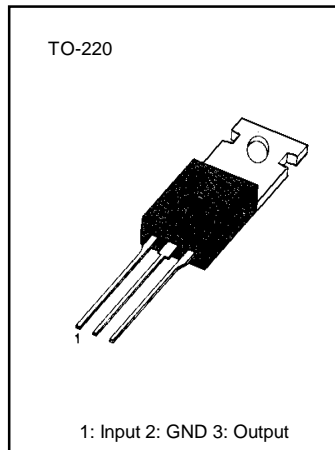


KA78TXX

FIXED VOLTAGE REGULATOR(POSITIVE)

3-TERMINAL 3A POSITIVE VOLTAGE REGULATORS

This family of fixed voltage regulators are monolithic integrated circuits capable of driving loads in excess of 3.0 amperes.



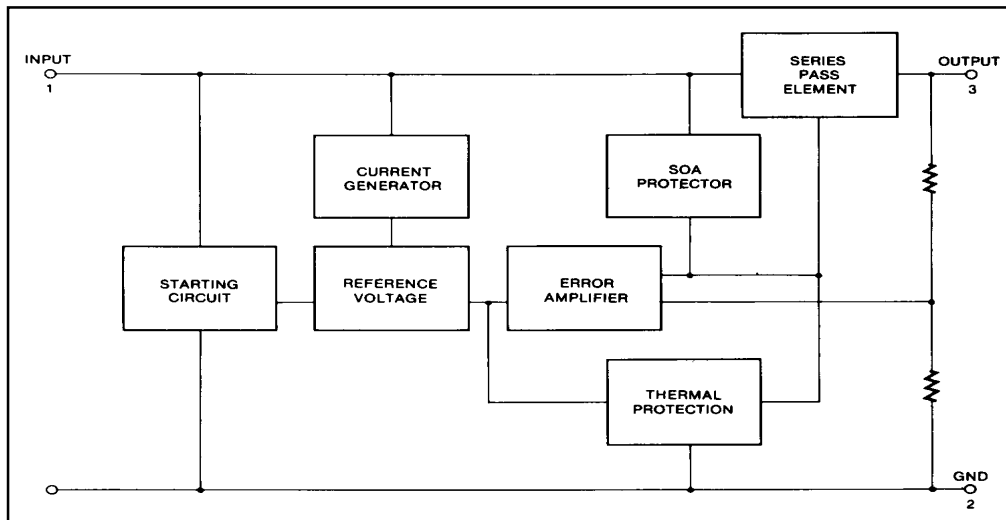
FEATURES

- Output current in excess of 3.0A
- Output transistor safe-area compensation
- Power dissipation: 25W
- Internal short-circuit current limiting
- Internal thermal overload protection
- Output voltage offered in 4% tolerance
- No external components required
- Output voltage of 5; 6; 8; 12; 15; 18V

ORDERING INFORMATION

Device	Package	Operating Temperature
KA78TXX	TO-220	0- 125°C

BLOCK DIAGRAM



KA78TXX

FIXED VOLTAGE REGULATOR(POSITIVE)

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

Characteristic	Symbol	Value	Unit
Input Voltage (5.0V - 12V) (15V - 24V)	V _I	35	V
		40	V
Power Dissipation	P _D	Internally limited	
Thermal Resistance, Junction to Air T _C =25°C	R _{θJA}	65	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	2.5	°C/W
Operating Temperature Range	T _{OPR}	0 to + 125	°C
Storage Temperature Range	T _{STG}	-65 to + 150	°C

KA78T05 ELECTRICAL CHARACTERISTICS

(V_I = 10V, I_o = 3.0A, T_J = 0°C to 125°C, P_o ≤ P_{max}, unless otherwise specified)

Characteristic	Symbol	Test Conditions	KA78T05			Unit
			Min	Typ	Max	
Output Voltage	V _O	5mA ≤ I _o ≤ 3.0A, T _J =25°C	4.8	5.0	5.2	V _{DC}
		5mA ≤ I _o ≤ 3A; 7.3V ≤ V _I ≤ 20V, 5mA ≤ I _o ≤ 2A	4.75	5.0	5.25	
Line Regulation	ΔV _O	7.2V ≤ V _I ≤ 35V, I _o =5mA, T _J =25°C		3.0	25	mV
		7.2V ≤ V _I ≤ 35V, I _o =1.0A, T _J =25°C				
		7.5V ≤ V _I ≤ 20V, I _o =2.0A				
		8.0V ≤ V _I ≤ 12V, I _o =3.0A				
Load Regulation	ΔV _O	5mA ≤ I _o ≤ 3.0A, T _J = 25°C		10	30	mV
		5mA ≤ I _o ≤ 3.0A		15	80	mV
Thermal Regulation	REG _T	Pulse=10ms, P = 20W, T _A =25°C		0.002	0.03	% V _O /W
Quiescent Current	I _q	5mA ≤ I _o ≤ 3A, T _J = 25°C		3.5	5.0	mA
		5mA ≤ I _o ≤ 3A		4.0	6.0	mA
Quiescent Current Change	ΔI _q	7.2V ≤ V _I ≤ 35V, I _o = 5mA, T _J = 25°C; 7.5V ≤ V _I ≤ 20V, I _o = 2A; 5mA ≤ I _o ≤ 3A		0.1	0.8	mA
Ripple Rejection	RR	8V ≤ V _I ≤ 18V, f = 120Hz, I _o = 2.0A		75		dB
Dropout Voltage	V _D	I _o = 3A, T _J = 25°C		2.2	2.5	V _{DC}
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100KHz, T _J = 25°C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Short Circuit Current Limit	I _{SC}	V _I = 35V, T _J = 25°C		1.5	2.5	A
Peak Output Current	I _{PK}	T _J = 25°C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _o = 5.0mA		0.2		mA

* Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used. (P_{MAX} = 25W)



KA78T06 ELECTRICAL CHARACTERISTICS

(V_I = 11V, I_O = 3.0V, T_J = 0 °C, to 125 °C, P_O ≤ P_{max}, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	5.0mA ≤ I _O ≤ 3A, T _J = +25 °C 5.0mA ≤ I _O ≤ 3A; 8.3V ≤ V _I ≤ 21V, 5mA ≤ I _O ≤ 2A	5.75 5.7	6.0 6.0	6.25 6.3	V
Line Regulation	ΔV _O	8.25V ≤ V _I ≤ 35V, I _O = 5.0mA, T _J = +25 °C; 8.25V ≤ V _I ≤ 35V, I _O = 1.0A, T _J = +25 °C; 8.6V ≤ V _I ≤ 21V, I _O = 2.0A 9.0V ≤ V _I ≤ 13V, I _O = 3.0A		4.0	30	mV
Load Regulation	ΔV _O	5mA ≤ I _O ≤ 3A, T _J = +25 °C 5mA ≤ I _O ≤ 3A		10 15	30 80	mV
Thermal Regulation	REG _T	Pulse = 10ms, P = 20W, T _A = 25 °C		0.002	0.03	%V _O /W
Quiescent Current	I _Q	5mA ≤ I _O ≤ 3A, T _J = +25 °C 5mA ≤ I _O ≤ 3A		3.5 4.0	5.0 6.0	mA
Quiescent Current Change	ΔI _Q	8.25V ≤ V _I ≤ 3A, T _J = +25 °C; 8.6V ≤ V _I ≤ 21V, I _O = 2A; 5mA ≤ I _O ≤ 3.0A		0.1	0.8	mA
Ripple Rejection	RR	9V ≤ V _I ≤ 19V, f = 120Hz, I _O = 2A	61	71		dB
Dropout Voltage	V _D	I _O = 3A, T _J = +25 °C		2.2	2.5	V
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100KHz, T _J = +25 °C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Short Circuit Current Limit	I _{SC}	V _I = 35V, T _J = +25 °C		1.5	2.5	A
Peak Output Current	I _{PK}	T _J = +25 °C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _O = 5.0mA		0.3		mV/°C

*Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

KA78T08 ELECTRICAL CHARACTERISTICS(V_I = 14V, I_o = 3.0V, T_J = 0°C to 125°C, P_o ≤ P_{max}, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	5.0mA ≤ I _o ≤ 3A, T _J = +25°C 5.0mA ≤ I _o ≤ 3A; 10.4V ≤ V _I ≤ 23V, 5mA ≤ I _o ≤ 2A	7.7	8.0	8.3	V _{DC}
Line Regulation	ΔV _O	10.3V ≤ V _I ≤ 35V, I _o = 5.0mA, T _J = +25°C 10.3V ≤ V _I ≤ 35V, I _o = 1.0 A, T _J = +25°C 10.7V ≤ V _I ≤ 23V, I _o = 2.0A 11V ≤ V _I ≤ 17V, I _o = 3.0A		4.0	35	mV
Load Regulation	ΔV _O	5mA ≤ I _o ≤ 3A, T _J = +25°C 5mA ≤ I _o ≤ 3A		10 15	30 80	mV
Thermal Regulation	REG _T	Pulse = 10ms, P = 20W, T _A = 25°C		0.002	0.03	% V _O /W
Quiescent Current	I _q	5mA ≤ I _o ≤ 3A, T _J = +25°C 5mA ≤ I _o ≤ 3A		3.5 4.0	5.0 6.0	mA
Quiescent Current Change	ΔI _q	10.3V ≤ V _I ≤ 35V, I _o = 5mA, T _J = +25°C 10.7V ≤ V _I ≤ 23V, I _o = 2A 5mA ≤ I _o ≤ 3A		0.1	0.8	mA
Ripple Rejection	RR	11V ≤ V _I ≤ 21V, f = 120Hz, I _o = 2A	61	71		dB
Dropout Voltage	V _D	I _o = 3A, T _J = +25°C		2.2	2.5	V _{DC}
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100KHz, T _J = +25°C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Short Circuit Current Limit	I _{SC}	V _I = 35V, T _J = +25°C		1.5	2.5	A
Peak Output Current	I _{PK}	T _J = +25°C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _o = 5.0mA		0.3		mV/°C

*Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

KA78T12 ELECTRICAL CHARACTERISTICS

(V_I = 19V, I_O = 3.0A, T_J = 0 °C to 125 °C, P_O ≤ P_{MAX}, unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	5.0mA ≤ I _O ≤ 3A, T _J = 25 °C	11.5	12	12.5	V _{DC}
		5.0mA ≤ I _O ≤ 3A; 5.0mA ≤ I _O ≤ 2A, 14.5V ≤ V _I ≤ 27V	11.4	12	12.6	
Line Regulation	ΔV _O	14.5V ≤ V _I ≤ 35V, I _O = 5mA, T _J = 25 °C; 14.5V ≤ V _I ≤ 35V, I _O = 1.0A, T _J = 2.5 °C 14.9V ≤ V _I ≤ 28V, I _O = 2.0A 16V ≤ V _I ≤ 22V, I _O = 3.0V		6.0	45	mV
Load Regulation	ΔV _O	5mA ≤ I _O ≤ 3A, T _J = 25 °C		10	30	mV
		5mA ≤ I _O ≤ 3A		15	80	mV
Thermal Regulation	REG _T	Pulse = 10ms, P = 20W T _A = 25 °C		0.002	0.03	%V _O /W
Quiescent Current	I _Q	5mA ≤ I _O ≤ 3A, T _J = 25 °C		3.5	5.0	mA
		5mA ≤ I _O ≤ 3A		4.0	6.0	mA
Quiescent Current Change	ΔI _Q	14.5V ≤ V _I ≤ 35V, I _O = 5mA, T _J = 25 °C; 14.0V ≤ V _I ≤ 27V, I _O = 2A; 5.0mA ≤ I _O ≤ 3.0A		0.1	0.8	mA
Ripple Rejection	RR	15V _{DC} ≤ V _I ≤ 25VDC, f = 120Hz, I _O = 2.0A	57	67		dB
Dropout Voltage	V _D	I _O = 3A, T _J = 25 °C		2.2	2.5	V _{DC}
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100Hz, T _J = 25 °C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Short Circuit Current Limit	I _{SC}	V _I = 35V, T _J = 25 °C		1.5	2.5	A
Peak Output Current	I _{PK}	T _J = 25 °C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O / ΔT	I _O = 5.0mA		0.5		mV/°C

*Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

KA78T15 ELECTRICAL CHARACTERISTICS

(V_I = 23V, I_O = 3.0A, T_J = 0°C to 125°C, P_O ≤ P_{MAX}, unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	5mA ≤ I _O ≤ 3A, T _J = +25°C 5mA ≤ I _O ≤ 3A; 17.5V _{DC} ≤ V _I ≤ 30V _{DC} , 5mA ≤ I _O ≤ 2A	14.4 14.25	15 15	15.6 15.75	V _{DC}
Line Regulation	ΔV _O	17.6 ≤ V _I ≤ 40V, I _O = 5mA, T _J = +25°C 17.6 ≤ V _I ≤ 40V, I _O = 1mA, T _J = +25°C 18V ≤ V _I ≤ 30V, I _O = 2.0A; 20V ≤ V _I ≤ 26V, I _O = 3.0A		7.5	55	mV
Load Regulation	ΔV _O L	5mA ≤ I _O ≤ 3A, T _J = +25°C 5mA ≤ I _O ≤ 3A		10 15	30 80	mV mV
Thermal Regulation	REG _T	Pulse = 10ms, P = 20W, T _A = 25°C		0.002	0.03	% V _O /W
Quiescent Current	I _Q	5mA ≤ I _O ≤ 3A, T _J = +25°C 5mA ≤ I _O ≤ 3A		3.5 4.0	5.0 6.0	mA mA
Quiescent Current Change	ΔI _Q	17.6 ≤ V _I ≤ 40V, I _O = 5mA, T _J = +25°C 18V ≤ V _I ≤ 30V, I _O = 2.0A; 5mA ≤ I _O ≤ 3A		0.1	0.8	mA
Ripple Rejection	RR	18.5V _{DC} ≤ V _I ≤ 28.5V _{DC} , f = 120Hz, I _O = 2.0A	55	65		dB
Dropout Voltage	V _D	I _O = 3.0A, T _J = +25°C		2.2	2.5	V _{DC}
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100KHz, T _J = +25°C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Short Circuit Current Limit	I _{SC}	V _I = 40V, T _J = +25°C		1.0	2.0	A
Peak Output Current	I _{OK}	T _J = +25°C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _O = 5.0mA		0.6		mV/°C

*Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

KA78T18 ELECTRICAL CHARACTERISTICS(V_I = 27V, I_O = 3.0V, T_J = 0°C to 125°C, P_O ≤ P_{MAX}, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	5.0mA ≤ I _O ≤ 3A, T _J = +25°C 5.0mA ≤ I _O ≤ 3A; 20.6 ≤ V _I ≤ 33V, 5mA ≤ I _O ≤ 2A	17.3 17.1	18 18	18.7 18.9	V _{DC}
Line Regulation	ΔV _O	20.7V ≤ V _I ≤ 40V, I _O = 5.0mA, T _J = +25°C; 20.7V ≤ V _I ≤ 40V, I _O = 1A, T _J = +25°C 21.2V ≤ V _I ≤ 33V, I _O = 2.0A; 24V ≤ V _I ≤ 30V, I _O = 3A		9.0	80	mV
Load Regulation	ΔV _O	5.0mA ≤ I _O ≤ 3A, T _J = +25°C 5.0mA ≤ I _O ≤ 3A		10 15	30 80	mV
Thermal Regulation	REG _T	Pulse = 10ms, P = 20W, T _A = 25°C		0.002	0.03	mV
Quiescent Current	I _Q	5.0mA ≤ I _O ≤ 3A, T _J = +25°C 5.0mA ≤ I _O ≤ 3A		3.5 4.0	5.0 6.0	mA
Quiescent Current Change	ΔI _Q	20.7V ≤ V _I ≤ 40V, I _O = 5.0mA, T _J = +25°C 21.2V ≤ V _I ≤ 33V, I _O = 2.0A; 5mA ≤ I _O ≤ 3.0A		0.1	0.8	mA
Ripple Rejection	RR	22 ≤ V _I ≤ 32V, f = 120Hz, I _O = 2.0A	54	64		dB
Dropout Voltage	V _D	I _O = 3A, T _J = +25°C		2.2	2.5	V _{DC}
Output Noise Voltage	V _N	10Hz ≤ f ≤ 100KHz, T _J = +25°C		10		μV/V _O
Output Resistance	R _O	f = 1.0KHz		2.0		mΩ
Output Circuit Current Limit	I _{SC}	V _I = 40V, T _J = +25°C		1.0	2.0	A
Peak Output Current	I _{PK}	T _J = +25°C		5.0		A
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _O = 5.0mA		0.7		mV/°C

*Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.