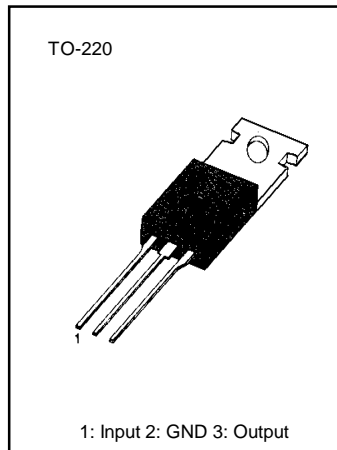


# KA78TXX

# 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.



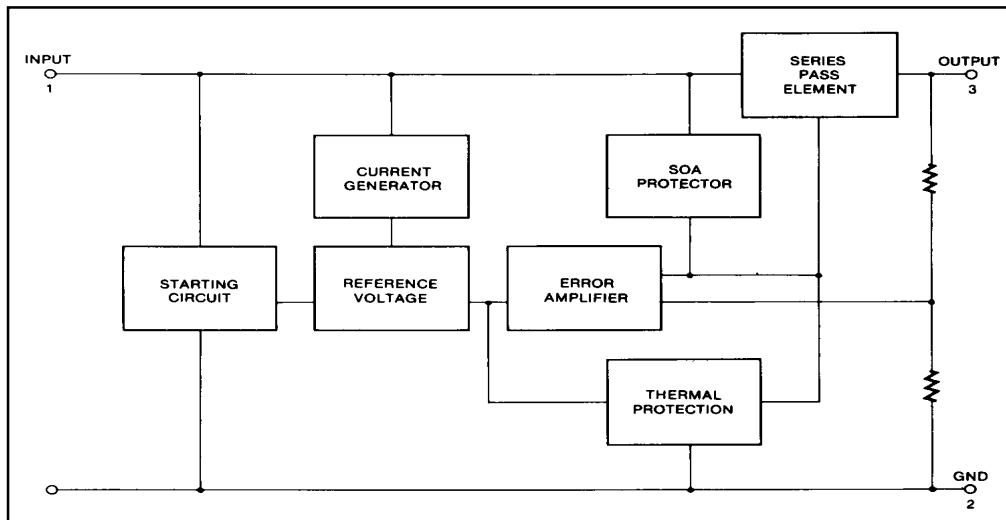
## FEATURES

- 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<sub>A</sub>=25°C, unless otherwise specified)

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

## KA78T05 ELECTRICAL CHARACTERISTICS

(V<sub>I</sub> = 10V, I<sub>o</sub> = 3.0A, T<sub>J</sub> = 0°C to 125°C, P<sub>o</sub> ≤ P<sub>max</sub>, unless otherwise specified)

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

\* Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used. (P<sub>MAX</sub> = 25W)



## KA78T06 ELECTRICAL CHARACTERISTICS

(V<sub>I</sub> = 11V, I<sub>O</sub> = 3.0V, T<sub>J</sub> = 0 °C, to 125 °C, P<sub>O</sub> ≤ P<sub>max</sub>, unless otherwise specified)

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

\*Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## KA78T08 ELECTRICAL CHARACTERISTICS

(V<sub>I</sub> = 14V, I<sub>o</sub> = 3.0V, T<sub>J</sub> = 0°C to 125°C, P<sub>o</sub> ≤ P<sub>max</sub>, unless otherwise specified)

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

\*Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## KA78T12 ELECTRICAL CHARACTERISTICS

(V<sub>I</sub> = 19V, I<sub>O</sub> = 3.0A, T<sub>J</sub> = 0°C to 125°C, P<sub>O</sub> ≤ P<sub>MAX</sub>, unless otherwise noted)

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

\*Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## KA78T15 ELECTRICAL CHARACTERISTICS

(V<sub>I</sub> = 23V, I<sub>O</sub> = 3.0A, T<sub>J</sub> = 0°C to 125°C, P<sub>O</sub> ≤ P<sub>MAX</sub>, unless otherwise noted)

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

\*Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## KA78T18 ELECTRICAL CHARACTERISTICS

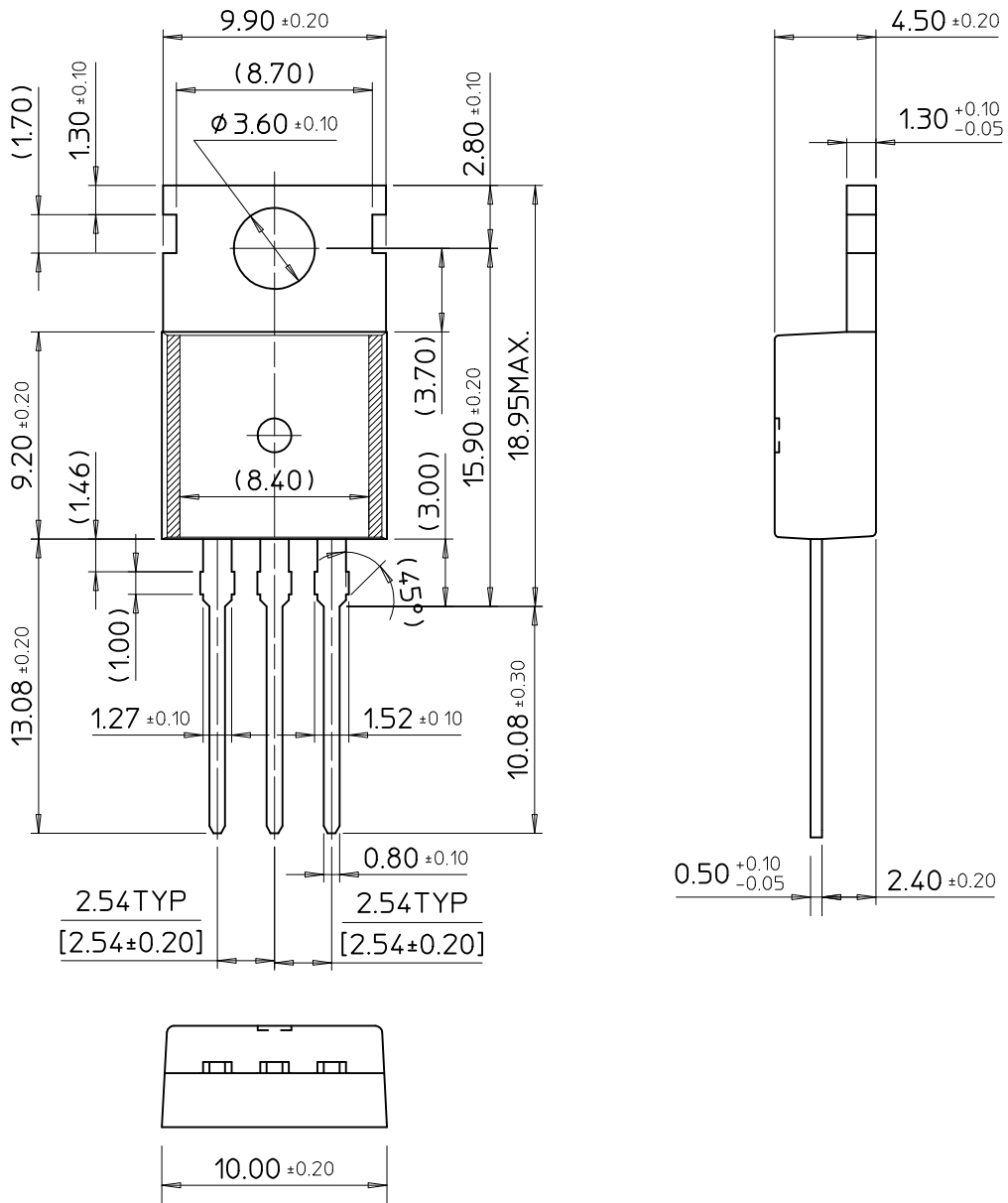
(V<sub>I</sub> = 27V, I<sub>O</sub> = 3.0V, T<sub>J</sub> = 0°C to 125°C, P<sub>O</sub> ≤ P<sub>MAX</sub>, unless otherwise specified)

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

\*Load and line regulation are specified at constant junction temperature. Change in V<sub>O</sub> due to heating effects must be taken into account separately. Pulse testing with low duty is used.

# TO-220

Dimensions in Millimeters



SAMSUNG ELECTRONICS CO.,LTD.