



March 2015

# KA78XXE / KA78XXAE

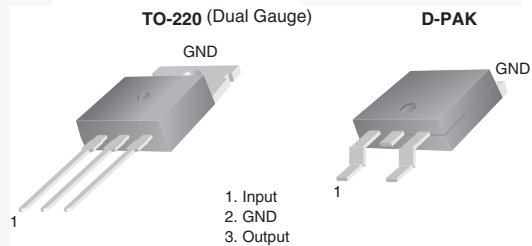
## 3-Terminal 1 A Positive Voltage Regulator

### Features

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

### Description

The KA78XXE / KA78XXAE series of three-terminal positive regulators is available in the TO-220 / D-PAK package 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. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed-voltage regulators, these devices can be used with external components for adjustable voltages and currents.



### Block Diagram

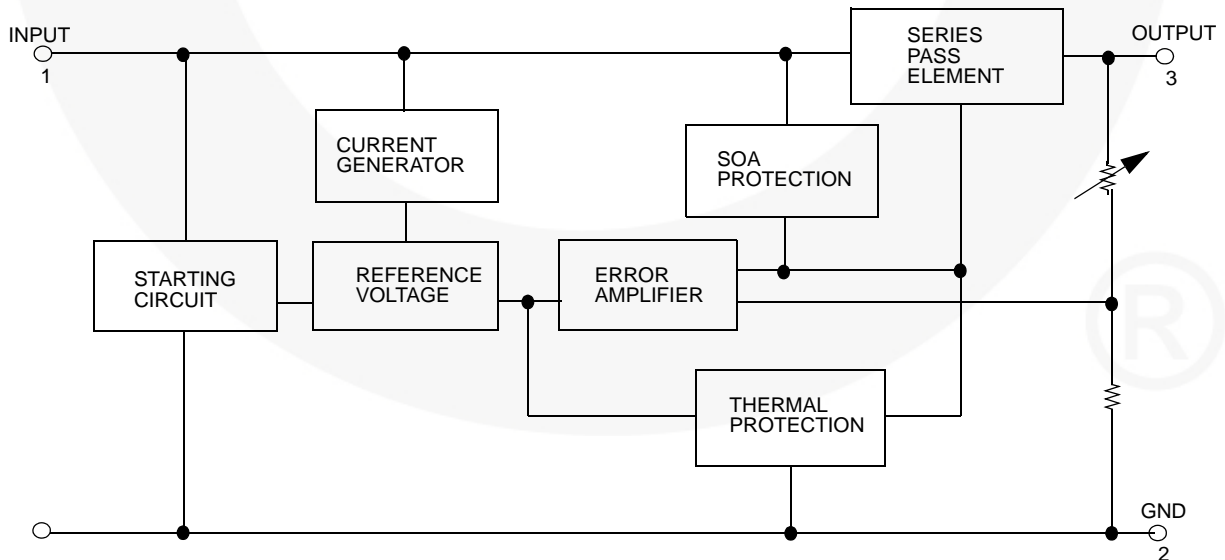


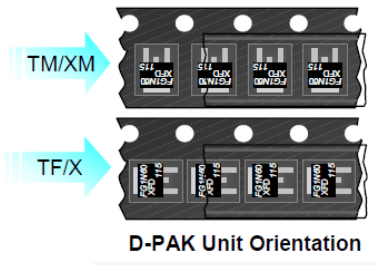
Figure 1. Block Diagram

### Ordering Information

Product Number	Output Voltage Tolerance <sup>(1)</sup>	Package	Operating Temperature	Parking Method
KA7805ETU	±4%	TO-220 (Dual Gauge)	-40°C to +125°C	Rail
KA7806ETU				
KA7808ETU				
KA7809ETU				
KA7810ETU				
KA7812ETU				
KA7815ETU				
KA7818ETU				
KA7824ETU				
KA7805ERTF				
KA7805ERTM				
KA7808ERTM				
KA7809ERTM				
KA7812ERTM				
KA7805AETU	±2%	TO-220 (Dual Gauge)	0°C to +125°C	Rail
KA7809AETU				
KA7810AETU				
KA7812AETU				
KA7815AETU				
KA7824AETU				

**Notes:**

1. Above output voltage tolerance is available at 25°C.
2. Refer to below figure for TM / TF Suffix for DPAK.



## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit	
$V_I$	Input Voltage	$V_O = 5\text{ V to }18\text{ V}$	35	V
		$V_O = 24\text{ V}$	40	V
$R_{\theta JC}$	Thermal Resistance Junction-Case (TO-220)	5	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance Junction-Air (TO-220)	65	$^\circ\text{C/W}$	
$T_{OPR}$	Operating Temperature Range	KA78XXE / KA78XXER	-40 to +125	$^\circ\text{C}$
		KA78XXAE	0 to +125	
$T_{STG}$	Storage Temperature Range	-65 to +150	$^\circ\text{C}$	

**Electrical Characteristics (KA7805E / KA7805ER)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 10 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.80	5.00	5.20	V	
		$5.0 \text{ mA } I_O \text{ 1.0 A, } P_O \text{ 15 W, } V_I = 7 \text{ V to } 20 \text{ V}$	4.75	5.00	5.25		
Regline	Line Regulation <sup>(3)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 7 \text{ V to } 25 \text{ V}$		4.0	100.0	mV
			$V_I = 8 \text{ V to } 12 \text{ V}$		1.6	50.0	
Regload	Load Regulation <sup>(3)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5.0 \text{ mA to } 1.5 \text{ A}$		9	100	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		4	50	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5	8	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5 \text{ mA to } 1.0 \text{ A}$		0.03	0.50	mA	
			$V_I = 7 \text{ V to } 25 \text{ V}$		0.30		1.30
$\Delta V_O / \Delta T$	Output Voltage Drift <sup>(4)</sup>	$I_O = 5 \text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(4)</sup>	$f = 120 \text{ Hz, } V_I = 8 \text{ V to } 18 \text{ V}$	62	73		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A, } T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(4)</sup>	$f = 1 \text{ kHz}$		15		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V, } T_A = +25^{\circ}\text{C}$		230		mA	
$I_{\text{PK}}$	Peak Current <sup>(4)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7806E)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{ mA}$ ,  $V_I = 11\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.75	6.00	6.25	V	
		5.0 mA $I_O$ 1.0 A, $P_O$ 15 W, $V_I = 8.0\text{ V to }21\text{ V}$	5.70	6.00	6.30		
Regline	Line Regulation <sup>(5)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 8\text{ V to }25\text{ V}$		5.0	120.0	mV
			$V_I = 9\text{ V to }13\text{ V}$		1.5	60.0	
Regload	Load Regulation <sup>(5)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		9	120	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		3	60	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5	8	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$ $V_I = 8\text{ V to }25\text{ V}$			0.5	mA	
					1.3		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(6)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(6)</sup>	$f = 120\text{ Hz}$ , $V_I = 9\text{ V to }19\text{ V}$	59	75		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(6)</sup>	$f = 1\text{ kHz}$		19		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(6)</sup>	$T_J = +25^{\circ}\text{C}$		2.2		A	

**Notes:**

5. 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.
6. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (KA7808E / KA7808ER)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 14 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.7	8.0	8.3	V	
		$5.0 \text{ mA } I_O \text{ } 1.0 \text{ A}, P_O \text{ } 15 \text{ W}, V_I = 10.5 \text{ V to } 23 \text{ V}$	7.6	8.0	8.4		
Regline	Line Regulation <sup>(7)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5 \text{ V to } 25 \text{ V}$		5	160	mV
			$V_I = 11.5 \text{ V to } 17 \text{ V}$		2	80	
Regload	Load Regulation <sup>(7)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5.0 \text{ mA to } 1.5 \text{ A}$		10	160	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		5	80	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5	8	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5 \text{ mA to } 1.0 \text{ A}$		0.05	0.50	mA	
		$V_I = 10.5 \text{ V to } 25 \text{ V}$		0.50	1.00		
$\Delta V_O / \Delta T$	Output Voltage Drift <sup>(8)</sup>	$I_O = 5 \text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(8)</sup>	$f = 120 \text{ Hz}, V_I = 11.5 \text{ V to } 21.5 \text{ V}$	56	73		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A}, T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(8)</sup>	$f = 1 \text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V}, T_A = +25^{\circ}\text{C}$		230		mA	
$I_{\text{PK}}$	Peak Current <sup>(8)</sup>	$T_J = +25^{\circ}\text{C}$		2.2		A	

**Notes:**

7. 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.
8. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (KA7809E / KA7809ER)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 15 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.65	9.00	9.35	V	
		$5.0 \text{ mA} \leq I_O \leq 1.0 \text{ A}$ , $P_O \leq 15 \text{ W}$ , $V_I = 11.5 \text{ V to } 24 \text{ V}$	8.60	9.00	9.40		
Regline	Line Regulation <sup>(9)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5 \text{ V to } 25 \text{ V}$		6	180	mV
			$V_I = 12 \text{ V to } 17 \text{ V}$		2	90	
Regload	Load Regulation <sup>(9)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		12	180	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		4	90	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5	8	mA	
$\Delta I_Q$	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 <sup>(10)</sup>	$I_O = 5 \text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(10)</sup>	$f = 120 \text{ Hz}$ , $V_I = 13 \text{ V to } 23 \text{ V}$	56	71		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(10)</sup>	$f = 1 \text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(10)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7810E)

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{ mA}$ ,  $V_I = 16\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.6	10.0	10.4	V	
		$5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ , $P_O \leq 15\text{ W}$ , $V_I = 12.5\text{ V to } 25\text{ V}$	9.5	10.0	10.5		
Regline	Line Regulation <sup>(11)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{ V to } 25\text{ V}$		10	200	mV
			$V_I = 13\text{ V to } 25\text{ V}$		3	100	
Regload	Load Regulation <sup>(11)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to } 1.5\text{ A}$		12	200	mV
			$I_O = 250\text{ mA to } 750\text{ mA}$		4	400	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.1	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{ mA to } 1.0\text{ A}$			0.5	mA	
		$V_I = 12.5\text{ V to } 29\text{ V}$			1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(12)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(12)</sup>	$f = 120\text{ Hz}$ , $V_I = 13\text{ V to } 23\text{ V}$	56	71		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(12)</sup>	$f = 1\text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(12)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7812E / KA7812ER)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{ mA}$ ,  $V_I = 19\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.5	12.0	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	12.0	12.6		
Regline	Line Regulation <sup>(13)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{ V to } 30\text{ V}$		10	240	mV
			$V_I = 16\text{ V to } 22\text{ V}$		3	120	
Regload	Load Regulation <sup>(13)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to } 1.5\text{ A}$		11	240	mV
			$I_O = 250\text{ mA to } 750\text{ mA}$		5	120	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.1	8.0	mA	
$\Delta I_Q$	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 <sup>(14)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(14)</sup>	$f = 120\text{ Hz}$ , $V_I = 15\text{ V to } 25\text{ V}$	55	71		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(14)</sup>	$f = 1\text{ kHz}$		18		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		230		mA	
$I_{\text{PK}}$	Peak Current <sup>(14)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7815E)

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 23 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.40	15.00	15.60	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	15.00	15.75		
Regline	Line Regulation <sup>(15)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 17.5 \text{ V to } 30 \text{ V}$		11	300	mV
			$V_I = 20 \text{ V to } 26 \text{ V}$		3	150	
Regload	Load Regulation <sup>(15)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		12	300	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		4	150	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
$\Delta I_Q$	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 <sup>(16)</sup>	$I_O = 5 \text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(16)</sup>	$f = 120 \text{ Hz}$ , $V_I = 18.5 \text{ V to } 28.5 \text{ V}$	54	70		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(16)</sup>	$f = 1 \text{ kHz}$		19		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(16)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7818E)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 27 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.3	18.0	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	18.0	18.9		
Regline	Line Regulation <sup>(17)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 21 \text{ V to } 33 \text{ V}$		15	360	mV
			$V_I = 24 \text{ V to } 30 \text{ V}$		5	180	
Regload	Load Regulation <sup>(17)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		15	360	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		5	180	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5 \text{ mA to } 1.0 \text{ A}$			0.5	mA	
		$V_I = 21 \text{ V to } 33 \text{ V}$			1.0		
$\Delta V_O / \Delta T$	Output Voltage Drift <sup>(18)</sup>	$I_O = 5 \text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(18)</sup>	$f = 120 \text{ Hz}$ , $V_I = 22 \text{ V to } 32 \text{ V}$	53	69		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(18)</sup>	$f = 1 \text{ kHz}$		22		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(18)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7824E)**

Refer to test circuit,  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500 \text{ mA}$ ,  $V_I = 33 \text{ V}$ ,  $C_I = 0.33 \mu\text{F}$ ,  $C_O = 0.1 \mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.00	24.00	25.00	V	
		$5.0 \text{ mA} \leq I_O \leq 1.0 \text{ A}$ , $P_O \leq 15 \text{ W}$ , $V_I = 27 \text{ V to } 38 \text{ V}$	22.80	24.00	25.25		
Regline	Line Regulation <sup>(19)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 27 \text{ V to } 38 \text{ V}$		17	480	mV
			$V_I = 30 \text{ V to } 36 \text{ V}$		6	240	
Regload	Load Regulation <sup>(19)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		15	480	mV
			$I_O = 250 \text{ mA to } 750 \text{ mA}$		5	240	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
$\Delta I_Q$	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	1.0		
$\Delta V_O / \Delta T$	Output Voltage Drift <sup>(20)</sup>	$I_O = 5 \text{ mA}$		-1.5		mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10 \text{ Hz to } 100 \text{ kHz}$ , $T_A = +25^{\circ}\text{C}$		120		$\mu\text{V}$	
RR	Ripple Rejection <sup>(20)</sup>	$f = 120 \text{ Hz}$ , $V_I = 28 \text{ V to } 38 \text{ V}$	50	67		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1 \text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(20)</sup>	$f = 1 \text{ kHz}$		28		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35 \text{ V}$ , $T_A = +25^{\circ}\text{C}$		230		mA	
$I_{\text{PK}}$	Peak Current <sup>(20)</sup>	$T_J = +25^{\circ}\text{C}$		2.2		A	

**Notes:**

19. 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.
20. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (KA7805AE)**

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.9	5.0	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	5.0	5.2		
Regline	Line Regulation <sup>(21)</sup>	$V_I = 7.5\text{ V to }25\text{ V}$ , $I_O = 500\text{ mA}$		5.0	50.0	mV	
		$V_I = 8\text{ V to }12\text{ V}$		3.0	50.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 7.3\text{ V to }20\text{ V}$		5.0		50.0
			$V_I = 8\text{ V to }12\text{ V}$		1.5		25.0
Regload	Load Regulation <sup>(21)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.5\text{ A}$		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	6	mA	
$\Delta I_Q$	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 <sup>(22)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(22)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 8\text{ V to }18\text{ V}$		68		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(22)</sup>	$f = 1\text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(22)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7809AE)**Refer to the test circuit,  $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$ ,  $I_O = 1\text{ A}$ ,  $V_I = 15\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.82	9.00	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	9.00	9.35		
Regline	Line Regulation <sup>(23)</sup>	$V_I = 11.7\text{ V to }25\text{ V}$ , $I_O = 500\text{ mA}$		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 <sup>(23)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.0\text{ A}$		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	6	mA	
$\Delta I_Q$	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 <sup>(24)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(24)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 12\text{ V to }22\text{ V}$		62		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(24)</sup>	$f = 1\text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(24)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7810AE)**

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	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 <sup>(25)</sup>	$V_I = 12.8\text{ V to }26\text{ V}$ , $I_O = 500\text{ mA}$		8	100	mV	
		$V_I = 13\text{ V to }20\text{ V}$		4	50		
		$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{ V to }25\text{ V}$		8		100
			$V_I = 13\text{ V to }20\text{ V}$		3		50
Regload	Load Regulation <sup>(25)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.5\text{ A}$		12	100	mV	
		$I_O = 5\text{ mA to }1\text{ mA}$		12	100		
		$I_O = 250\text{ mA to }750\text{ mA}$		5	50		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5	6	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{ mA to }1.0\text{ A}$			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		
$\Delta V/\Delta T$	Output Voltage Drift <sup>(26)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(26)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 14\text{ V to }24\text{ V}$		62		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(26)</sup>	$f = 1\text{ kHz}$		17		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(26)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7812AE)**Refer to the test circuit,  $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$ ,  $I_O = 1\text{ A}$ ,  $V_I = 19\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.75	12.00	12.25	V	
		$I_O = 5\text{ mA to }1\text{ A}$ , $P_O \leq 15\text{ W}$ , $V_I = 14.8\text{ V to }27\text{ V}$	11.50	12.00	12.50		
Regline	Line Regulation <sup>(27)</sup>	$V_I = 14.8\text{ V to }30\text{ V}$ , $I_O = 500\text{ mA}$		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 <sup>(27)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.5\text{ A}$		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	
$\Delta I_Q$	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 <sup>(28)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(28)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 14\text{ V to }24\text{ V}$		60		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(28)</sup>	$f = 1\text{ kHz}$		18		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(28)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7815AE)**

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.7	15.0	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	15.0	15.6		
Regline	Line Regulation <sup>(29)</sup>	$V_I = 17.9\text{ V to }30\text{ V}$ , $I_O = 500\text{ mA}$		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 <sup>(29)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.5\text{ A}$		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	
$\Delta I_Q$	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 <sup>(30)</sup>	$I_O = 5\text{ mA}$		-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		$\mu\text{V}$	
RR	Ripple Rejection <sup>(30)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 18.5\text{ V to }28.5\text{ V}$		58		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(30)</sup>	$f = 1\text{ kHz}$		19		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(30)</sup>	$T_J = +25^{\circ}\text{C}$		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 (KA7824AE)**Refer to the test circuit,  $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$ ,  $I_O = 1\text{ A}$ ,  $V_I = 33\text{ V}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.5	24.0	24.5	V	
		$I_O = 5\text{ mA to }1\text{ A}$ , $P_O \leq 15\text{ W}$ , $V_I = 27.3\text{ V to }38\text{ V}$	23.0	24.0	25.0		
Regline	Line Regulation <sup>(31)</sup>	$V_I = 27\text{ V to }38\text{ V}$ , $I_O = 500\text{ mA}$		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 <sup>(31)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{ mA to }1.5\text{ A}$		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	
$\Delta I_Q$	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 <sup>(32)</sup>	$I_O = 5\text{ mA}$		-1.5		mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$ , $T_A = +25^{\circ}\text{C}$		120		$\mu\text{V}$	
RR	Ripple Rejection <sup>(32)</sup>	$f = 120\text{ Hz}$ , $I_O = 500\text{ mA}$ , $V_I = 28\text{ V to }38\text{ V}$		54		dB	
$V_{\text{Drop}}$	Dropout Voltage	$I_O = 1\text{ A}$ , $T_J = +25^{\circ}\text{C}$		2		V	
$R_O$	Output Resistance <sup>(32)</sup>	$f = 1\text{ kHz}$		20		m $\Omega$	
$I_{\text{SC}}$	Short-Circuit Current	$V_I = 35\text{ V}$ , $T_A = +25^{\circ}\text{C}$		250		mA	
$I_{\text{PK}}$	Peak Current <sup>(32)</sup>	$T_J = +25^{\circ}\text{C}$		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.

Typical Performance Characteristics

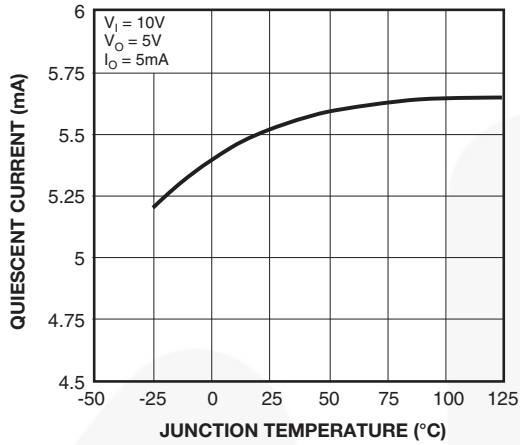


Figure 2. Quiescent Current

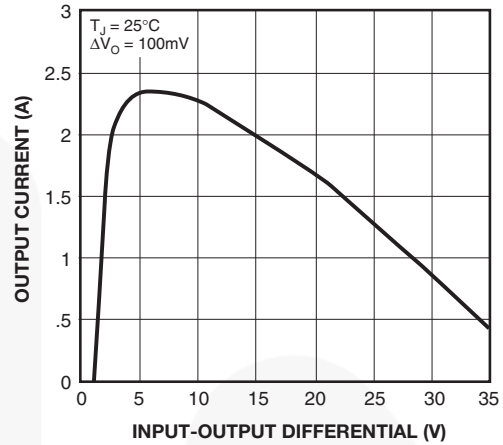


Figure 3. Peak Output Current

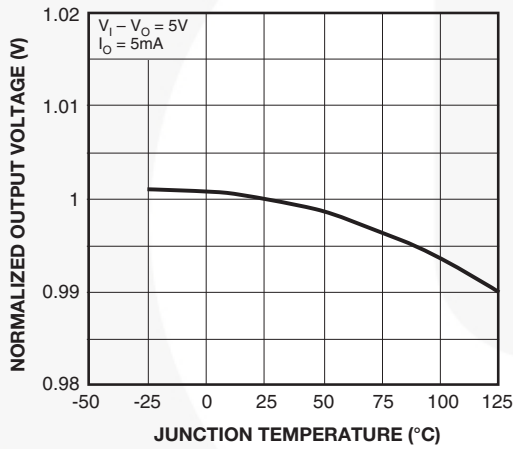


Figure 4. Output Voltage

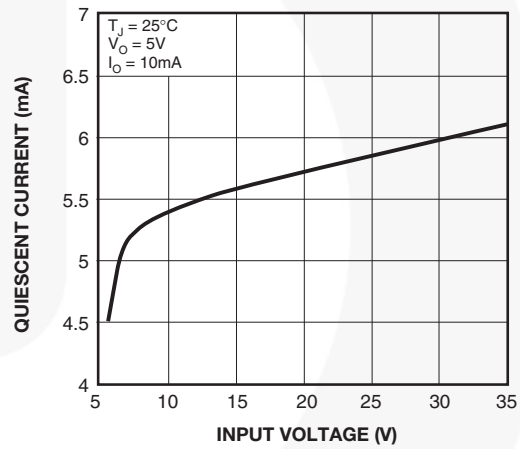


Figure 5. Quiescent Current

Typical Applications

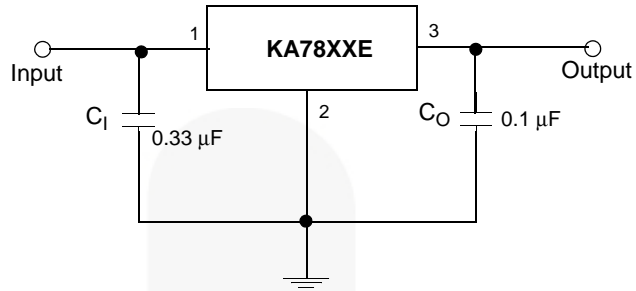


Figure 6. DC Parameters

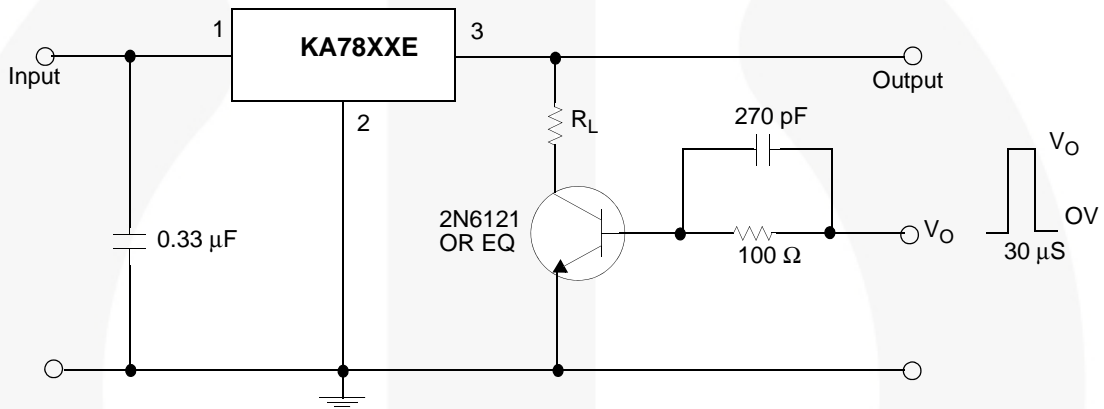


Figure 7. Load Regulation

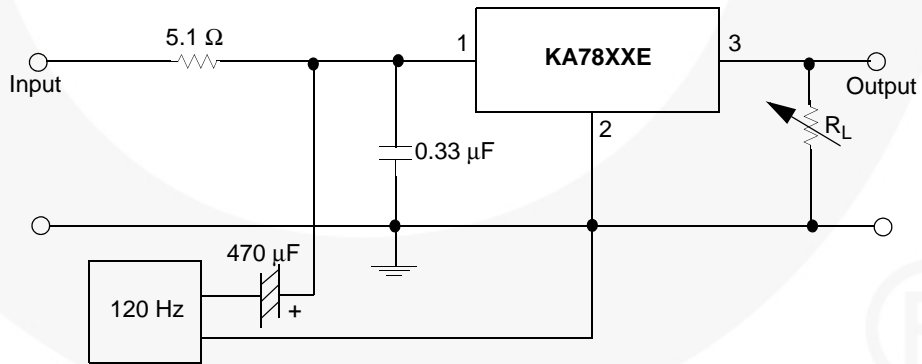
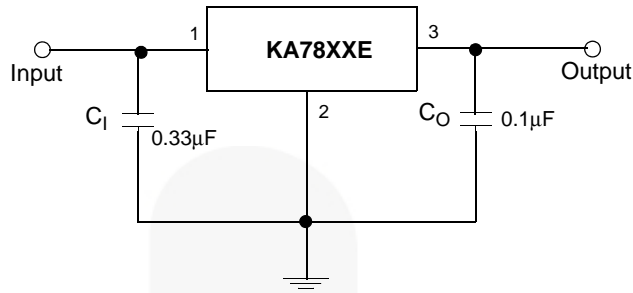
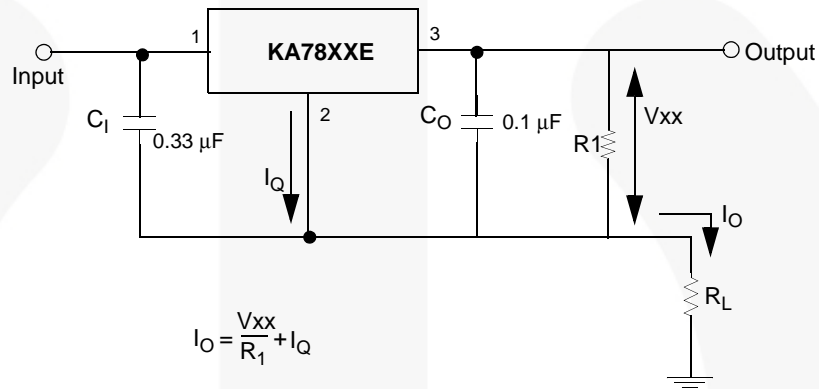


Figure 8. Ripple Rejection

**Typical Applications** (Continued)



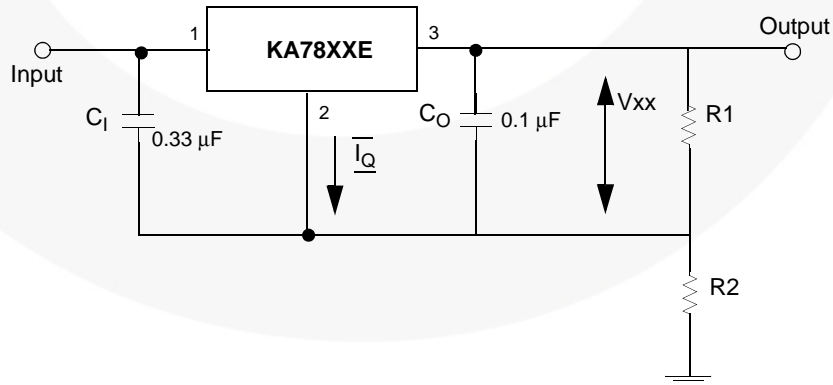
**Figure 9. Fixed Output Regulator**



**Figure 10. Constant Current Regulator**

**Notes:**

- 33. 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 2.0 V above the output voltage even during the low point on the input ripple voltage.
- 34. C<sub>1</sub> is required if regulator is located an appreciable distance from power supply filter.
- 35. C<sub>O</sub> improves stability and transient response.

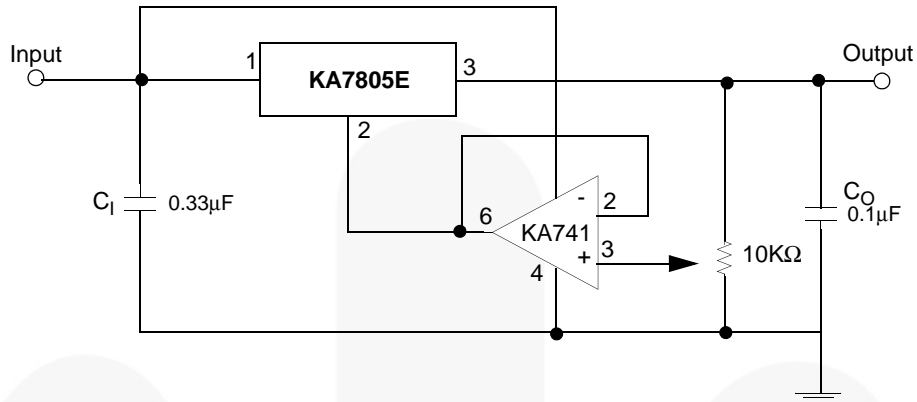


$$I_{R1} \geq 5I_Q$$

$$V_O = V_{XX}(1+R_2/R_1) + I_Q R_2$$

**Figure 11. Circuit for Increasing Output Voltage**

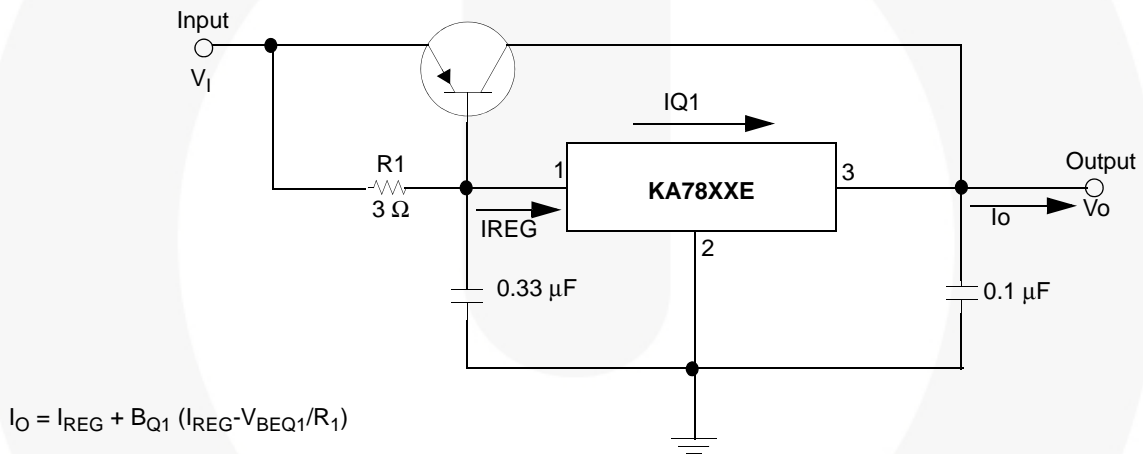
**Typical Applications** (Continued)



$$I_{R1} \geq 5 I_Q$$

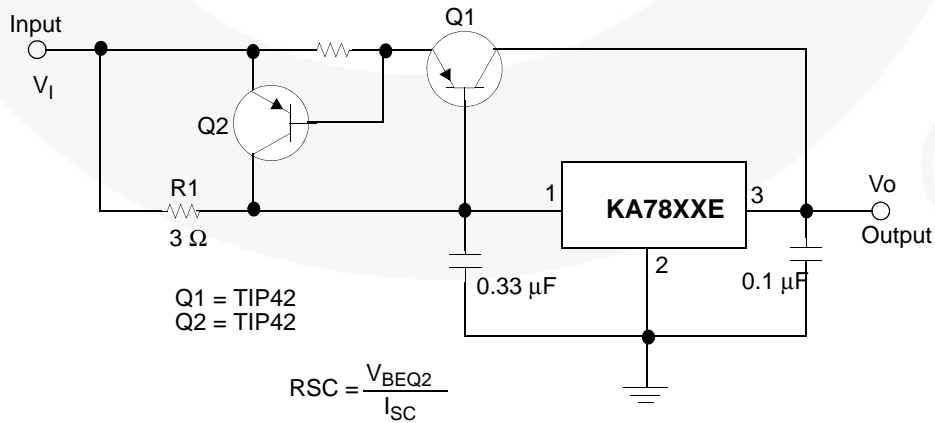
$$V_O = V_{XX}(1+R_2/R_1) + I_Q R_2$$

**Figure 12. Adjustable Output Regulator (7 V to 30 V)**



$$I_O = I_{REG} + B_{Q1} (I_{REG} - V_{BEQ1}/R_1)$$

**Figure 13. High-Current Voltage Regulator**

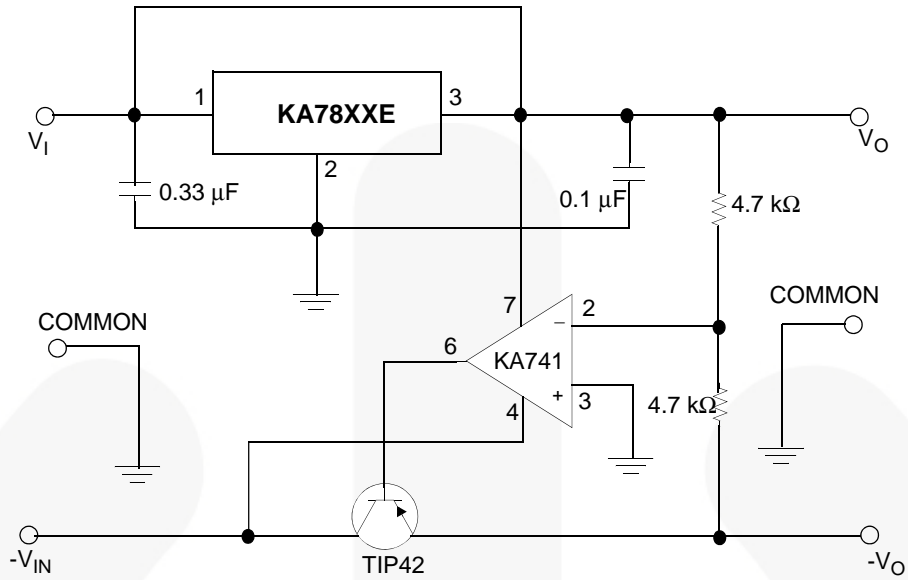


Q1 = TIP42  
Q2 = TIP42

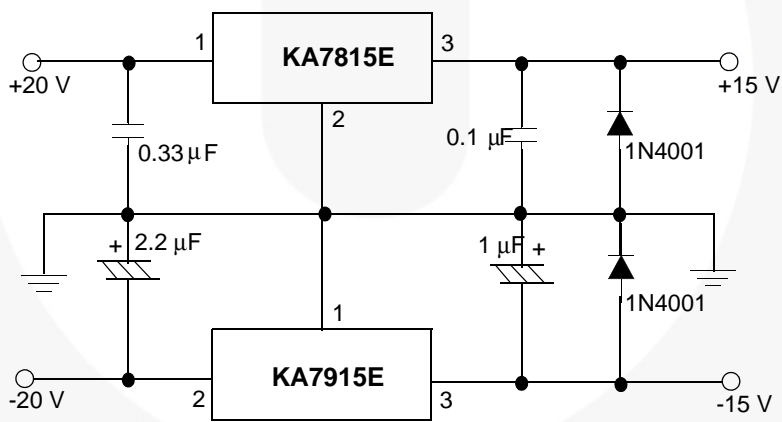
$$R_{SC} = \frac{V_{BEQ2}}{I_{SC}}$$

**Figure 14. High Output Current with Short-Circuit Protection**

**Typical Applications** (Continued)



**Figure 15. Tracking Voltage Regulator**



**Figure 16. Split-Power Supply (±15 V - 1 A)**

Typical Applications (Continued)

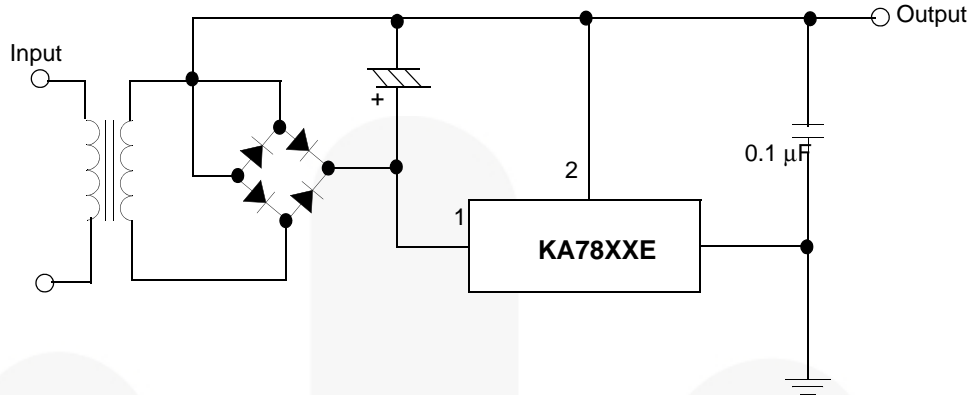


Figure 17. Negative Output Voltage Circuit

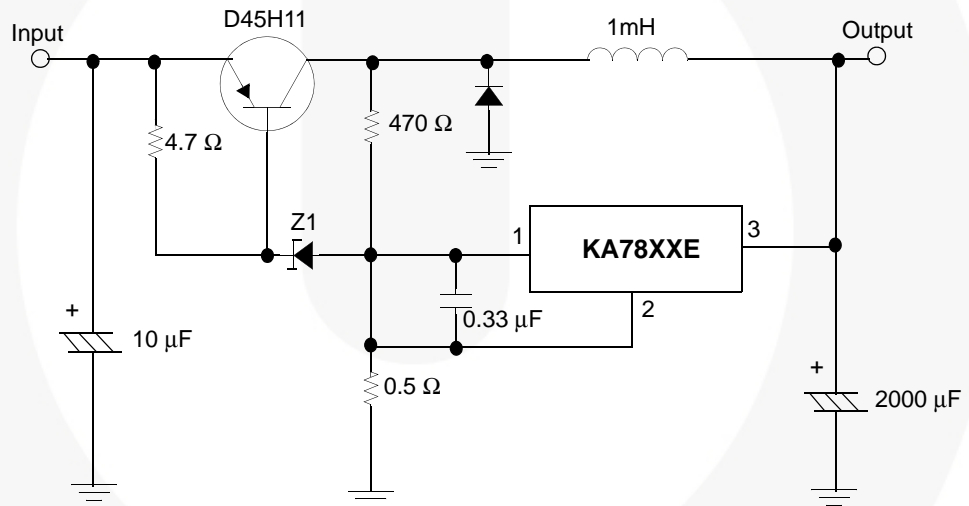


Figure 18. Switching Regulator



Physical Dimensions

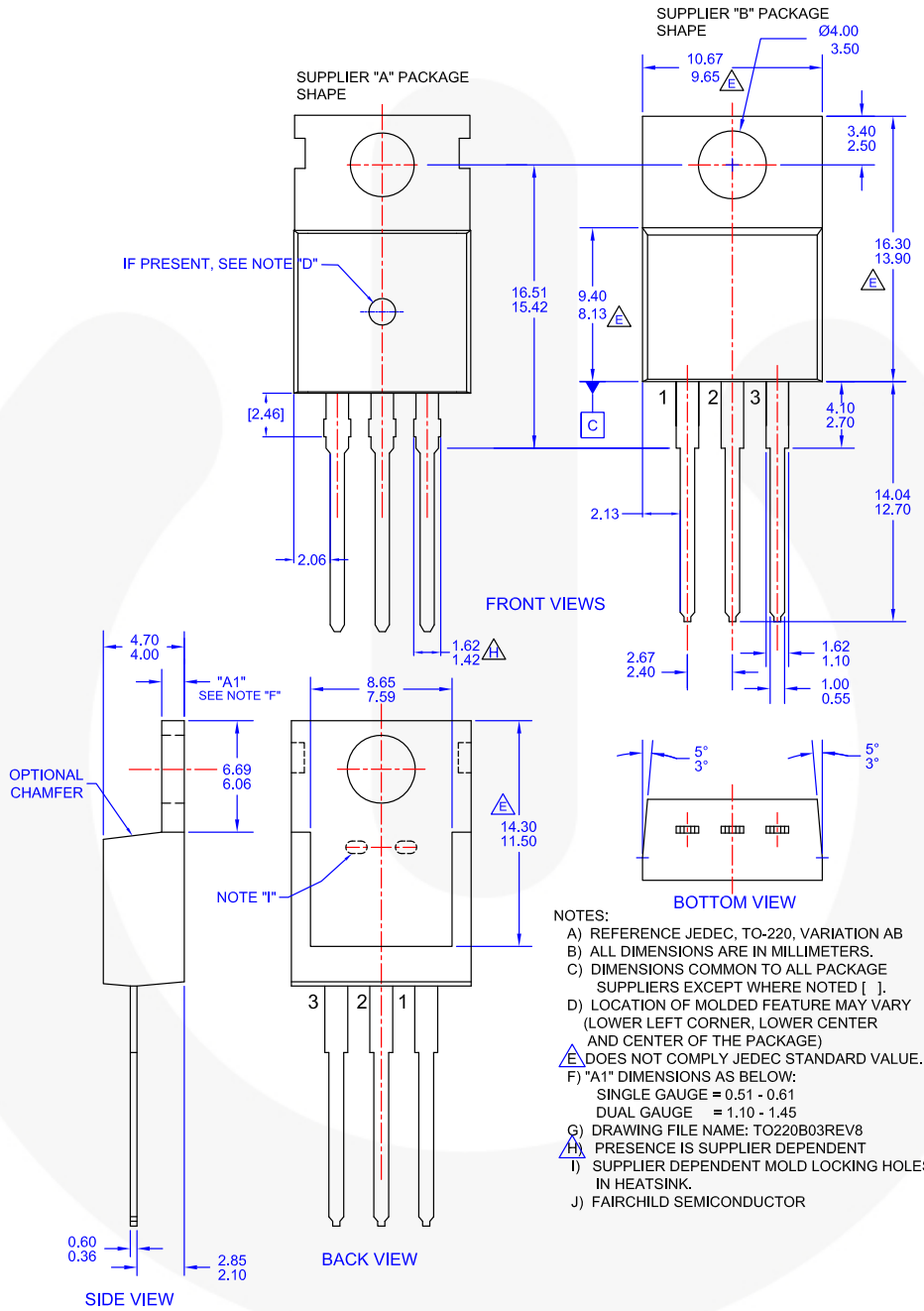


Figure 19. TO-220, MOLDED, 3-LEAD, NON-JEDEC, VARIATION AB (DUAL GAUGE)

Physical Dimensions (Continued)

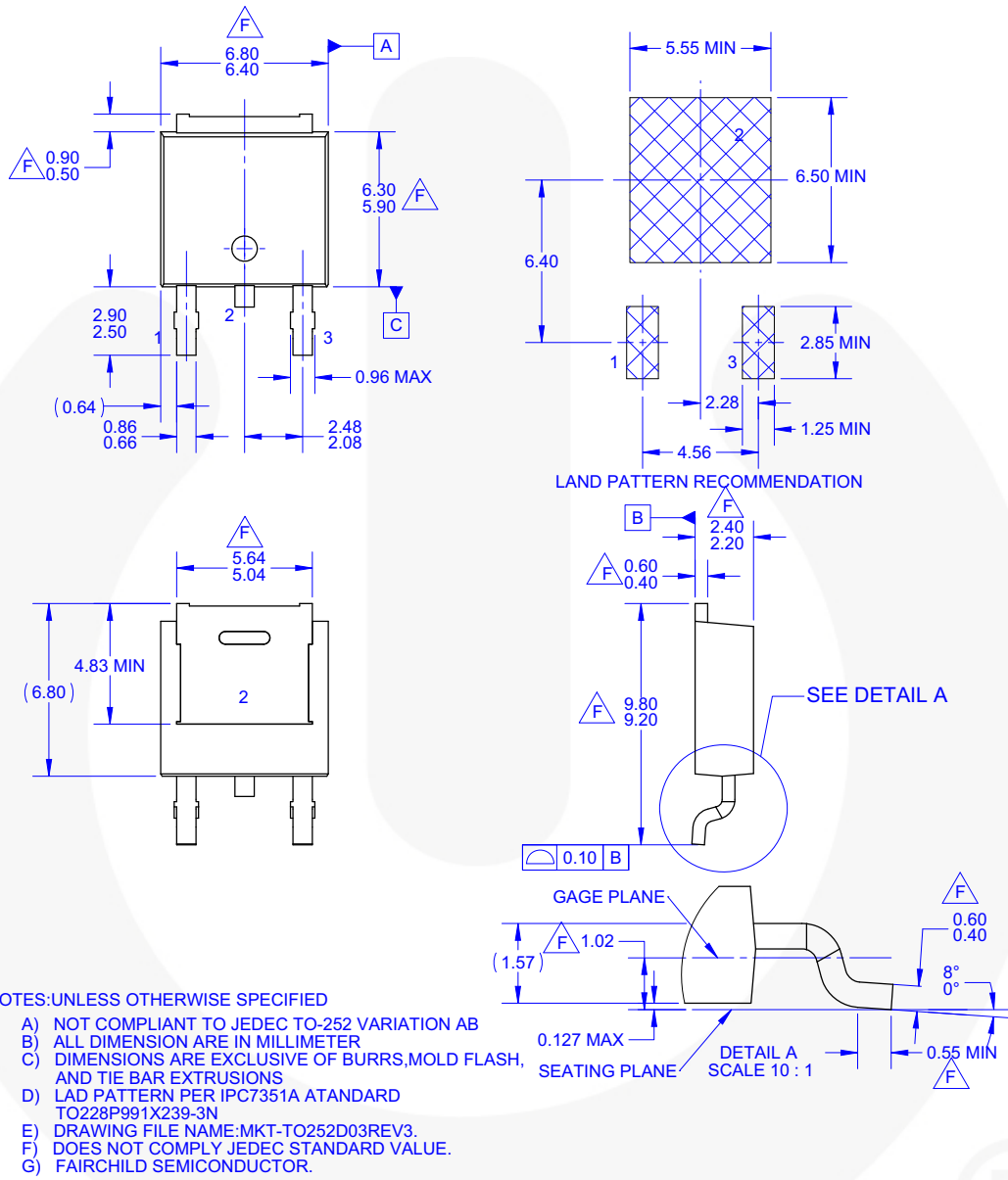







Figure 20. 3-LEAD, TO-252, NOT COMPLIANT TO JEDEC TO-252 VAR. AB, SURFACE MOUNT (DPAK)



**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- |  |  |   |   |
|--|--|---|---|
| AccuPower™   | F-PFS™   | OPTOPLANAR®   |  SYSTEM GENERAL® |
| AttitudeEngine™  | FRFET®   |  ® | TinyBoost®  |
| Awinda®  | Global Power Resource™                         | PowerTrench®  | TinyBuck®   |
| AX-CAP®*   | GreenBridge™                                   | PowerXS™  | TinyCalc™   |
| BitSiC™  | Green FPS™                                     | Programmable Active Droop™  | TinyLogic®  |
| Build it Now™  | Green FPS™ e-Series™                           | QFET®   | TINYOPTO™   |
| CorePLUS™  | Gmax™  | QS™   | TinyPower™  |
| CorePOWER™   | GTO™   | Quiet Series™   | TinyPWM™  |
| CROSSVOLT™   | IntelliMAX™                                    | RapidConfigure™   | TinyWire™   |
| CTL™   | ISOPLANAR™                                     |  ™ | TranSiC™  |
| Current Transfer Logic™  | Making Small Speakers Sound Louder and Better™ | Saving our world, 1mW/W/kW at a time™   | TriFault Detect™  |
| DEUXPEED®  | MegaBuck™                                      | SignalWise™   | TRUECURRENT®*   |
| Dual Cool™   | MICROCOUPLER™                                  | SmartMax™   | µSerDes™  |
| EcoSPARK®  | MicroFET™                                      | SMART START™  |  SerDes™         |
| EfficientMax™  | MicroPak™                                      | Solutions for Your Success™   | UHC®  |
| ESBC™  | MicroPak2™                                     | SPM®  | Ultra FRFET™  |
|  Fairchild® | MillerDrive™                                   | STEALTH™  | UniFET™   |
| Fairchild Semiconductor®   | MotionMax™                                     | SuperFET®   | VCX™  |
| FACT Quiet Series™   | MotionGrid®                                    | SuperSOT™-3   | VisualMax™  |
| FACT®  | MTi®   | SuperSOT™-6   | VoltagePlus™  |
| FAST®  | MTx®   | SuperSOT™-8   | XS™   |
| FastvCore™   | MVN®   | SupreMOS®   | Xsens™  |
| FETBench™  | mWSaver®                                       | SyncFET™  | 仙童™   |
| FPS™   | OptoHiT™                                       | Sync-Lock™  |   |
|  | OPTOLOGIC®                                     |   |   |

\* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT [HTTP://WWW.FAIRCHILDSEMI.COM](http://www.fairchildsemi.com). 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, and (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 a significant injury of the user.
2. A critical component in 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.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

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

Rev. I73