

KA78XXE/KA78XXAE

3-Terminal 1A Positive Voltage Regulator

Features

- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The KA78XXE/KA78XXAE series of three-terminal positive regulator are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Ordering Information

Part Number	Output Voltage Tolerance	Package	Operating Temperature
KA7805E / KA7806E	±4%	TO-220	0 to +125°C
KA7808E / KA7809E			
KA7810E			
KA7812E / KA7815E			
KA7818E / KA7824E			
KA7805AE / KA7806AE	±2%		
KA7808AE / KA7809AE			
KA7810AE			
KA7812AE/KA7815AE			
KA7818AE/KA7824AE			
KA7805ER / KA7806ER	±4%	D-PAK	
KA7808ER / KA7809ER			
KA7812ER			

Block Diagram

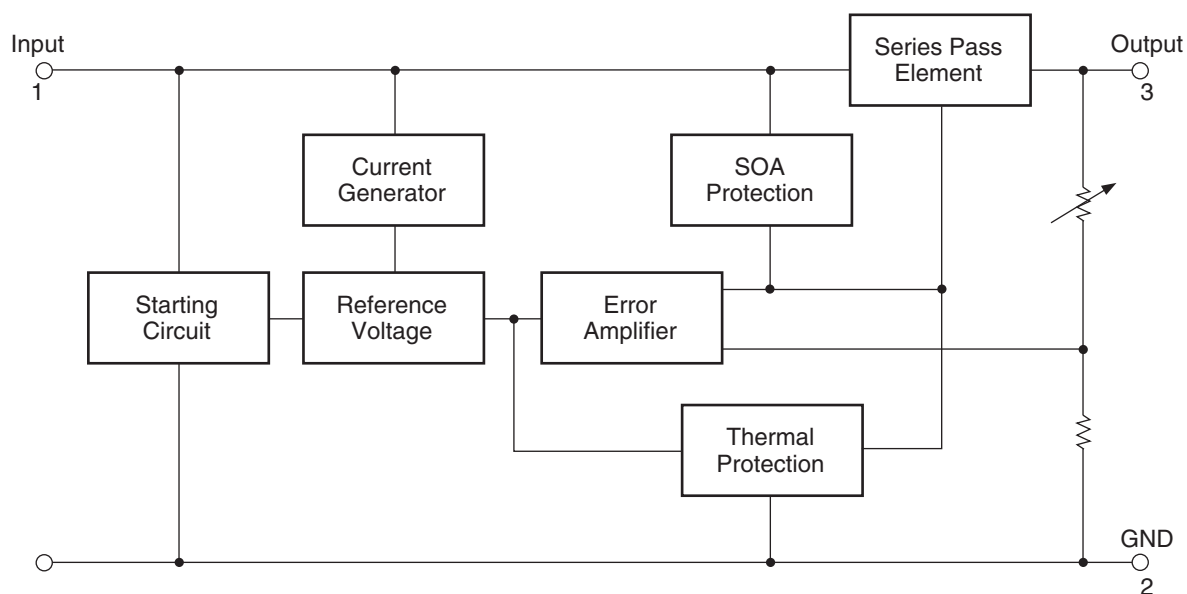


Figure 1.

Pin Assignment

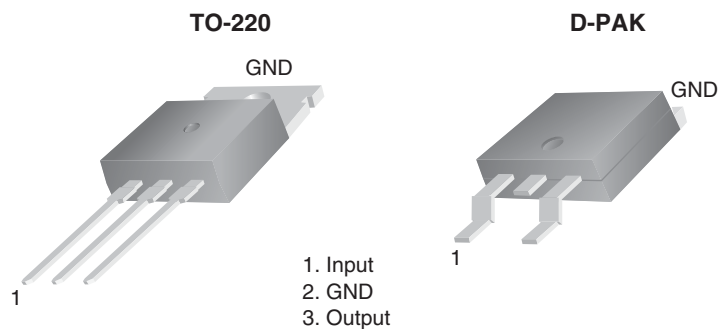


Figure 2.

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_I	Input Voltage	$V_O = 5V \text{ to } 18V$	35	V
		$V_O = 24V$	40	
$R_{\theta JC}$	Thermal Resistance Junction-Cases (TO-220)		5	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Air (TO-220)		65	$^{\circ}C/W$
T_{OPR}	Operating Temperature Range (KA78XXE/AE/ER)		0 to +125	$^{\circ}C$
T_{STG}	Storage Temperature Range		-65 to +150	$^{\circ}C$

Electrical Characteristics (KA7805E/KA7805ER)

Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 10\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7805E/ER			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.8	5.0	5.2	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 7\text{V to } 20\text{V}$	4.75	5.0	5.25	
Regline	Line Regulation ⁽¹⁾	$T_J = +25^{\circ}\text{C}$				mV
		$V_O = 7\text{V to } 25\text{V}$	–	4.0	100	
		$V_I = 8\text{V to } 12\text{V}$	–	1.6	50	
Regload	Load Regulation ⁽¹⁾	$T_J = +25^{\circ}\text{C}$				mV
		$I_O = 5.0\text{mA to } 1.5\text{A}$	–	9	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	4	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	–	0.03	0.5	mA
		$V_I = 7\text{V to } 25\text{V}$	–	0.3	1.3	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁾	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	42	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²⁾	$f = 120\text{Hz}$, $V_O = 8\text{V to } 18\text{V}$	62	73	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2	–	V
r_O	Output Resistance ⁽²⁾	$f = 1\text{kHz}$	–	15	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	230	–	mA
I_{PK}	Peak Current ⁽²⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7806E/KA7806ER) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 11\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7806E/ER			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.75	6.0	6.25	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 8.0\text{V to } 21\text{V}$	5.7	6.0	6.3	
Regline	Line Regulation ⁽³⁾	$T_J = +25^{\circ}\text{C}$				mV
		$V_I = 8\text{V to } 25\text{V}$	—	5	120	
		$V_I = 9\text{V to } 13\text{V}$	—	1.5	60	
Regload	Load Regulation ⁽³⁾	$T_J = +25^{\circ}\text{C}$				mV
		$I_O = 5\text{mA to } 1.5\text{A}$	—	9	120	
		$I_O = 250\text{mA to } 750\text{mA}$	—	3	60	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	—	—	0.5	mA
		$V_I = 8\text{V to } 25\text{V}$	—	—	1.3	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁴⁾	$I_O = 5\text{mA}$	—	-0.8	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	—	45	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽⁴⁾	$f = 120\text{Hz}$ $V_I = 9\text{V to } 19\text{V}$	59	75	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽⁴⁾	$f = 1\text{kHz}$	—	19	—	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	250	—	mA
I_{PK}	Peak Current ⁽⁴⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7808E/KA7808ER) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 14\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7808E/ER			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.7	8.0	8.3	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 10.5\text{V to } 23\text{V}$	7.6	8.0	8.4	
Regline	Line Regulation ⁽⁵⁾	$T_J = +25^{\circ}\text{C}$ $V_I = 10.5\text{V to } 25\text{V}$	—	5.0	160	mV
			—	2.0	80	
Regload	Load Regulation ⁽⁵⁾	$T_J = +25^{\circ}\text{C}$ $I_O = 5.0\text{mA to } 1.5\text{A}$	—	10	160	mV
			—	5.0	80	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	—	0.05	0.5	mA
		$V_I = 10.5\text{A to } 25\text{V}$	—	0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽⁶⁾	$I_O = 5\text{mA}$	—	-0.8	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	—	52	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽⁶⁾	$f = 120\text{Hz}$, $V_I = 11.5\text{V to } 21.5\text{V}$	56	73	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽⁶⁾	$f = 1\text{kHz}$	—	17	—	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	230	—	mA
I_{PK}	Peak Current ⁽⁶⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7809E/KA7809ER) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 15\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7809E/ER			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.65	9	9.35	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 11.5\text{V to } 24\text{V}$	8.6	9	9.4	
Regline	Line Regulation ⁽⁷⁾	$T_J = +25^{\circ}\text{C}$				mV
		$V_I = 11.5\text{V to } 25\text{V}$	–	6	180	
		$V_I = 12\text{V to } 17\text{V}$	–	2	90	
Regload	Load Regulation ⁽⁷⁾	$T_J = +25^{\circ}\text{C}$				mV
		$I_O = 5\text{mA to } 1.5\text{A}$	–	12	180	
		$I_O = 250\text{mA to } 750\text{mA}$	–	4	90	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	mA
		$V_I = 11.5\text{V to } 26\text{V}$	–	–	1.3	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁸⁾	$I_O = 5\text{mA}$	–	-1	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	58	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽⁸⁾	$f = 120\text{Hz}$ $V_I = 13\text{V to } 23\text{V}$	56	71	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2	–	V
r_O	Output Resistance ⁽⁸⁾	$f = 1\text{kHz}$	–	17	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽⁸⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7810E) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 16\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7810E			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.6	10.0	10.4	V
		$5\text{mA} \leq I_O \leq 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 12.5\text{V to } 25\text{V}$	9.5	10.0	10.5	
Regline	Line Regulation ⁽⁹⁾	$T_J = +25^{\circ}\text{C}$				mV
		$V_I = 12.5\text{V to } 25\text{V}$	–	10.0	200	
Regload	Load Regulation ⁽⁹⁾	$T_J = +25^{\circ}\text{C}$				mV
		$I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	200	
		$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	400	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA
		$V_I = 12.5\text{V to } 29\text{V}$	–	–	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁰⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	58.0	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽¹⁰⁾	$f = 120\text{Hz}$ $V_O = 13\text{V to } 23\text{V}$	56.0	71.0	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽¹⁰⁾	$f = 1\text{kHz}$	–	17.0	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽¹⁰⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

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

10. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7812E/KA7812ER) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 19\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7812E/ER			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.5	12	12.5	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 14.5\text{V to } 27\text{V}$	11.4	12	12.6	
Regline	Line Regulation ⁽¹¹⁾	$T_J = +25^{\circ}\text{C}$ $V_I = 14.5\text{V to } 30\text{V}$	–	10	240	mV
		$V_I = 16\text{V to } 22\text{V}$	–	3.0	120	
Regload	Load Regulation ⁽¹¹⁾	$T_J = +25^{\circ}\text{C}$ $I_O = 5\text{mA to } 1.5\text{A}$	–	11	240	mV
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	120	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	–	0.1	0.5	mA
		$V_I = 14.5\text{V to } 30\text{V}$	–	0.5	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹²⁾	$I_O = 5\text{mA}$	–	–1	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	76	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽¹²⁾	$f = 120\text{Hz}$ $V_I = 15\text{V to } 25\text{V}$	55	71	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2	–	V
r_O	Output Resistance ⁽¹²⁾	$f = 1\text{kHz}$	–	18	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	230	–	mA
I_{PK}	Peak Current ⁽¹²⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

11. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
12. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7815E) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 23\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7815E			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.4	15	15.6	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 17.5\text{V to } 30\text{V}$	14.25	15	15.75	
Regline	Line Regulation ⁽¹³⁾	$T_J = +25^{\circ}\text{C}$	—	11	300	mV
		$V_I = 17.5\text{V to } 30\text{V}$ $V_I = 20\text{V to } 26\text{V}$		3	150	
Regload	Load Regulation ⁽¹³⁾	$T_J = +25^{\circ}\text{C}$	—	12	300	mV
		$I_O = 5\text{mA to } 1.5\text{A}$ $I_O = 250\text{mA to } 750\text{mA}$	—	4	150	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	—	—	0.5	mA
		$V_I = 17.5\text{V to } 30\text{V}$	—	—	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁴⁾	$I_O = 5\text{mA}$	—	-1	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	—	90	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽¹⁴⁾	$f = 120\text{Hz}$ $V_I = 18.5\text{V to } 28.5\text{V}$	54	70	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽¹⁴⁾	$f = 1\text{kHz}$	—	19	—	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	250	—	mA
I_{PK}	Peak Current ⁽¹⁴⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

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

14. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7818E) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 27\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7818E			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.3	18	18.7	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 21\text{V to } 33\text{V}$	17.1	18	18.9	
Regline	Line Regulation ⁽¹⁵⁾	$T_J = +25^{\circ}\text{C}$ $V_I = 21\text{V to } 33\text{V}$	–	15	360	mV
		$V_I = 24\text{V to } 30\text{V}$	–	5	180	
Regload	Load Regulation ⁽¹⁵⁾	$T_J = +25^{\circ}\text{C}$ $I_O = 5\text{mA to } 1.5\text{A}$	–	15	360	mV
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	180	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	mA
		$V_I = 21\text{V to } 33\text{V}$	–	–	1	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁶⁾	$I_O = 5\text{mA}$	–	-1	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	110	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽¹⁶⁾	$f = 120\text{Hz}$ $V_I = 22\text{V to } 32\text{V}$	53	69	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2	–	V
r_O	Output Resistance ⁽¹⁶⁾	$f = 1\text{kHz}$	–	22	–	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽¹⁶⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

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

16. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7824E) (Continued)Refer to test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 33\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7824E			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	23	24	25	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 27\text{V to } 38\text{V}$	22.8	24	25.25	
Regline	Line Regulation ⁽¹⁷⁾	$T_J = +25^{\circ}\text{C}$				mV
		$V_I = 27\text{V to } 38\text{V}$	–	17	480	
		$V_I = 30\text{V to } 36\text{V}$	–	6	240	
Regload	Load Regulation ⁽¹⁷⁾	$T_J = +25^{\circ}\text{C}$				mV
		$I_O = 5\text{mA to } 1.5\text{A}$	–	15	480	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	240	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1.0\text{A}$	–	0.1	0.5	mA
		$V_I = 27\text{V to } 38\text{V}$	–	0.5	1	
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽¹⁸⁾	$I_O = 5\text{mA}$	–	-1.5	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	60	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽¹⁸⁾	$f = 120\text{Hz}$ $V_I = 28\text{V to } 38\text{V}$	50	67	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2	–	V
r_O	Output Resistance ⁽¹⁸⁾	$f = 1\text{kHz}$	–	28	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	230	–	mA
I_{PK}	Peak Current ⁽¹⁸⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

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

18. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7805AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 10\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7805AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.9	5	5.1	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 7.5\text{V to } 20\text{V}$	4.8	5	5.2	
Regline	Line Regulation ⁽¹⁹⁾	$V_I = 7.5\text{V to } 25\text{V}$ $I_O = 500\text{mA}$	—	5	50	mV
		$V_I = 8\text{V to } 12\text{V}$	—	3	50	
		$T_J = +25^{\circ}\text{C}$ $V_I = 7.3\text{V to } 20\text{V}$	—	5	50	
		$V_I = 8\text{V to } 12\text{V}$	—	1.5	25	
Regload	Load Regulation ⁽¹⁹⁾	$T_J = +25^{\circ}\text{C}$ $I_O = 5\text{mA to } 1.5\text{A}$	—	9	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	—	9	100	
		$I_O = 250\text{mA to } 750\text{mA}$	—	4	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	5.0	6.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	—	—	0.5	mA
		$V_I = 8\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	—	—	0.8	
		$V_I = 7.5\text{V to } 20\text{V}$, $T_J = +25^{\circ}\text{C}$	—	—	0.8	
$\Delta V/\Delta T$	Output Voltage Drift ⁽²⁰⁾	$I_O = 5\text{mA}$	—	-0.8	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	—	10	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²⁰⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 8\text{V to } 18\text{V}$	—	68	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽²⁰⁾	$f = 1\text{kHz}$	—	17	—	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	250	—	mA
I_{PK}	Peak Current ⁽²⁰⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

19. 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.

20. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7806AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 11\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7806AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.58	6	6.12	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 8.6\text{V to } 21\text{V}$	5.76	6	6.24	
Regline	Line Regulation ⁽²¹⁾	$V_I = 8.6\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	—	5	60	mV
		$V_I = 9\text{V to } 13\text{V}$	—	3	60	
		$T_J = +25^{\circ}\text{C}$ $V_I = 8.3\text{V to } 21\text{V}$	—	5	60	
		$V_I = 9\text{V to } 13\text{V}$	—	1.5	30	
Regload	Load Regulation ⁽²¹⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	—	9	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	—	9	100	
		$I_O = 250\text{mA to } 750\text{mA}$	—	5.0	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	4.3	6.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	—	—	0.5	mA
		$V_I = 9\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	—	—	0.8	
		$V_I = 8.5\text{V to } 21\text{V}$, $T_J = +25^{\circ}\text{C}$	—	—	0.8	
$\Delta V/\Delta T$	Output Voltage Drift ⁽²²⁾	$I_O = 5\text{mA}$	—	-0.8	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	—	10	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²²⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 9\text{V to } 19\text{V}$	—	65	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽²²⁾	$f = 1\text{kHz}$	—	17	—	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	250	—	mA
I_{PK}	Peak Current ⁽²²⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

21. 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.
22. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7808AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 14\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7808AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.84	8	8.16	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 10.6\text{V to } 23\text{V}$	7.7	8	8.3	
Regline	Line Regulation ⁽²³⁾	$V_I = 10.6\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	—	6	80	mV
		$V_I = 11\text{V to } 17\text{V}$	—	3	80	
		$T_J = +25^{\circ}\text{C}$ $V_I = 10.4\text{V to } 23\text{V}$ $V_I = 11\text{V to } 17\text{V}$	—	6	80	
			—	2	40	
Regload	Load Regulation ⁽²³⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	—	12	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	—	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	—	5	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	—	5.0	6.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	—	—	0.5	mA
		$V_I = 11\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	—	—	0.8	
		$V_I = 10.6\text{V to } 23\text{V}$, $T_J = +25^{\circ}\text{C}$	—	—	0.8	
$\Delta V/\Delta T$	Output Voltage Drift ⁽²⁴⁾	$I_O = 5\text{mA}$	—	-0.8	—	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	—	10	—	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²⁴⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 11.5\text{V to } 21.5\text{V}$	—	62	—	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	—	2	—	V
r_O	Output Resistance ⁽²⁴⁾	$f = 1\text{kHz}$	—	18	—	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	—	250	—	mA
I_{PK}	Peak Current ⁽²⁴⁾	$T_J = +25^{\circ}\text{C}$	—	2.2	—	A

Notes:

23. 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.

24. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7809AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 15\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7809AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.82	9.0	9.18	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 11.2\text{V to } 24\text{V}$	8.65	9.0	9.35	
Regline	Line Regulation ⁽²⁵⁾	$V_I = 11.7\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	–	6	90	mV
		$V_I = 12.5\text{V to } 19\text{V}$	–	4	45	
		$T_J = +25^{\circ}\text{C}$ $V_I = 11.5\text{V to } 24\text{V}$	–	6	90	
		$V_I = 12.5\text{V to } 19\text{V}$	–	2	45	
Regload	Load Regulation ⁽²⁵⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.0\text{A}$	–	12	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	–	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA
ΔI_Q	Quiescent Current Change	$V_I = 11.7\text{V to } 25\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.8	mA
		$V_I = 12\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	
$\Delta V/\Delta T$	Output Voltage Drift ⁽²⁶⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	10	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²⁶⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 12\text{V to } 22\text{V}$	–	62	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽²⁶⁾	$f = 1\text{kHz}$	–	17	–	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽²⁶⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

25. 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.

26. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7810AE) (Continued)

Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 16\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7810AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.8	10.0	10.2	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 12.8\text{V to } 25\text{V}$	9.6	10.0	10.4	
Regline	Line Regulation ⁽²⁷⁾	$V_I = 12.8\text{V to } 26\text{V}$, $I_O = 500\text{mA}$	–	8.0	100	mV
		$V_I = 13\text{V to } 20\text{V}$	–	4.0	50.0	
		$T_J = +25^{\circ}\text{C}$ $V_I = 12.5\text{V to } 25\text{V}$	–	8.0	100	
		$V_I = 13\text{V to } 20\text{V}$	–	3.0	50.0	
Regload	Load Regulation ⁽²⁷⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA
ΔI_Q	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA
		$V_I = 12.8\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$V_I = 13\text{V to } 26\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.5	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁸⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽²⁸⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 14\text{V to } 24\text{V}$	–	62.0	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽²⁸⁾	$f = 1\text{kHz}$	–	17.0	–	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽²⁸⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

27. 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.

28. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7812AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 19\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7812AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.75	12	12.25	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 14.8\text{V to } 27\text{V}$	11.5	12	12.5	
Regline	Line Regulation ⁽²⁹⁾	$V_I = 14.8\text{V to } 30\text{V}$, $I_O = 500\text{mA}$	–	10	120	mV
		$V_I = 16\text{V to } 22\text{V}$	–	4	120	
		$T_J = +25^{\circ}\text{C}$ $V_I = 14.5\text{V to } 27\text{V}$	–	10	120	
		$V_I = 16\text{V to } 22\text{V}$	–	3	60	
Regload	Load Regulation ⁽²⁹⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	–	12	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	–	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	6.0	mA
ΔI_Q	Quiescent Current Change	$V_I = 15\text{V to } 30\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.8	mA
		$V_I = 14\text{V to } 27\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	
$\Delta V/\Delta T$	Output Voltage Drift ⁽³⁰⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	10	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽³⁰⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 14\text{V to } 24\text{V}$	–	60	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽³⁰⁾	$f = 1\text{kHz}$	–	18	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽³⁰⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

29. 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.

30. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7815AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 23\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7815AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.7	15	15.3	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 17.7\text{V to } 30\text{V}$	14.4	15	15.6	
Regline	Line Regulation ⁽³¹⁾	$V_I = 17.9\text{V to } 30\text{V}$, $I_O = 500\text{mA}$	–	10	150	mV
		$V_I = 20\text{V to } 26\text{V}$	–	5	150	
		$T_J = +25^{\circ}\text{C}$ $V_I = 17.5\text{V to } 30\text{V}$	–	11	150	
		$V_I = 20\text{V to } 26\text{V}$	–	3	75	
Regload	Load Regulation ⁽³¹⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	–	12	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	–	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA
ΔI_Q	Quiescent Current Change	$V_I = 17.5\text{V to } 30\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.8	mA
		$V_I = 17.5\text{V to } 30\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	
$\Delta V/\Delta T$	Output Voltage Drift ⁽³²⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	10	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽³²⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 18.5\text{V to } 28.5\text{V}$	–	58	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽³²⁾	$f = 1\text{kHz}$	–	19	–	m Ω
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽³²⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

31. 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.

32. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7818AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 27\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7818AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.64	18	18.36	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 21\text{V to } 33\text{V}$	17.3	18	18.7	
Regline	Line Regulation ⁽³³⁾	$V_I = 21\text{V to } 33\text{V}$, $I_O = 500\text{mA}$	–	15	180	mV
		$V_I = 21\text{V to } 33\text{V}$	–	5	180	
		$T_J = +25^{\circ}\text{C}$ $V_I = 20.6\text{V to } 33\text{V}$	–	15	180	
		$V_I = 24\text{V to } 30\text{V}$	–	5	90	
Regload	Load Regulation ⁽³³⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	–	15	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	–	15	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	7	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA
ΔI_Q	Quiescent Current Change	$V_I = 21\text{V to } 33\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.8	mA
		$V_I = 21\text{V to } 33\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	
$\Delta V/\Delta T$	Output Voltage Drift ⁽³⁴⁾	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$	–	10	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽³⁴⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 22\text{V to } 32\text{V}$	–	57	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽³⁴⁾	$f = 1\text{kHz}$	–	19	–	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽³⁴⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:33. 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.

34. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7824AE) (Continued)Refer to the test circuits. $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 33\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	KA7824AE			Unit
			Min.	Typ.	Max.	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.5	24	24.5	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 27.3\text{V to } 38\text{V}$	23	24	25	
Regline	Line Regulation ⁽³⁵⁾	$V_I = 27\text{V to } 38\text{V}$, $I_O = 500\text{mA}$	–	18	240	mV
		$V_I = 21\text{V to } 33\text{V}$	–	6	240	
		$T_J = +25^{\circ}\text{C}$ $V_I = 26.7\text{V to } 38\text{V}$	–	18	240	
		$V_I = 30\text{V to } 36\text{V}$	–	6	120	
Regload	Load Regulation ⁽³⁵⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	–	15	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	–	15	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	7	50	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA
ΔI_Q	Quiescent Current Change	$V_I = 27.3\text{V to } 38\text{V}$, $T_J = +25^{\circ}\text{C}$	–	–	0.8	mA
		$V_I = 27.3\text{V to } 38\text{V}$, $I_O = 500\text{mA}$	–	–	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	–	–	0.5	
$\Delta V/\Delta T$	Output Voltage Drift ⁽³⁶⁾	$I_O = 5\text{mA}$	–	-1.5	–	mV/ $^{\circ}\text{C}$
V_N	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = 25^{\circ}\text{C}$	–	10	–	$\mu\text{V}/V_O$
RR	Ripple Rejection ⁽³⁶⁾	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 28\text{V to } 38\text{V}$	–	54	–	dB
V_{Drop}	Dropout Voltage	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
r_O	Output Resistance ⁽³⁶⁾	$f = 1\text{kHz}$	–	20	–	$\text{m}\Omega$
I_{SC}	Short Circuit Current	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	–	250	–	mA
I_{PK}	Peak Current ⁽³⁶⁾	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

Notes:

35. 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.

36. These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

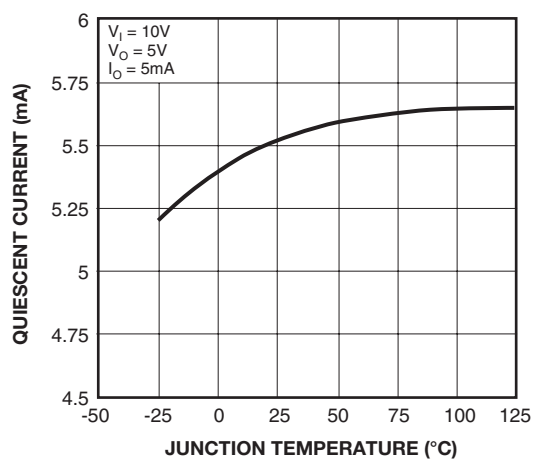


Figure 3. Quiescent Current

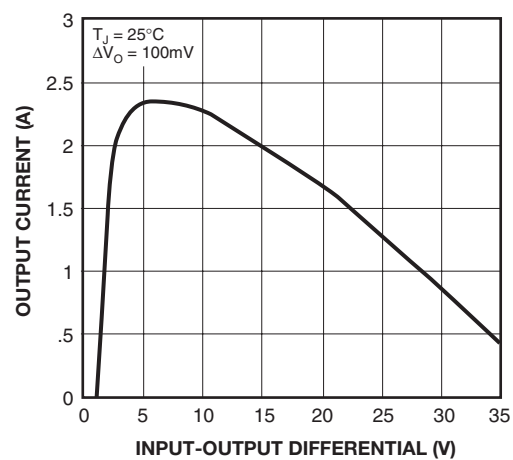


Figure 4. Peak Output Current

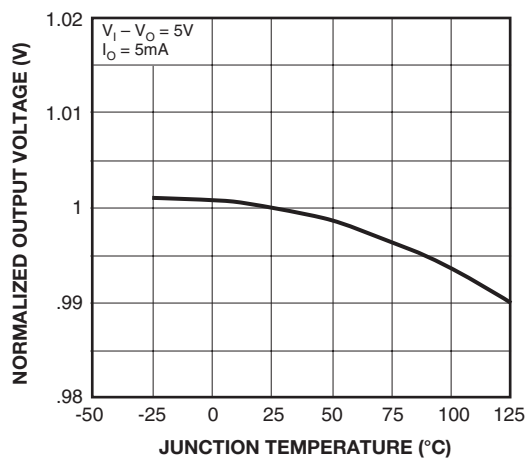


Figure 5. Output Voltage

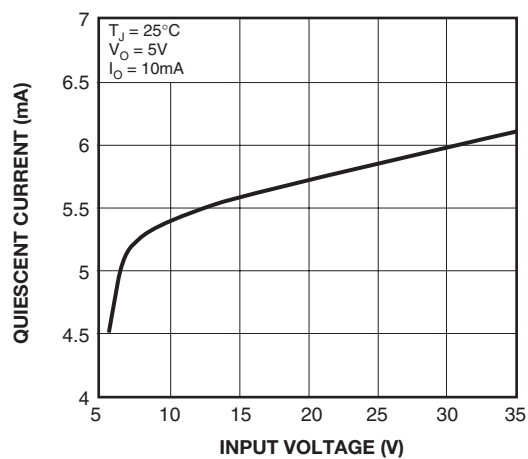


Figure 6. Quiescent Current

Typical Applications

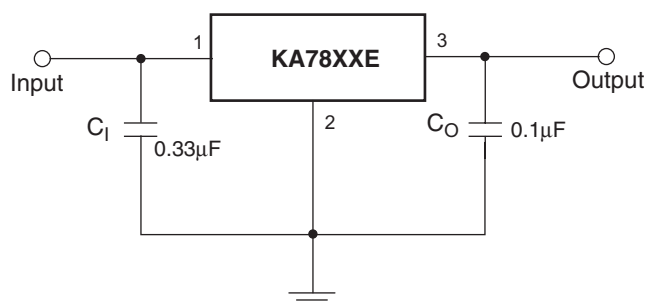


Figure 7. DC Parameters

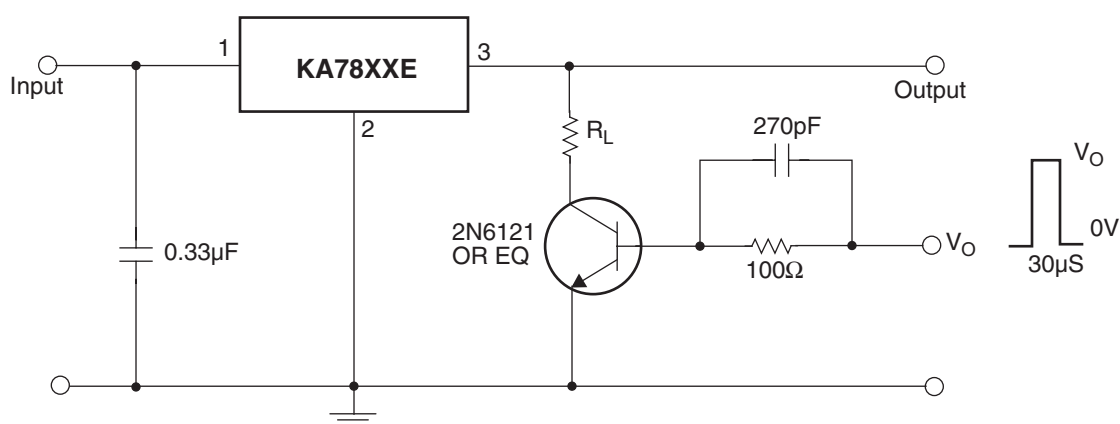


Figure 8. Load Regulation

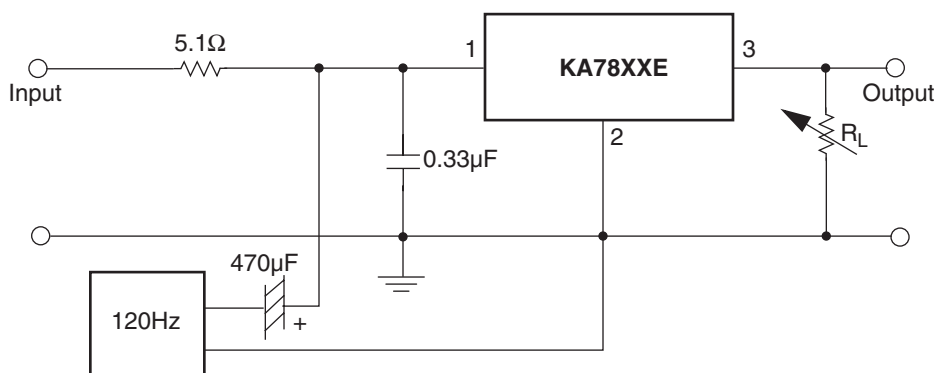


Figure 9. Ripple Rejection

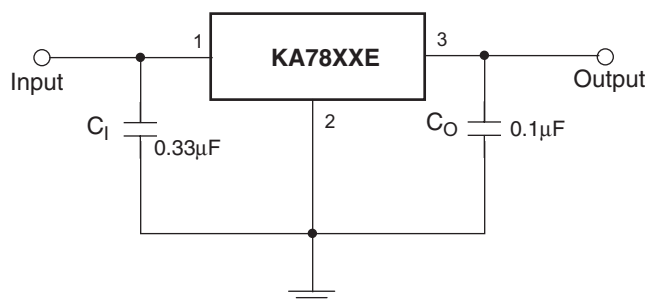


Figure 10. Fixed Output Regulator

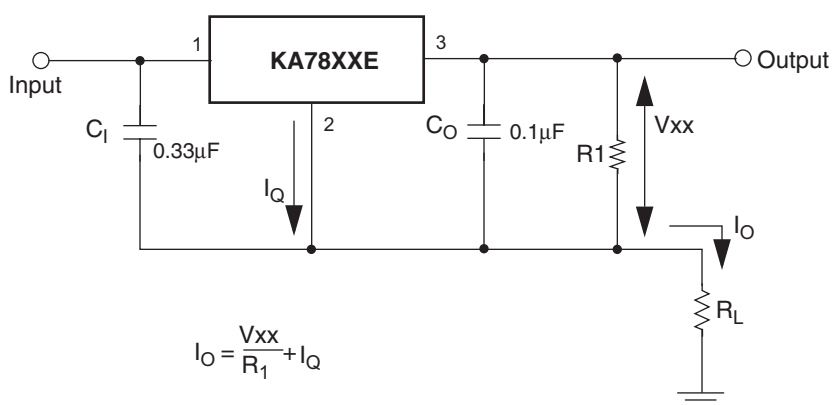


Figure 11. Constant Current Regulator

Notes:

1. To specify an output voltage, substitute voltage value for "XX." A common ground is required between the input and the Output voltage. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.
2. C_1 is required if regulator is located an appreciable distance from power Supply filter.
3. C_0 improves stability and transient response.

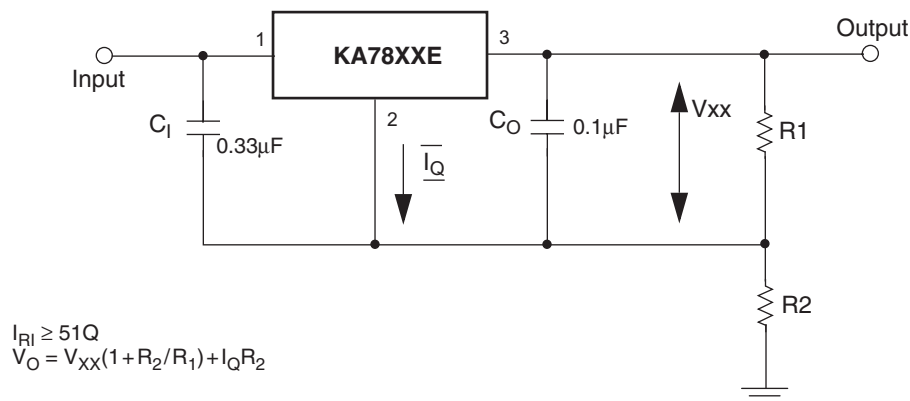


Figure 12. Circuit for Increasing Output Voltage

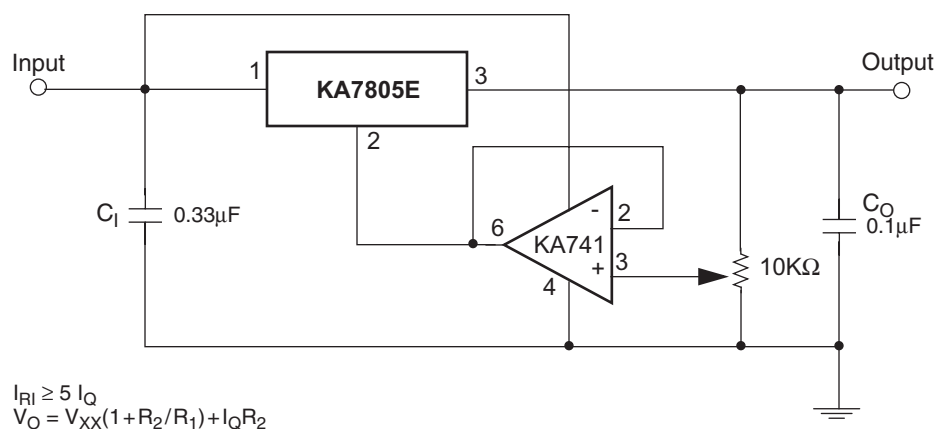


Figure 13. Adjustable Output Regulator (7 to 30V)

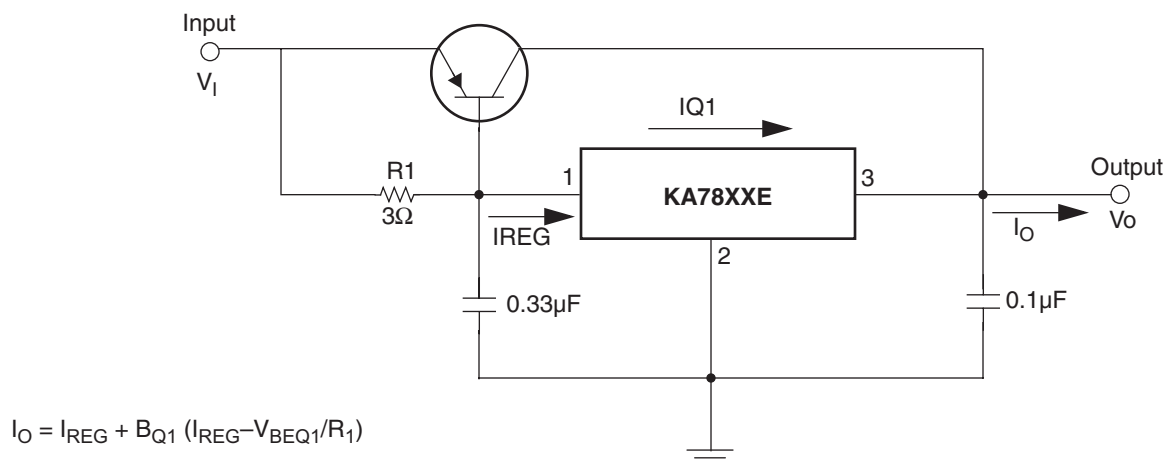


Figure 14. High Current Voltage Regulator

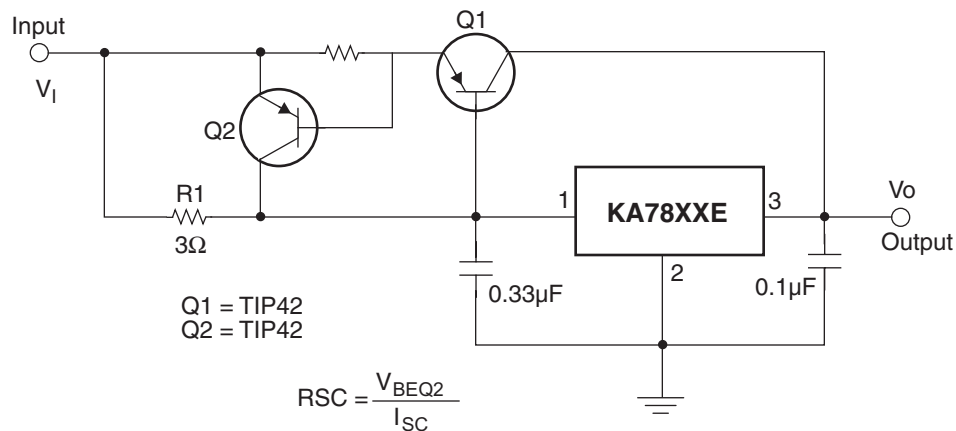


Figure 15. High Output Current with Short Circuit Protection

www.fairchildsemi.com

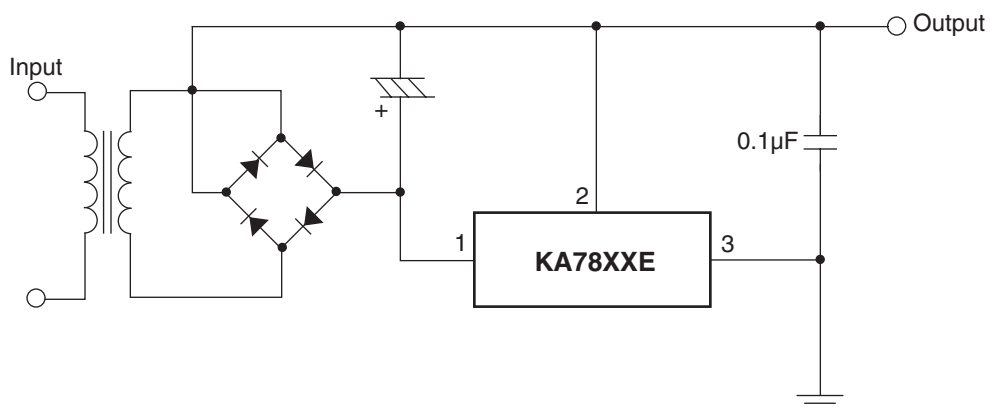


Figure 18. Negative Output Voltage Circuit

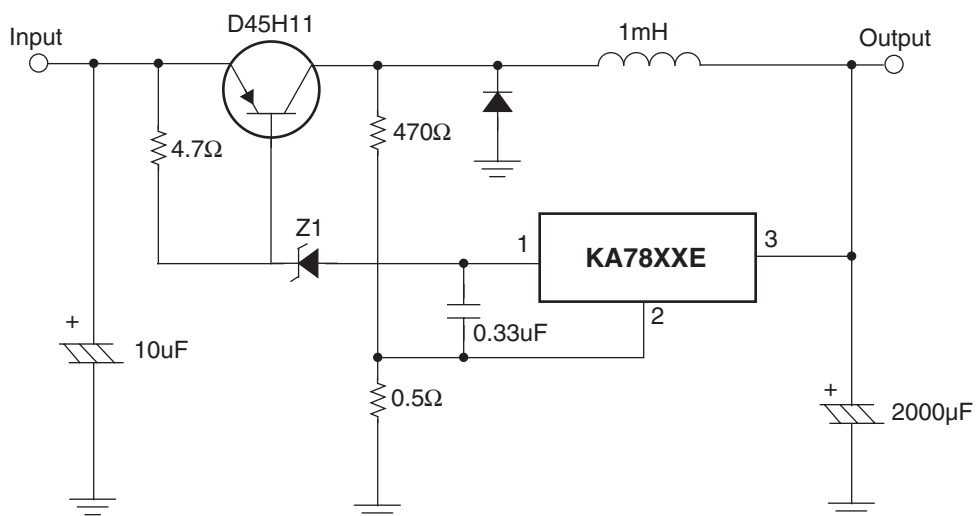
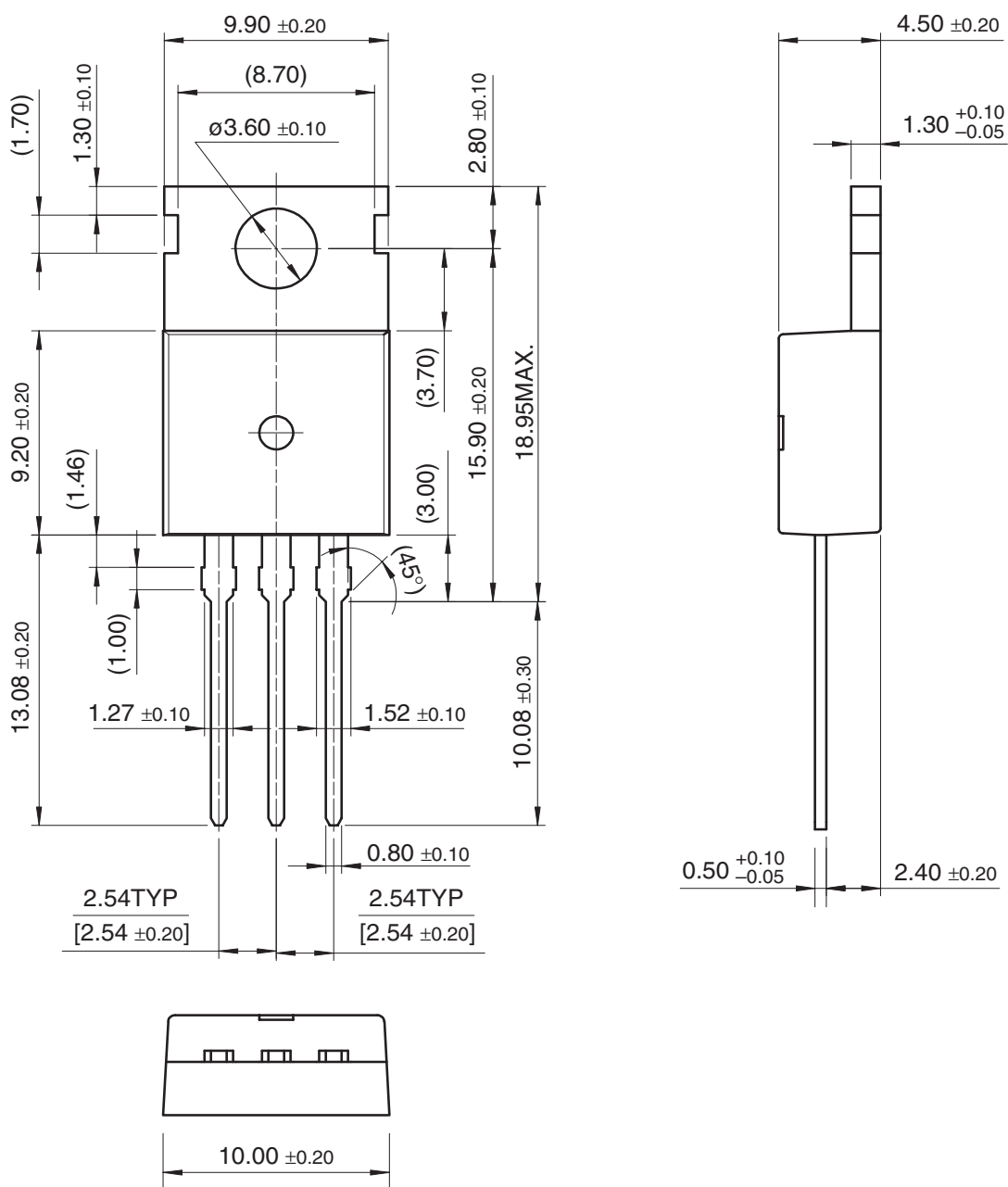


Figure 19. Switching Regulator

Mechanical Dimensions

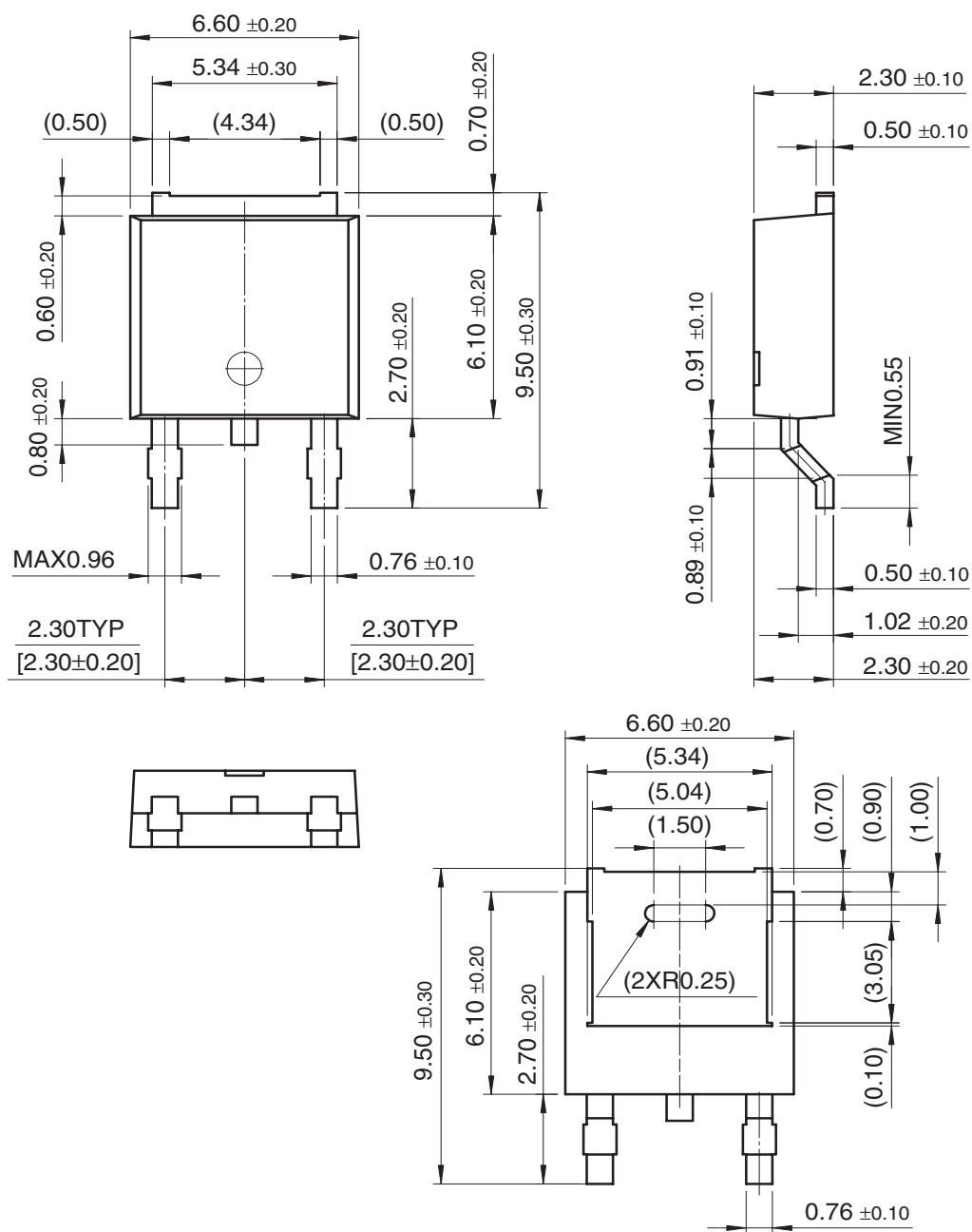
Dimensions in millimeters

TO-220



Mechanical Dimensions (Continued)

Dimensions in millimeters

D-PAK

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACE ^x ™	FAST [®]	ISOPLANAR™	PowerEdge™	SuperFET™
ActiveArray™	FAST ^r ™	LittleFET™	PowerSaver™	SuperSOT™-3
Bottomless™	FPS™	MICROCOUPLER™	PowerTrench [®]	SuperSOT™-6
Build it Now™	FRFET™	MicroFET™	QFET [®]	SuperSOT™-8
CoolFET™	GlobalOptoisolator™	MicroPak™	QS™	SyncFET™
CROSSVOLT™	GTO™	MICROWIRE™	QT Optoelectronics™	TCM™
DOME™	HiSeC™	MSX™	Quiet Series™	TinyLogic [®]
EcoSPARK™	I ² C™	MSXPro™	RapidConfigure™	TINYOPTO™
E ² C MOS™	i-Lo™	OCX™	RapidConnect™	TruTranslation™
EnSigna™	ImpliedDisconnect™	OCXPro™	μSerDes™	UHC™
FACT™	IntelliMAX™	OPTOLOGIC [®]	ScalarPump™	UniFET™
FACT Quiet Series™		OPTOPLANAR™	SILENT SWITCHER [®]	UltraFET [®]
Across the board. Around the world.™		PACMAN™	SMART START™	VCX™
The Power Franchise [®]		POP™	SPM™	Wire™
Programmable Active Droop™		Power247™	Stealth™	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. 119