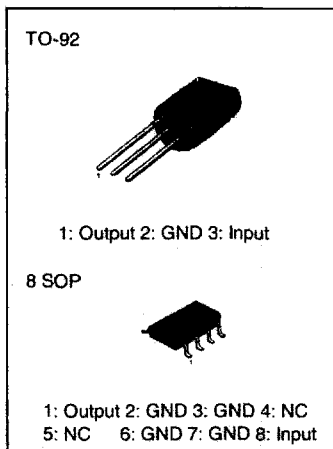


FIXED VOLTAGE REGULATOR (POSITIVE)

The KA78LXX series of fixed voltage monolithic integrated circuit voltage regulators are suitable for application that required supply up to 100mA.

- Maximum Output Current of 100mA
- Output Voltage of 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V
- Thermal Overload Protection
- Short Circuit Current Limiting



Device	Package	Operating Temperature
KA78LXXAZ	TO-92	0 ~ + 125℃
KA78LXXAD	8 SOP	0 ~ + 125℃



KA78LXXA**FIXED VOLTAGE REGULATOR (POSITIVE)****ABSOLUTE MAXIMUM RATINGS** ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Characteristic	Symbol	Value	Unit
Input Voltage (for $V_O = 5\text{V}, 8\text{V}$)	V_I	30	V
(for $V_O = 12\text{V}, 15\text{V}$)		35	V
Operating Junction Temperature Range	T_{OPR}	$0 \sim +125$	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-65 \sim +150$	$^\circ\text{C}$

KA78L05A ELECTRICAL CHARACTERISTICS

($V_I = 10\text{V}$, $I_O = 40\text{mA}$, $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	4.8	5.0	5.2	V
Line Regulation	ΔV_O	$T_J = 25^\circ\text{C}$				
		$7\text{V} \leq V_I \leq 20\text{V}$		8	150	mV
		$8\text{V} \leq V_I \leq 20\text{V}$		6	100	mV
Load Regulation	ΔV_O	$T_J = 25^\circ\text{C}$				
		$1\text{mA} \leq I_O \leq 100\text{mA}$		11	60	mV
		$1\text{mA} \leq I_O \leq 40\text{mA}$		5.0	30	mV
Output Voltage	V_O	$7\text{V} \leq V_I \leq 0\text{V}$			5.25	V
		$7\text{V} \leq V_I \leq V_{MAX}$ (Note 2)			5.25	V
Quiescent Current	I_Q	$T_J = 25^\circ\text{C}$		2.0	5.5	mA
Quiescent Current	with line	$8\text{V} \leq V_I \leq 20\text{V}$			1.5	mA
Change	with load	$1\text{mA} \leq I_O \leq 40\text{mA}$			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ\text{C}$, $10\text{Hz} \leq f \leq 100\text{KHz}$		40		μV
Temperature Coefficient of V_O	$\frac{\Delta V_O}{\Delta T}$	$I_O = 5\text{mA}$		-0.65		mV/ $^\circ\text{C}$
Ripple Rejection	RR	$f = 120\text{Hz}$, $8\text{V} \leq V_I \leq 18\text{V}$, $T_J = 25^\circ\text{C}$	41	80		dB
Dropout Voltage	V_D	$T_J = 25^\circ\text{C}$		1.7		V

KA78LXXA**FIXED VOLTAGE REGULATOR (POSITIVE)****KA78L06A ELECTRICAL CHARACTERISTICS**

($V_i = 12V$, $I_o = 40mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_1 = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	5.75	6.0	6.25	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$		64	175	mV
		$8.5V < V_i < 20V$				
Load Regulation	ΔV_o	$T_J = 25^\circ C$		12.8	80	mV
		$1mA < I_o < 100mA$				
Output Voltage	V_o	$8.5 < V_i < 20V$, $1mA < I_o < 40mA$	5.7		6.3	V
		$8.5 < V_i < V_{max}(\text{Note})$, $1mA < I_o < 70mA$	5.7		6.3	V
Quiescent Current	I_q	$T_J = 25^\circ C$		3.9	6.0	mA
		$T_J = 125^\circ C$			5.5	mA
Quiescent Current Change	with line	ΔI_q			1.5	mA
	with load	ΔI_q			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz < f < 100KHz$		40		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		0.75		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $10V < V_i < 20V$, $T_J = 25^\circ C$	40	46		dB
Dropout Voltage	V_D	$T_J = 25^\circ C$		1.7		V

KA78L08A ELECTRICAL CHARACTERISTICS

($V_i = 14V$, $I_o = 40mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_1 = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	7.7	8.0	8.3	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$		10	175	mV
		$10.5V \leq V_i \leq 23V$				
Load Regulation	ΔV_o	$T_J = 25^\circ C$		15	80	mV
		$1mA \leq I_o \leq 100mA$				
Output Voltage	V_o	$10.5V \leq V_i \leq 23V$	7.6		8.4	V
		$10.5V \leq V_i \leq V_{max}(\text{Note 2})$	7.6		8.4	V
Quiescent Current	I_q	$T_J = 25^\circ C$		2.0	5.5	mA
Quiescent Current Change	with line	ΔI_q			1.5	mA
	with load	ΔI_q			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz \leq f \leq 100KHz$		60		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		-0.8		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $11V \leq V_i \leq 21V$, $T_J = 25^\circ C$	39	70		dB
Dropout Voltage	V_D	$T_J = 25^\circ C$		1.7		V



KA78LXXA**FIXED VOLTAGE REGULATOR (POSITIVE)****KA78L09A ELECTRICAL CHARACTERISTICS**

($V_i = 15V$, $I_o = 40mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_i = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	8.64	9.0	9.36	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$				
		$11.5V \leq V_i \leq 24V$		90	200	mV
Load Regulation	ΔV_o	$T_J = 25^\circ C$				
		$1mA \leq I_o \leq 100mA$		20	90	mV
Output Voltage	V_o	$11.5V \leq V_i \leq 24V$	8.55		9.45	V
		$11.5V \leq V_i \leq V_{MAX}$ (Note 2)	8.55		9.45	V
Quiescent Current	I_o	$T_J = 25^\circ C$		2.1	6.0	mA
Quiescent Current Change	with line	ΔI_o			1.5	mA
	with load	ΔI_o			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz \leq f \leq 100KHz$		70		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		-0.9		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $12V \leq V_i \leq 22V$, $T_J = 25^\circ C$	38	44		dB
Dropout Voltage	V_D	$T_J = 25^\circ C$		1.7		V

KA78L10A ELECTRICAL CHARACTERISTICS

($V_i = 16V$, $I_o = 40mA$, $0^\circ C < T_J < 125^\circ C$, $C_i = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	9.6	10.0	10.4	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$				
		$12.5 < V_i < 25V$		100	220	mV
Load Regulation	ΔV_o	$T_J = 25^\circ C$				
		$1mA < I_o < 100mA$		20	94	mV
Output Voltage	V_o	$12.5 < V_i < 25V$, $1mA < I_o < 40mA$	9.5		10.5	V
		$12.5 < V_i < V_{MAX}(\text{Note})$, $1mA < I_o < 70mA$	9.5		10.5	V
Quiescent Current	I_o	$T_J = 25^\circ C$		4.2	6.5	mA
		$T_J = 125^\circ C$			6.0	mA
Quiescent Current Change	with line	ΔI_o			1.5	mA
	with load	ΔI_o			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz < f < 100KHz$		74		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		0.95		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $15V < V_i < 25V$, $T_J = 25^\circ C$	38	43		dB
Drop Voltage	V_D	$T_J = 25^\circ C$		1.7		V



KA78LXXA**FIXED VOLTAGE REGULATOR (POSITIVE)****KA78L12A ELECTRICAL CHARACTERISTICS**(V_I = 19V, I_O = 40mA, 0°C ≤ T_J ≤ 125°C, C_I = 0.33 μF, C_O = 0.1 μF, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	11.5	12	12.5	V
Line Regulation	ΔV _O	T _J = 25°C	14.5V ≤ V _I ≤ 27V	20	250	mV
			16V ≤ V _I ≤ 27V	15	200	mV
Load Regulation	ΔV _O	T _J = 25°C	1mA ≤ I _O ≤ 100mA	20	100	mV
			1mA ≤ I _O ≤ 40mA	10	50	mV
Output Voltage	V _O	14.5V ≤ V _I ≤ 27V	1mA ≤ I _O ≤ 40mA	11.4	12.6	V
		14.5V ≤ V _I ≤ V _{MAX} (Note 2)	1mA ≤ I _O ≤ 70mA	11.4	12.6	V
Quiescent Current	I _Q	T _J = 25°C		2.1	6.0	mA
Quiescent Current Change	with line ΔI _Q	16V ≤ V _I ≤ 27V			1.5	mA
	with load ΔI _Q	1mA ≤ I _O ≤ 40mA			0.1	mA
Output Noise Voltage	V _N	T _A = 25°C, 10Hz ≤ f ≤ 100KHz		80		μV
Temperature Coefficient of V _O	$\frac{\Delta V_O}{\Delta T}$	I _O = 5mA		-1.0		mV/°C
Ripple Rejection	RR	f = 120Hz, 15V ≤ V _I ≤ 25V, T _J = 25°C	37	65		dB
Dropout Voltage	V _D	T _J = 25°C		1.7		V

KA78L15A ELECTRICAL CHARACTERISTICS(V_I = 23V, I_O = 40mA, 0°C ≤ T_J ≤ 125°C, C_I = 0.33 μF, C_O = 0.1 μF, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V _O	T _J = 25°C	14.4	15	15.6	V
Line Regulation	ΔV _O	T _J = 25°C	17.5V ≤ V _I ≤ 30V	25	300	mV
			20V ≤ V _I ≤ 20V	20	250	mV
Load Regulation	ΔV _O	T _J = 25°C	1mA ≤ I _O ≤ 100mA	25	150	mV
			1mA ≤ I _O ≤ 40mA	12	75	mV
Output Voltage	V _O	17.5V ≤ V _I ≤ 30V	1mA ≤ I _O ≤ 40mA	14.25	15.75	V
		17.5V ≤ V _I ≤ V _{MAX} (Note 2)	1mA ≤ I _O ≤ 70mA	14.25	15.75	V
Quiescent Current	I _Q	T _J = 25°C		2.1	6.0	mA
Quiescent Current Change	with line ΔI _Q	20V ≤ V _I ≤ 30V			1.5	mA
	with load ΔI _Q	1mA ≤ I _O ≤ 40mA			0.1	mA
Output Noise Voltage	V _N	T _A = 25°C, 10Hz ≤ f ≤ 100KHz		90		μV
Temperature Coefficient of V _O	$\frac{\Delta V_O}{\Delta T}$	I _O = 5mA		-1.3		mV/°C
Ripple Rejection	RR	f = 120Hz, 18.5V ≤ V _I ≤ 28.5V, T _J = 25°C	34	60		dB
Dropout Voltage	V _D	T _J = 25°C		1.7		V

KA78LXXA**FIXED VOLTAGE REGULATOR (POSITIVE)****KA78L18A ELECTRICAL CHARACTERISTICS**

($V_i = 27V$, $I_o = 40mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_i = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	17.3	18	18.7	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$		145	300	mV
		$21V \leq V_i \leq 33V$		135	250	mV
Load Regulation	ΔV_o	$T_J = 25^\circ C$		30	170	mV
		$1mA \leq I_o \leq 100mA$		15	85	mV
Output Voltage	V_o	$21V \leq V_i \leq 33V$	17.1		18.9	V
		$21V \leq V_i \leq V_{MAX}$ (Note 2)	17.1		18.9	V
Quiescent Current	I_o	$T_J = 25^\circ C$		2.2	6.0	mA
Quiescent Current Change	with line	ΔI_o			1.5	mA
	with load	ΔI_o			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz \leq f \leq 100KHz$		150		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		-1.8		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $23V \leq V_i \leq 33V$, $T_J = 25^\circ C$	34	48		dB
Drop Voltage	V_D	$T_J = 25^\circ C$		1.7		V

KA78L24A ELECTRICAL CHARACTERISTICS

($V_i = 33V$, $I_o = 40mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $C_i = 0.33 \mu F$, $C_o = 0.1 \mu F$, unless otherwise specified. (Note 1))

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J = 25^\circ C$	23	24	25	V
Line Regulation	ΔV_o	$T_J = 25^\circ C$		160	300	mV
		$27V \leq V_i \leq 38V$		150	250	mV
Load Regulation	ΔV_o	$T_J = 25^\circ C$		40	200	mV
		$1mA \leq I_o \leq 100mA$		20	100	mV
Output Voltage	V_o	$27V \leq V_i \leq 38V$	22.8		25.2	V
		$27V \leq V_i \leq V_{MAX}$ (Note 2)	22.8		25.2	V
Quiescent Current	I_o	$T_J = 25^\circ C$		2.2	6.0	mA
Quiescent Current Change	with line	ΔI_o			1.5	mA
	with load	ΔI_o			0.1	mA
Output Noise Voltage	V_N	$T_A = 25^\circ C$, $10Hz \leq f \leq 100KHz$		200		μV
Temperature Coefficient of V_o	$\frac{\Delta V_o}{\Delta T}$	$I_o = 5mA$		-2.0		mV/ $^\circ C$
Ripple Rejection	RR	$f = 120Hz$, $28V \leq V_i \leq 38V$, $T_J = 25^\circ C$	34	45		dB
Dropout Voltage	V_D	$T_J = 25^\circ C$		1.7		V

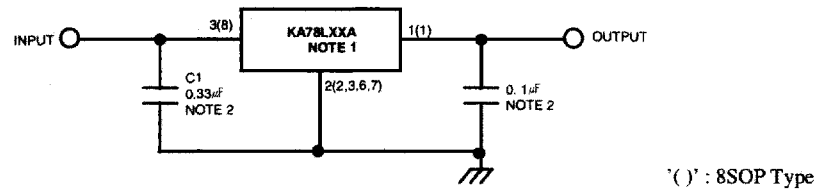
Notes

1. The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperature as indicated at the initiation of tests.
2. Power dissipation $\leq 0.75W$.

KA78LXXA

FIXED VOLTAGE REGULATOR (POSITIVE)

TYPICAL APPLICATION



Notes

1. To specify an output voltage, substitute voltage value for "XX".
2. Bypass Capacitors are recommend for optimum stability and transient response and should be located as close as possible to the regulator