5	V
	I_O= 5mA to 1A, V_I= -14.5V to -27V, P≤15W	0°C to 125°C	-11.4	-12	-12.6	
Input regulation	V_I= -14.5V to -30V	25°C		5	80	mV
	V_I= -16V to -22V			3	30	
Ripple rejection	V_I= -15V to -25V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		15	200	mV
	I_O= 250mA to 750mA			5	75	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-0.8		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		300		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	V_I= -14.5V to -30V	0°C to 125°C		0.04	0.5	
	I_O= 5mA to 1A			0.06	0.5	
Peak output current		25°C		2.1		A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

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Electrical characteristics MIK7915

Electrical characteristics at specified virtual junction temperature, V_I= -23V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7915			Units
			Min	Typ	Max	
Output voltage**		25°C	-14.4	-15	-15.6	V
	I_O= 5mA to 1A, V_I= -17.5V to -30V, P≤15W	0°C to 125°C	-14.25	-15	-15.75	
Input regulation	V_I= -17.5V to -30V	25°C		5	100	mV
	V_I= -20V to -26V			3	50	
Ripple rejection	V_I= -18.5V to -28.5V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		15	200	mV
	I_O= 250mA to 750mA			5	75	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-1		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		375		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	V_I= -17.5V to -30V	0°C to 125°C		0.04	0.5	
	I_O= 5mA to 1A			0.06	0.5	
Peak output current		25°C		2.1		A

Electrical characteristics MIK7918

Electrical characteristics at specified virtual junction temperature, V_I= -27V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7918			Units
			Min	Typ	Max	
Output voltage**		25°C	-17.3	-18	-18.7	V
	I_O= 5mA to 1A, V_I= -21V to -33V, P≤15W	0°C to 125°C	-17.1	-18	-18.9	
Input regulation	V_I= -21V to -33V	25°C		5	360	mV
	V_I= -24V to -30V			3	180	
Ripple rejection	V_I= -22V to -32V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		30	360	mV
	I_O= 250mA to 750mA			10	180	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-1.0		mV/°C
Output noise voltage	f= 10Hz to 100 KHz	25°C		450		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	V_I= -21V to -33V	0°C to 125°C		0.04	1	
	I_O= 5mA to 1A			0.06	0.5	
Peak output current		25°C		2.1		A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

Electrical characteristics MIK7924

Electrical characteristics at specified virtual junction temperature, V_I= -33V, I_O = 500mA (unless otherwise noted)

Parameter	Test Conditions*		MIK7924			Units
			Min	Typ	Max	
Output voltage**		25°C	-23	-24	-25	V
	I_O= 5mA to 1A, V_I= -27V to -38V, P≤15W	0°C to 125°C	-22.8	-24	-25.2	
Input regulation	V_I= -27V to -38V	25°C		5	480	mV
	V_I= -30V to -36V			3	240	
Ripple rejection	V_I= -28V to -38V, f= 120Hz	0°C to 125°C	54	60		dB
Output regulation	I_O= 5mA to 1.5A	25°C		85	480	mV
	I_O= 250mA to 750mA			25	240	
Temperature coefficient of output voltage	I_O= 5mA	0°C to 125°C		-1		mV/°C
Output noise voltage	f= 10Hz to 100 KHz	25°C		600		µV
Dropout voltage	I_O= 1A	25°C		1.1		V
Bias current		25°C		2	3	mA
Bias current change	V_I= -27V to -38V	0°C to 125°C		0.04	1	
	I_O= 5mA to 1A			0.06	0.5	
Peak output current		25°C		2.1		A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

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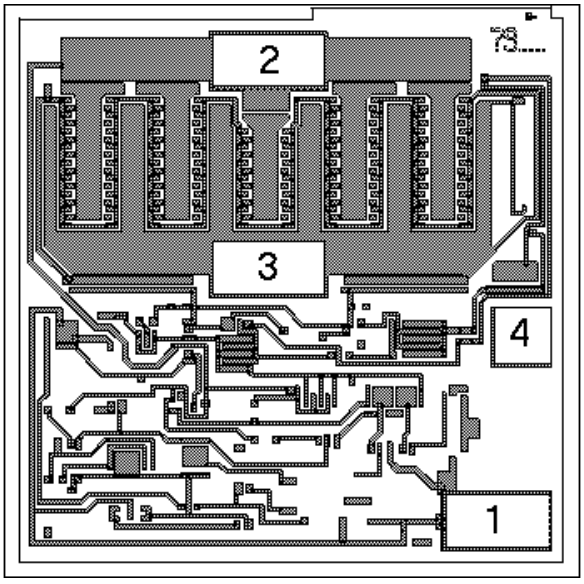
Pad Location MIK7900



Chip size 2.0 x 2.0 mm

Pad Location Coordinates

Pad N	Pad Name	Coordinates (µm)	
		X	Y
1	Ground	1530	100
2	Input	725	1710
3	Output	725	990
4	Output	1700	745