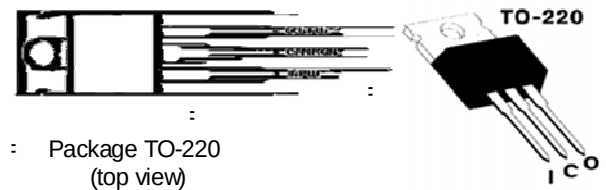


Description

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. Each of these regulators can deliver up to 1.5 A of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload.

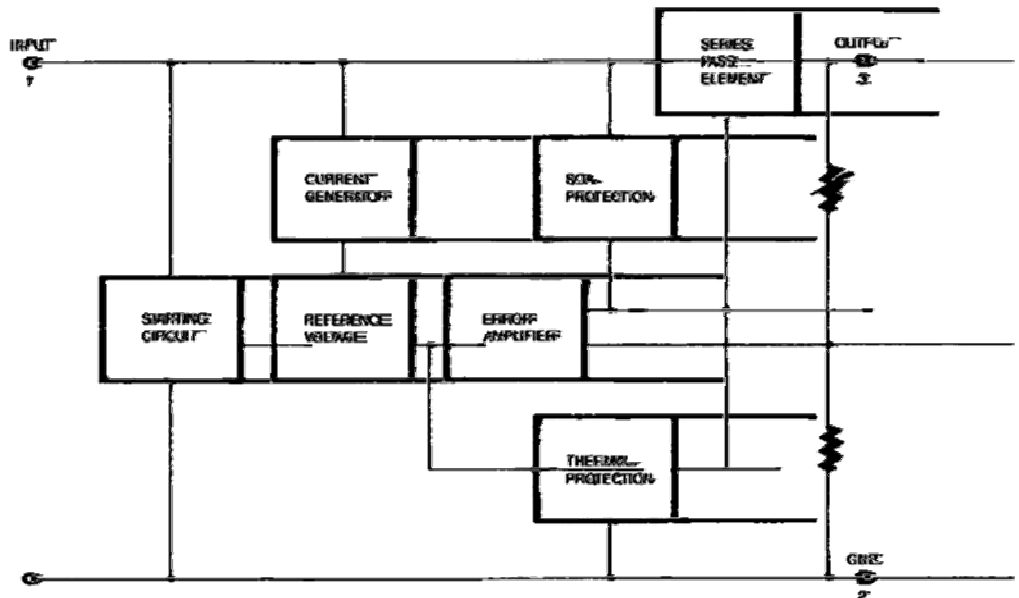
Features

- 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



Internal Block Diagram

Package



Absolute Maximum Ratings

over operating temperature range (unless otherwise noted)

Parameter		Maximum	Units
Input voltage	7824	40	V
	7827		
	All others	35	
Continuous total dissipation at 25 °C free-air temperature		2	W
Continuous total dissipation at (or below) 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 1.6 mm (1/16 inch) from case for 10 seconds		260	

Recommended Operating Conditions

Parameter		Min	Max	Units
Input voltage V_i	7805	7	25	V
	7806	8	25	
	7808	10.5	25	
	7885	10.5	25	
	7809	11.5	27	
	7810	12.5	28	
	7812	14.5	30	
	7815	17.5	30	
	7818	21	33	
	7820	23	36	
	7824	27	38	
	7827	30	40	
Output current, I_o			1.5	
Operating virtual junction temperature, T_j		0	125	°C

Device Selection Guide

Device	Output Voltage
7805	5V
7806	6V
7808	8V
7885	8.5V
7809	9V
7810	10V
7812	12V
7815	15V
7818	18V
7820	20V
7824	24V
7827	27V

Electrical characteristics 7805

Electrical characteristics at specified virtual junction temperature, $V_i = 10V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	7805			Units
		Min	Typ	Max	
Output voltage**	$25^{\circ}C$	4.8	5	5.2	V
	$I_o = 5mA \text{ to } 1A$, $V_i = 7V \text{ to } 20V$, $P \leq 15W$	4.75	5	5.25	
Input regulation	$25^{\circ}C$		3	100	mV
	$V_i = 7V \text{ to } 25V$		1	50	
Ripple rejection	$V_i = 8V \text{ to } 18V$, $f = 120Hz$	62	78		dB
Output regulation	$I_o = 5mA \text{ to } 1.5A$		15	100	mV
	$I_o = 250mA \text{ to } 750mA$		5	50	
Output resistance	$f = 1KHz$		0.017		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-1.1		$mV/^{\circ}C$
Output noise voltage	$f = 10 \text{ Hz to } 100 \text{ KHz}$		40		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current	$25^{\circ}C$		4.2	8	mA
Bias current change	$V_i = 7V \text{ to } 25V$			1.3	mA
	$I_o = 5mA \text{ to } 1A$			0.5	
Short-circuit output current	$25^{\circ}C$		750		A
Peak output current	$25^{\circ}C$		2.2		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 7806

Electrical characteristics at specified virtual junction temperature, $V_i = 11V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	7805			Units
		Min	Typ	Max	
Output voltage**	$25^{\circ}C$	5.75	6	6.25	V
	$I_o = 5mA \text{ to } 1A$, $V_i = 8V \text{ to } 21V$, $P \leq 15W$	5.7	6	6.3	
Input regulation	$25^{\circ}C$		5	120	mV
	$V_i = 8V \text{ to } 25V$ $V_i = 9V \text{ to } 13V$		1.5	60	
Ripple rejection	$V_i = 9V \text{ to } 19V$, $f = 120Hz$	59	75		dB
Output regulation	$I_o = 5mA \text{ to } 1.5A$		14	120	mV
	$I_o = 250mA \text{ to } 750mA$		4	60	
Output resistance	$f = 1KHz$		0.019		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-0.8		$mV/^{\circ}C$
Output noise voltage	$f = 10 \text{ Hz to } 100 \text{ KHz}$		45		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current	$25^{\circ}C$		4.3	8	mA
Bias current change	$V_i = 8V \text{ to } 25V$			1.3	mA
	$I_o = 5mA \text{ to } 1A$			0.5	
Short-circuit output current	$25^{\circ}C$		550		A
Peak output current	$25^{\circ}C$		2.2		A

Electrical Characteristics 7808

Electrical characteristics at specified virtual junction temperature, $V_i = 14V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*		7808			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		6	160	mV
	V _i = 11V to 17V			2	80	
Ripple rejection	V _i = 11.5V to 21.5V, f= 120Hz	0°C to 125°C	55	72		dB
Output regulation	I _o = 5mA to 1.5A	25°C		12	160	mV
	I _o = 250mA to 750mA			4	80	
Output resistance	f= 1KHz	0°C to 125°C		0.016		Ω
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		52		μV
Dropout voltage	I _o = 1A	25°C		2.0		V
Bias current		25°C		4.3	8	
Bias current change	V _i = 10.5V to 25V	0°C to 125°C			1	mA
	I _o = 5mA to 1A				0.5	
Short-circuit output current		25°C		450		
Peak output current		25°C		2.2		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 7885

Electrical characteristics at specified virtual junction temperature, $V_i = 15V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*		MIK7885			Units
			Min	Typ	Max	
Output voltage**		25°C	8.15	8.5	8.85	V
	I _o = 5mA to 1A, V _i = 11V to 23.5V, P≤15W	0°C to 125°C	8.1	8.5	8.9	
Input regulation	V _i = 10.5V to 25V	25°C		6	170	mV
	V _i = 11V to 17V			2	85	
Ripple rejection	V _i = 11.5V to 21.5V, f= 120Hz	0°C to 125°C	54	70		dB
Output regulation	I _o = 5mA to 1.5A	25°C		12	170	mV
	I _o = 250mA to 750mA			4	85	
Output resistance	f= 1KHz	0°C to 125°C		0.016		Ω
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		55		μV
Dropout voltage	I _o = 1A	25°C		2.0		V
Bias current		25°C		4.3	8	
Bias current change	V _i = 10.5V to 25V	0°C to 125°C			1	mA
	I _o = 5mA to 1A				0.5	
Short-circuit output current		25°C		450		
Peak output current		25°C		2.2		A

⋮

Electrical Characteristics 7809

Electrical characteristics at specified virtual junction temperature, $V_i = 16V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*		7809			Units
			Min	Typ	Max	
Output voltage**		25°C	8.65	9	9.35	V
	I _o = 5mA to 1A, V _i = 11.5V to 24V, P≤15W	0°C to 125°C	8.55	9	9.45	
Input regulation	V _i = 11.5V to 27V	25°C		7	180	mV
	V _i = 13V to 19V			2	90	
Ripple rejection	V _i = 12V to 22V, f= 120Hz	0°C to 125°C	55	70		dB
Output regulation	I _o = 5mA to 1.5A	25°C		12	180	mV
	I _o = 250mA to 750mA			4	90	
Output resistance	f= 1KHz	0°C to 125°C		0.018		Ω
Temperature coefficient of output voltage	I _o = 5mA	0°C to 125°C		-1.0		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		60		μV
Dropout voltage	I _o = 1A	25°C		2.0		V
Bias current		25°C		4.3	8	mA
Bias current change	V _i = 11.5V to 27V	0°C to 125°C			1	
	I _o = 5mA to 1A				0.5	
Short-circuit output current		25°C		400		
Peak output current		25°C		2.2		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 7810

Electrical characteristics at specified virtual junction temperature, $V_i = 17V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*		MIK7810			Units
			Min	Typ	Max	
Output voltage**		25°C	9.6	10	10.4	V
	I _o = 5mA to 1A, V _i = 12.5V to 25V, P≤15W	0°C to 125°C	9.5	10	10.5	
Input regulation	V _i = 12.5V to 28V	25°C		7	200	mV
	V _i = 14V to 20V			2	100	
Ripple rejection	V _i = 13V to 23V, f= 120Hz	0°C to 125°C	55	71		dB
Output regulation	I _o = 5mA to 1.5A	25°C		12	200	mV
	I _o = 250mA to 750mA			4	100	
Output resistance	f= 1KHz	0°C to 125°C		0.018		Ω
Temperature coefficient of output voltage	I _o = 5mA	0°C to 125°C		-1.0		mV/°C
Output noise voltage	f= 10 Hz to 100 KHz	25°C		70		μV
Dropout voltage	I _o = 1A	25°C		2.0		V
Bias current		25°C		4.3	8	
Bias current change	V _i = 12.5V to 28V	0°C to 125°C			1	mA
	I _o = 5mA to 1A				0.5	
Short-circuit output current		25°C		400		
Peak output current		25°C		2.2		A

Electrical Characteristics **7812**

Electrical characteristics at specified virtual junction temperature, $V = 19V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	7812			Units
		Min	Typ	Max	
Output voltage**	$25^{\circ}C$	11.5	12	12.5	V
	$I_o = 5mA \text{ to } 1A$, $V = 14.5V \text{ to } 27V$, $P \leq 15W$	11.4	12	12.6	
Input regulation	$V = 14.5V \text{ to } 30V$		10	240	mV
	$V = 16V \text{ to } 22V$		3	120	
Ripple rejection	$V = 15V \text{ to } 25V$, $f = 120Hz$	55	71		dB
Output regulation	$I_o = 5mA \text{ to } 1.5A$		12	240	mV
	$I_o = 250mA \text{ to } 750mA$		4	120	
Output resistance	$f = 1KHz$		0.018		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-1.0		mV/ $^{\circ}C$
Output noise voltage	$f = 10 \text{ Hz to } 100 \text{ KHz}$		75		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current	$25^{\circ}C$		4.3	8	
Bias current change	$V = 14.5V \text{ to } 30V$			1	mA
	$I_o = 5mA \text{ to } 1A$			0.5	
Short-circuit output current	$25^{\circ}C$		350		
Peak output current	$25^{\circ}C$		2.2		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 **7815**

Electrical characteristics at specified virtual junction temperature, $V = 23V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	MIK7815			Units
		Min	Typ	Max	
Output voltage**	$25^{\circ}C$	14.4	15	15.6	V
	$I_o = 5mA \text{ to } 1A$, $V = 17.5V \text{ to } 30V$, $P \leq$	14.25	15	15.75	
Input regulation	$V = 17.5V \text{ to } 30V$		12	300	mV
	$V = 20V \text{ to } 26V$		3	150	
Ripple rejection	$V = 18.5V \text{ to } 28.5V$, $f = 120Hz$	54	70		dB
Output regulation	$I_o = 5mA \text{ to } 1.5A$		12	300	mV
	$I_o = 250mA \text{ to } 750mA$		4	150	
Output resistance	$f = 1KHz$		0.019		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-1.0		mV/ $^{\circ}C$
Output noise voltage	$f = 10 \text{ Hz to } 100 \text{ KHz}$		90		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current	$25^{\circ}C$		4.3	8	
Bias current change	$V = 17.5V \text{ to } 30V$			1	mA
	$I_o = 5mA \text{ to } 1A$			0.5	
Short-circuit output current	$25^{\circ}C$		230		
Peak output current	$25^{\circ}C$		2.1		A

Electrical Characteristics 7818

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

Parameter	Test Conditions*		7818			Units
			Min	Typ	Max	
Output voltage**		25°C	17.3	18	18.7	V
	$I_O = 5mA \text{ to } 1A$, $V_F = 21V \text{ to } 33V$, $P \leq$	0°C to 125°C	17.1	18	18.9	
Input regulation	$V_F = 21V \text{ to } 33V$	25°C		15	360	mV
	$V_F = 24V \text{ to } 30V$			5	180	
Ripple rejection	$V_F = 22V \text{ to } 32V$, $f = 120Hz$	0°C to 125°C	53	69		dB
Output regulation	$I_O = 5mA \text{ to } 1.5A$	25°C		12	360	mV
	$I_O = 250mA \text{ to } 750mA$			4	180	
Output resistance	$f = 1KHz$	0°C to 125°C		0.022		Ω
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$f = 10Hz \text{ to } 100KHz$	25°C		110		μV
Dropout voltage	$I_O = 1A$	25°C		2.0		V
Bias current		25°C		4.5	8	
Bias current change	$V_F = 21V \text{ to } 33V$	0°C to 125°C			1	mA
	$I_O = 5mA \text{ to } 1A$				0.5	
Short-circuit output current		25°C		200		
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 7820

Electrical characteristics at specified virtual junction temperature, $V_F = 29V$, $I_O = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*		MIK7820			Units
			Min	Typ	Max	
Output voltage**		25°C	19.2	20	20.8	V
	$I_O = 5mA \text{ to } 1A$, $V_F = 23V \text{ to } 35V$, $P \leq$	0°C to 125°C	19	20	21	
Input regulation	$V_F = 23V \text{ to } 35V$	25°C		18	400	mV
	$V_F = 26V \text{ to } 32V$			7	200	
Ripple rejection	$V_F = 24V \text{ to } 34V$, $f = 120Hz$	0°C to 125°C	51	66		dB
Output regulation	$I_O = 5mA \text{ to } 1.5A$	25°C		15	400	mV
	$I_O = 250mA \text{ to } 750mA$			7	200	
Output resistance	$f = 1KHz$	0°C to 125°C		0.027		Ω
Temperature coefficient of output voltage	$I_O = 5mA$	0°C to 125°C		-1.3		mV/°C
Output noise voltage	$f = 10Hz \text{ to } 100KHz$	25°C		150		μV
Dropout voltage	$I_O = 1A$	25°C		2.0		V
Bias current		25°C		4.5	8	
Bias current change	$V_F = 23V \text{ to } 35V$	0°C to 125°C			1	mA
	$I_O = 5mA \text{ to } 1A$				0.5	
Short-circuit output current		25°C		180		
Peak output current		25°C		2.1		A

Electrical Characteristics **7824**

Electrical characteristics at specified virtual junction temperature, $V = 33V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	7824			Units
		Min	Typ	Max	
Output voltage**		23	24	25	V
	$I_o = 5mA$ to $1A$, $V = 27V$ to $38V$, $P \leq$	22.8	24	25.2	
Input regulation	$V = 27V$ to $38V$		18	480	mV
	$V = 30V$ to $36V$		6	240	
Ripple rejection	$V = 28V$ to $38V$, $f = 120Hz$	50	66		dB
Output regulation	$I_o = 5mA$ to $1.5A$		12	480	mV
	$I_o = 250mA$ to $750mA$		4	240	
Output resistance	$f = 1KHz$		0.028		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-1.5		$mV/^\circ C$
Output noise voltage	$f = 10 Hz$ to $100 KHz$		170		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current			4.6	8	mA
Bias current change	$V = 27V$ to $38V$			1	
	$I_o = 5mA$ to $1A$			0.5	
Short-circuit output current			150		
Peak output current			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 **7827**

Electrical characteristics at specified virtual junction temperature, $V = 36V$, $I_o = 500mA$ (unless otherwise noted)

Parameter	Test Conditions*	MIK7827			Units
		Min	Typ	Max	
Output voltage**		25.9	27	28.1	V
	$I_o = 5mA$ to $1A$, $V = 30V$ to $40V$, $P \leq 15W$	25.7	27	28.3	
Input regulation	$V = 30V$ to $40V$		25	540	mV
	$V = 33V$ to $39V$		10	270	
Ripple rejection	$V = 30V$ to $40V$, $f = 120Hz$	50	64		dB
Output regulation	$I_o = 5mA$ to $1.5A$		20	540	mV
	$I_o = 250mA$ to $750mA$		9	270	
Output resistance	$f = 1KHz$		0.030		Ω
Temperature coefficient of output voltage	$I_o = 5mA$		-1.6		$mV/^\circ C$
Output noise voltage	$f = 10 Hz$ to $100 KHz$		200		μV
Dropout voltage	$I_o = 1A$		2.0		V
Bias current			4.8	8	mA
Bias current change	$V = 30V$ to $40V$			1	
	$I_o = 5mA$ to $1A$			0.5	
Short-circuit output current			120		
Peak output current			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.

Typical Applications Circuit

For a positive regulator, a 0.33- μ F bypass capacitor should be used on the input terminals. While not necessary for stability, an output capacitor of 0.1 μ F may be used to improve the transient response of the regulator. These capacitors should be on or as near as possible to the regulator terminals. See Fig.1.

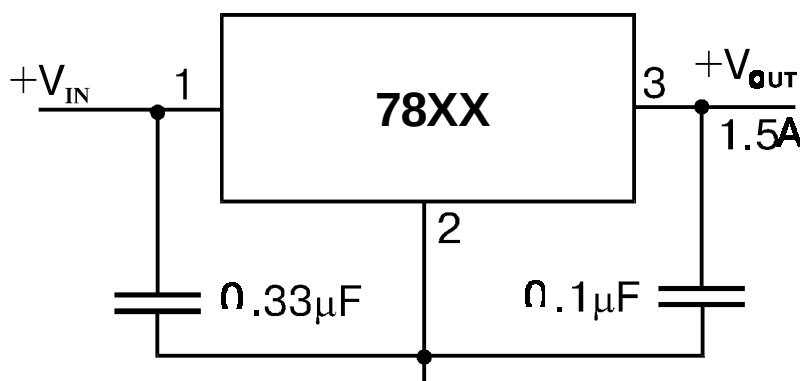


Fig. 1. Positive Regulator

Ordering Information

ORDERING NUMBER	PACKAGE	MARKING
78XX	TO - 220	ET78XX / ESTЕК7805

Address : 北京市海淀区永定路 88 号长银大厦 6A06--6A07

Rm 6A07, Changyin Office Building ,No.88, Yong Ding Road, Hai Dian District ,Beijing

Postalcode:100039

Tel: 86-010-58895780 / 81 / 82 / 83 / 84

Fax : 010-58895793

Http://www.estek.com.cn

Email:sales@estek.com.cn

REV No:01-060803