March 2015

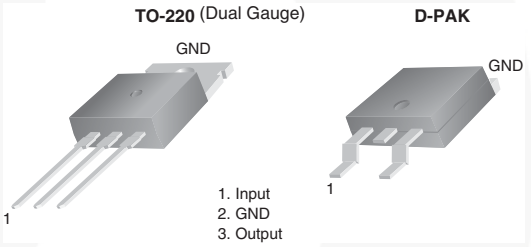
KA78XXE / KA78XXAE
3-Terminal 1 A Positive Voltage Regulator

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

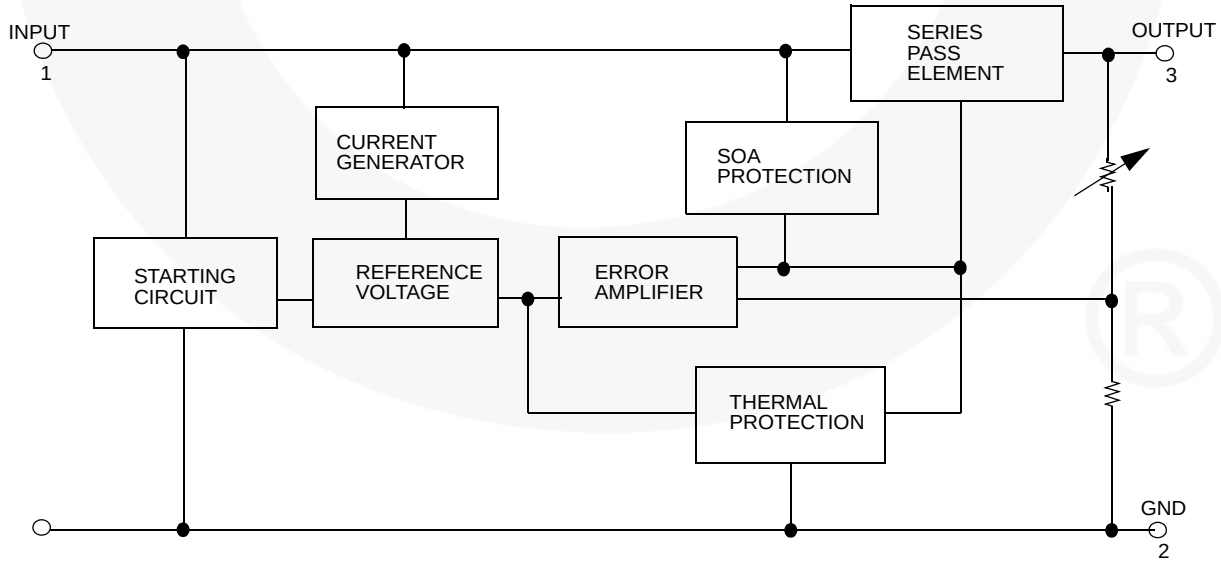


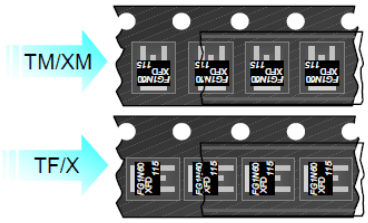
Figure 1. Block Diagram

Ordering Information

Product Number	Output Voltage Tolerance[1]	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		D-PAK[2]		Tape and Reel
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.



D-PAK Unit Orientation

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°C unless otherwise noted.

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

Electrical Characteristics (KA7805E / KA7805ER)

Refer to test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I =10 V, C_I= 0.33 µF, C_O=0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		4.80	5.00	5.20	V
		5.0 mA $\leq I_O \leq$ 1.0 A, $P_O \leq$ 15 W, V_I = 7 V to 20 V		4.75	5.00	5.25	
Regline	Line Regulation(3)	T_J = +25°C	V_I = 7 V to 25 V		4.0	100.0	mV
			V_I = 8 V to 12 V		1.6	50.0	
Regload	Load Regulation(3)	T_J = +25°C	I_O = 5.0 mA to 1.5 A		9	100	mV
			I_O = 250 mA to 750 mA		4	50	
I_Q	Quiescent Current	T_J = +25°C			5	8	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A			0.03	0.50	mA
		V_I = 7 V to 25 V			0.30	1.30	
$\Delta V_O/\Delta T$	Output Voltage Drift(4)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			42		µV
RR	Ripple Rejection(4)	f = 120 Hz, V_I = 8 V to 18 V		62	73		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(4)	f = 1 kHz			15		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			230		mA
I_{PK}	Peak Current(4)	T_J = +25°C			2.2		A

Notes:

3. 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.
4. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (KA7806E)

Refer to test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 11 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		5.75	6.00	6.25	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 8.0 V to 21 V		5.70	6.00	6.30	
Regline	Line Regulation(5)	T_J = +25°C	V_I = 8 V to 25 V		5.0	120.0	mV
			V_I = 9 V to 13 V		1.5	60.0	
Regload	Load Regulation(5)	T_J = +25°C	I_O = 5 mA to 1.5 A		9	120	mV
			I_O = 250 mA to 750 mA		3	60	
I_Q	Quiescent Current	T_J = +25°C			5	8	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 8 V to 25 V				1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift(6)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			45		µV
RR	Ripple Rejection(6)	f = 120 Hz, V_I = 9 V to 19 V		59	75		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(6)	f = 1 kHz			19		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A= +25°C			250		mA
I_{PK}	Peak Current(6)	T_J = +25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 14 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		7.7	8.0	8.3	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 10.5 V to 23 V		7.6	8.0	8.4	
Regline	Line Regulation(7)	T_J = +25°C	V_I = 10.5 V to 25 V		5	160	mV
			V_I = 11.5 V to 17 V		2	80	
Regload	Load Regulation(7)	T_J = +25°C	I_O = 5.0 mA to 1.5 A		10	160	mV
			I_O = 250 mA to 750 mA		5	80	
I_Q	Quiescent Current	T_J = +25°C			5	8	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A			0.05	0.50	mA
		V_I = 10.5 A to 25 V			0.50	1.00	
$\Delta V_O/\Delta T$	Output Voltage Drift(8)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			52		µV
RR	Ripple Rejection(8)	f = 120 Hz, V_I= 11.5 V to 21.5 V		56	73		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(8)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			230		mA
I_{PK}	Peak Current(8)	T_J = +25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 15 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		8.65	9.00	9.35	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 11.5 V to 24 V		8.60	9.00	9.40	
Regline	Line Regulation(9)	T_J = +25°C	V_I = 11.5 V to 25 V		6	180	mV
			V_I = 12 V to 17 V		2	90	
Regload	Load Regulation(9)	T_J = +25°C	I_O = 5 mA to 1.5 A		12	180	mV
			I_O = 250 mA to 750 mA		4	90	
I_Q	Quiescent Current	T_J = +25°C			5	8	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A				0.5	mA
		V_I = 11.5 V to 26 V				1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift(10)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58		µV
RR	Ripple Rejection(10)	f = 120 Hz, V_I = 13 V to 23 V		56	71		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(10)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(10)	T_J = +25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 16 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		9.6	10.0	10.4	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 12.5 V to 25 V		9.5	10.0	10.5	
Regline	Line Regulation(11)	T_J = +25°C	V_I = 12.5 V to 25 V		10	200	mV
			V_I = 13 V to 25 V		3	100	
Regload	Load Regulation(11)	T_J = +25°C	I_O = 5 mA to 1.5 A		12	200	mV
			I_O = 250 mA to 750 mA		4	400	
I_Q	Quiescent Current	T_J = +25°C			5.1	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A				0.5	mA
		V_I = 12.5 V to 29 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(12)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58		µV
RR	Ripple Rejection(12)	f = 120 Hz, V_I = 13 V to 23 V		56	71		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(12)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(12)	T_J = +25°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 (KA7812E / KA7812ER)

Refer to test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 19 V, C_I = 0.33 µF, C_O= 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		11.5	12.0	12.5	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 14.5 V to 27 V		11.4	12.0	12.6	
Regline	Line Regulation(13)	T_J = +25°C	V_I = 14.5 V to 30 V		10	240	mV
			V_I = 16 V to 22 V		3	120	
Regload	Load Regulation(13)	T_J = +25°C	I_O = 5 mA to 1.5 A		11	240	mV
			I_O = 250 mA to 750 mA		5	120	
I_Q	Quiescent Current	T_J = +25°C			5.1	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A			0.1	0.5	mA
		V_I = 14.5 V to 30 V			0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(14)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			76		µV
RR	Ripple Rejection(14)	f = 120 Hz, V_I = 15 V to 25 V		55	71		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J= +25°C			2		V
R_O	Output Resistance(14)	f = 1 kHz			18		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			230		mA
I_{PK}	Peak Current(14)	T_J = +25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 23 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		14.40	15.00	15.60	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 17.5 V to 30 V		14.25	15.00	15.75	
Regline	Line Regulation(15)	T_J = +25°C	V_I = 17.5 V to 30 V		11	300	mV
			V_I = 20 V to 26 V		3	150	
Regload	Load Regulation(15)	T_J = +25°C	I_O = 5 mA to 1.5 A		12	300	mV
			I_O = 250 mA to 750 mA		4	150	
I_Q	Quiescent Current	T_J = +25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A				0.5	mA
		V_I = 17.5 V to 30 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(16)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			90		µV
RR	Ripple Rejection(16)	f = 120 Hz, V_I = 18.5 V to 28.5 V		54	70		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J= +25°C			2		V
R_O	Output Resistance(16)	f = 1 kHz			19		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A= +25°C			250		mA
I_{PK}	Peak Current(16)	T_J =+25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 27 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J =+25°C		17.3	18.0	18.7	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 21 V to 33 V		17.1	18.0	18.9	
Regline	Line Regulation(17)	T_J = +25°C	V_I = 21 V to 33 V		15	360	mV
			V_I = 24 V to 30 V		5	180	
Regload	Load Regulation(17)	T_J = +25°C	I_O = 5 mA to 1.5 A		15	360	mV
			I_O = 250 mA to 750 mA		5	180	
I_Q	Quiescent Current	T_J =+25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A				0.5	mA
		V_I = 21 V to 33 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(18)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			110		µV
RR	Ripple Rejection(18)	f = 120 Hz, V_I = 22 V to 32 V		53	69		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J= +25°C			2		V
R_O	Output Resistance(18)	f = 1 kHz			22		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(18)	T_J = +25°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°C < T_J < 125°C, I_O = 500 mA, V_I = 33 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		23.00	24.00	25.00	V
		5.0 mA ≤ I_O ≤ 1.0 A, P_O ≤ 15 W, V_I = 27 V to 38 V		22.80	24.00	25.25	
Regline	Line Regulation(19)	T_J = +25°C	V_I = 27 V to 38 V		17	480	mV
			V_I = 30 V to 36 V		6	240	
Regload	Load Regulation(19)	T_J = +25°C	I_O = 5 mA to 1.5 A		15	480	mV
			I_O = 250 mA to 750 mA		5	240	
I_Q	Quiescent Current	T_J = +25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A			0.1	0.5	mA
		V_I = 27 V to 38 V			0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(20)	I_O = 5mA			-1.5		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			120		µV
RR	Ripple Rejection(20)	f = 120 Hz, V_I = 28 V to 38 V		50	67		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J= +25°C			2		V
R_O	Output Resistance(20)	f = 1 kHz			28		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A= +25°C			230		mA
I_{PK}	Peak Current(20)	T_J = +25°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°C < T_J < +125°C, I_o = 1 A, V_I = 10 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J =+25°C		4.9	5.0	5.1	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 7.5 V to 20 V		4.8	5.0	5.2	
Regline	Line Regulation(21)	V_I = 7.5 V to 25 V, I_O = 500 mA			5.0	50.0	mV
		V_I = 8 V to 12 V			3.0	50.0	
		T_J = +25°C	V_I= 7.3 V to 20 V		5.0	50.0	
			V_I= 8 V to 12 V		1.5	25.0	
Regload	Load Regulation(21)	T_J =+25°C, I_O = 5 mA to 1.5 A			9	100	mV
		I_O = 5 mA to 1 A			9	100	
		I_O = 250 mA to 750 mA			4	50	
I_Q	Quiescent Current	T_J = +25°C			5	6	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 8 V to 25 V, I_O = 500 mA				0.8	
		V_I = 7.5 V to 20 V, T_J = +25°C				0.8	
$\Delta V/\Delta T$	Output Voltage Drift(22)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A =+25°C			42		µV
RR	Ripple Rejection(22)	f = 120 Hz, I_O = 500 mA, V_I = 8 V to 18 V			68		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(22)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(22)	T_J = +25°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°C < T_J < +125 °C, I_O = 1 A, V_I = 15 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		8.82	9.00	9.18	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 11.2 V to 24 V		8.65	9.00	9.35	
Regline	Line Regulation(23)	V_I = 11.7 V to 25 V, I_O = 500 mA			6	90	mV
		V_I = 12.5 V to 19 V			4	45	
		T_J = +25°C	V_I = 11.5 V to 24 V		6	90	
			V_I = 12.5 V to 19 V		2	45	
Regload	Load Regulation(23)	T_J = +25°C, I_O = 5 mA to 1.0 A			12	100	mV
		I_O = 5 mA to 1.0 A			12	100	
		I_O = 250 mA to 750 mA			5	50	
I_Q	Quiescent Current	T_J = +25°C			5	6	mA
ΔI_Q	Quiescent Current Change	V_I = 11.7 V to 25 V, T_J = +25°C				0.8	mA
		V_I = 12 V to 25 V, I_O = 500 mA				0.8	
		I_O = 5 mA to 1.0 A				0.5	
$\Delta V/\Delta T$	Output Voltage Drift(24)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58		µV
RR	Ripple Rejection(24)	f = 120 Hz, I_O = 500 mA, V_I = 12 V to 22 V			62		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(24)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I= 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(24)	T_J = +25°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°C < T_J < +125 °C, I_O = 1 A, V_I = 16 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J =+25°C		9.8	10.0	10.2	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 12.8 V to 25 V		9.6	10.0	10.4	
Regline	Line Regulation(25)	V_I = 12.8 V to 26 V, I_O = 500 mA			8	100	mV
		V_I = 13 V to 20 V			4	50	
		T_J = +25°C	V_I = 12.5 V to 25 V		8	100	
			V_I = 13 V to 20 V		3	50	
Regload	Load Regulation(25)	T_J = +25°C, I_O = 5 mA to 1.5 A			12	100	mV
		I_O = 5 mA to 1 mA			12	100	
		I_O = 250 mA to 750 mA			5	50	
I_Q	Quiescent Current	T_J = +25°C			5	6	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1.0 A				0.5	mA
		V_I = 12.8 V to 25 V, I_O = 500 mA				0.8	
		V_I = 13 V to 26 V, T_J = +25°C				0.5	
$\Delta V/\Delta T$	Output Voltage Drift(26)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58		µV
RR	Ripple Rejection(26)	f = 120 Hz, I_O = 500 mA, V_I = 14 V to 24 V			62		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(26)	f = 1 kHz			17		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(26)	T_J = +25°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°C < T_J < +125°C, I_O = 1 A, V_I = 19 V, C_I= 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		11.75	12.00	12.25	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 14.8 V to 27 V		11.50	12.00	12.50	
Regline	Line Regulation(27)	V_I = 14.8 V to 30 V, I_O = 500 mA			10	120	mV
		V_I= 16 V to 22 V			4	120	
		T_J = +25°C	V_I= 14.5 V to 27 V		10	120	
			V_I= 16 V to 22 V		3	60	
Regload	Load Regulation(27)	T_J = +25°C, I_O = 5 mA to 1.5 A			12	100	mV
		I_O = 5 mA to 1.0 A			12	100	
		I_O = 250 mA to 750 mA			5	50	
I_Q	Quiescent Current	T_J = +25°C			5.1	6.0	mA
ΔI_Q	Quiescent Current Change	V_I = 15 V to 30 V, T_J = +25°C				0.8	mA
		V_I = 14 V to 27 V, I_O = 500 mA				0.8	
		I_O = 5 mA to 1.0 A				0.5	
$\Delta V/\Delta T$	Output Voltage Drift(28)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			76		µV
RR	Ripple Rejection(28)	f = 120 Hz, I_O = 500 mA, V_I = 14 V to 24 V			60		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(28)	f = 1 kHz			18		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(28)	T_J = +25°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°C < T_J < +125°C, I_O = 1 A, V_I = 23 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		14.7	15.0	15.3	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 17.7 V to 30 V		14.4	15.0	15.6	
Regline	Line Regulation(29)	V_I = 17.9 V to 30 V, I_O = 500 mA			10	150	mV
		V_I = 20 V to 26 V			5	150	
		T_J = +25°C	V_I = 17.5 V to 30 V		11	150	
			V_I = 20 V to 26 V		3	75	
Regload	Load Regulation(29)	T_J = +25°C, I_O = 5 mA to 1.5 A			12	100	mV
		I_O = 5 mA to 1.0 A			12	100	
		I_O = 250 mA to 750 mA			5	50	
I_Q	Quiescent Current	T_J = +25°C			5.2	6.0	mA
ΔI_Q	Quiescent Current Change	V_I = 17.5 V to 30 V, T_J = +25°C				0.8	mA
		V_I = 17.5 V to 30 V, I_O = 500 mA				0.8	
		I_O = 5 mA to 1.0 A				0.5	
$\Delta V/\Delta T$	Output Voltage Drift(30)	I_O = 5 mA			-1		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			90		µV
RR	Ripple Rejection(30)	f = 120 Hz, I_O = 500 mA, V_I = 18.5 V to 28.5 V			58		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(30)	f = 1 kHz			19		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(30)	T_J = +25°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°C < T_J < +125°C, I_O =1 A, V_I = 33 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		23.5	24.0	24.5	V
		I_O = 5 mA to 1 A, P_O ≤15 W, V_I = 27.3 V to 38 V		23.0	24.0	25.0	
Regline	Line Regulation(31)	V_I = 27 V to 38 V, I_O = 500 mA			18	240	mV
		V_I = 21 V to 33 V			6	240	
		T_J = +25°C	V_I = 26.7 V to 38 V		18	240	
			V_I = 30 V to 36 V		6	120	
Regload	Load Regulation(31)	T_J = +25°C, I_O = 5 mA to 1.5 A			15	100	mV
		I_O = 5 mA to 1.0 A			15	100	
		I_O = 250 mA to 750 mA			7	50	
I_Q	Quiescent Current	T_J = +25°C			5.2	6.0	mA
ΔI_Q	Quiescent Current Change	V_I = 27.3 V to 38 V, T_J = +25°C				0.8	mA
		V_I = 27.3 V to 38 V, I_O = 500 mA				0.8	
		I_O = 5 mA to 1.0 A				0.5	
$\Delta V/\Delta T$	Output Voltage Drift(32)	I_O = 5 mA			-1.5		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			120		µV
RR	Ripple Rejection(32)	f = 120 Hz, I_O = 500 mA, V_I = 28 V to 38 V			54		dB
V_{Drop}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2		V
R_O	Output Resistance(32)	f = 1 kHz			20		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_A = +25°C			250		mA
I_{PK}	Peak Current(32)	T_J = +25°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

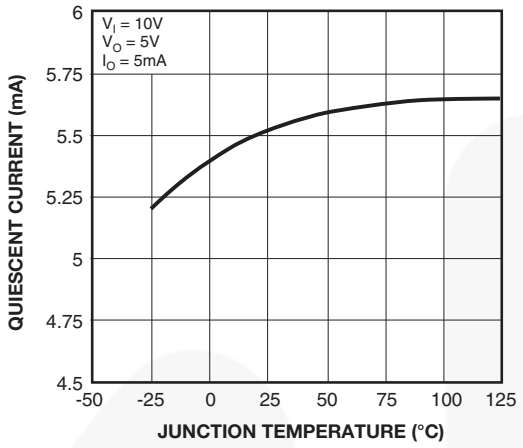


Figure 2. Quiescent Current

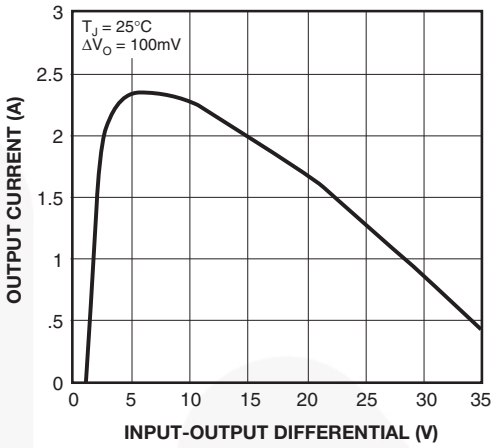


Figure 3. Peak Output Current

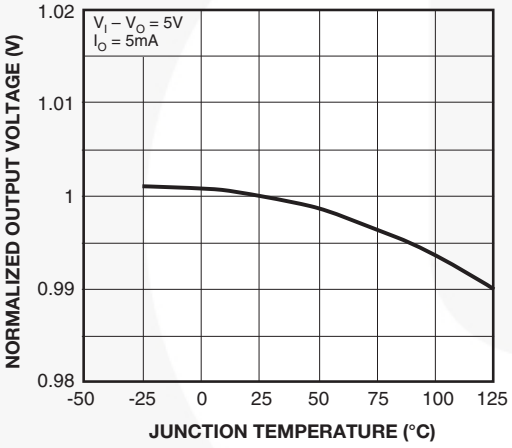


Figure 4. Output Voltage

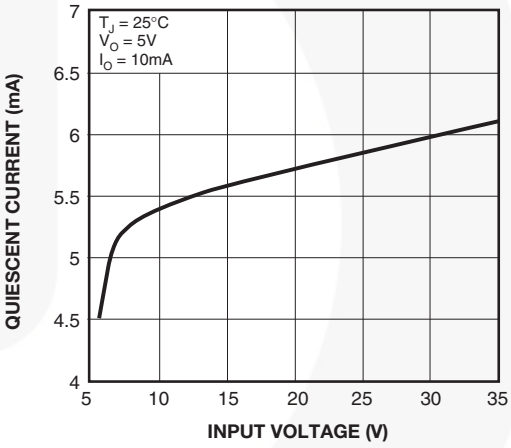


Figure 5. Quiescent Current

Typical Applications

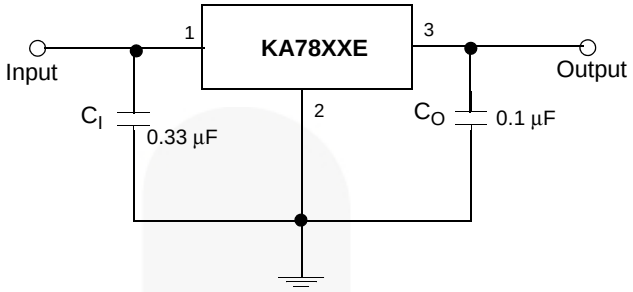


Figure 6. DC Parameters

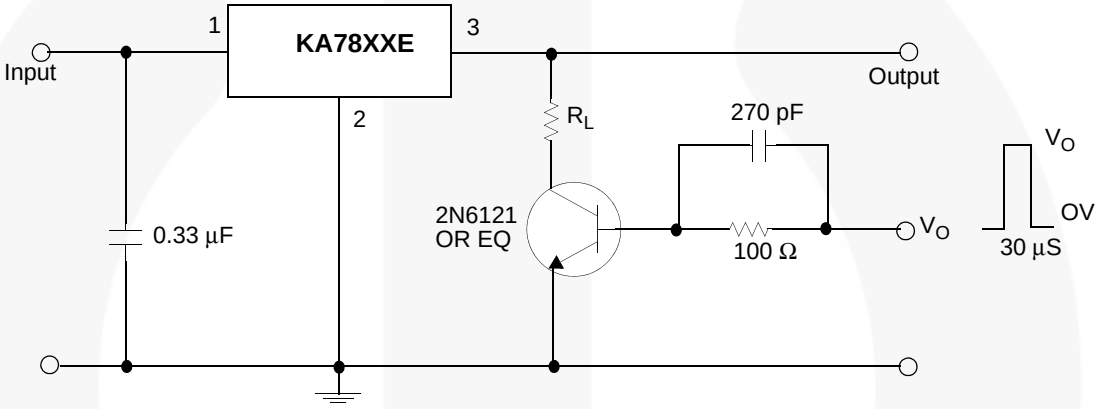


Figure 7. Load Regulation

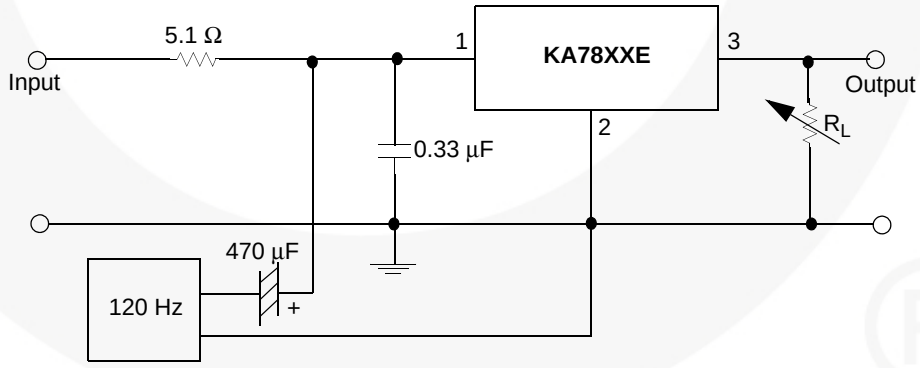


Figure 8. Ripple Rejection

Typical Applications (Continued)

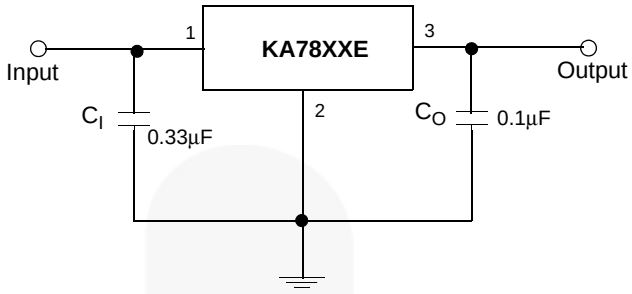


Figure 9. Fixed Output Regulator

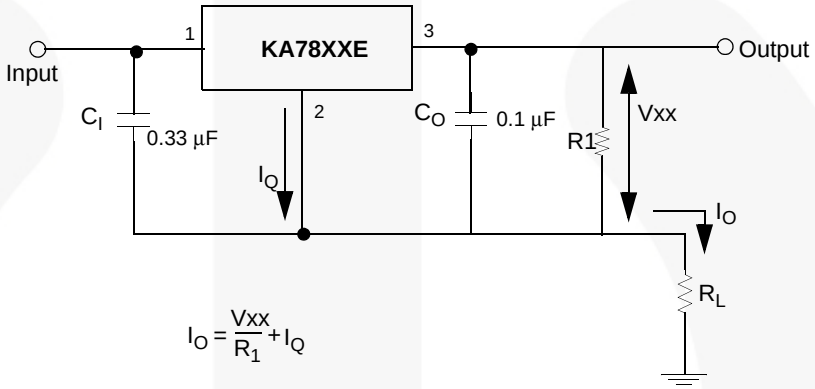
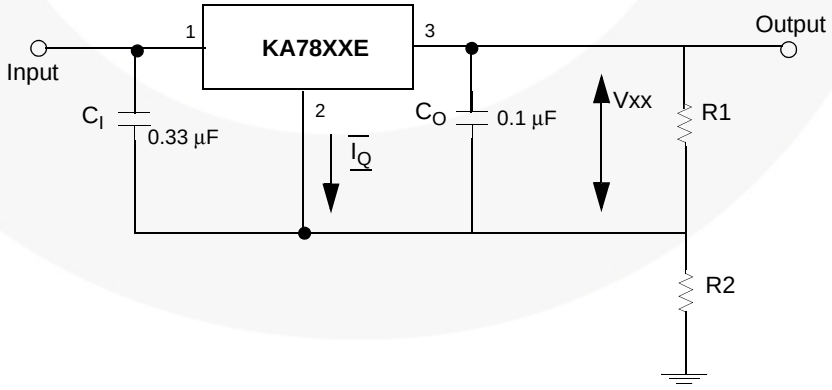


Figure 10. Constant Current Regulator

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_I is required if regulator is located an appreciable distance from power supply filter.
35. C_O improves stability and transient response.

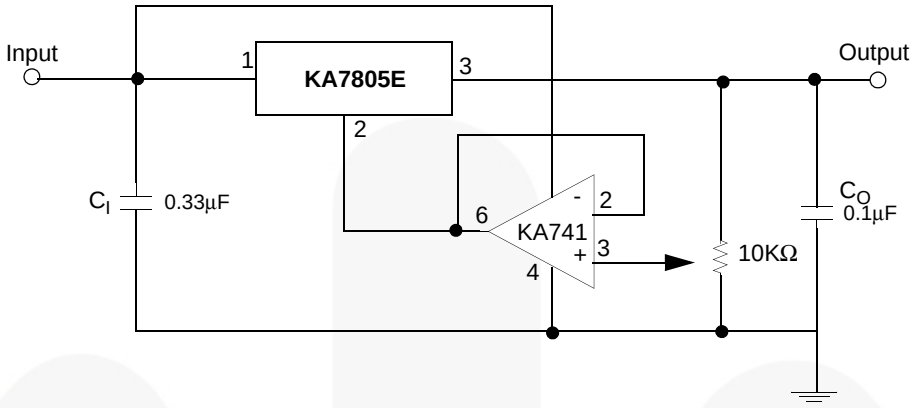


$I_{RI} \geq 5IQ$

$V_O = V_{XX}(1+R_2/R_1) + I_QR_2$

Figure 11. Circuit for Increasing Output Voltage

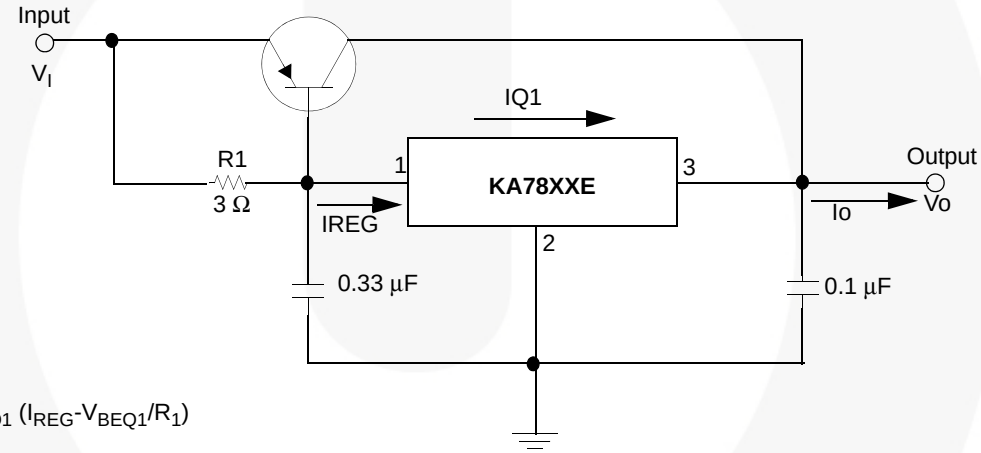
Typical Applications (Continued)



$I_{RI} \geq 5\ I_Q$

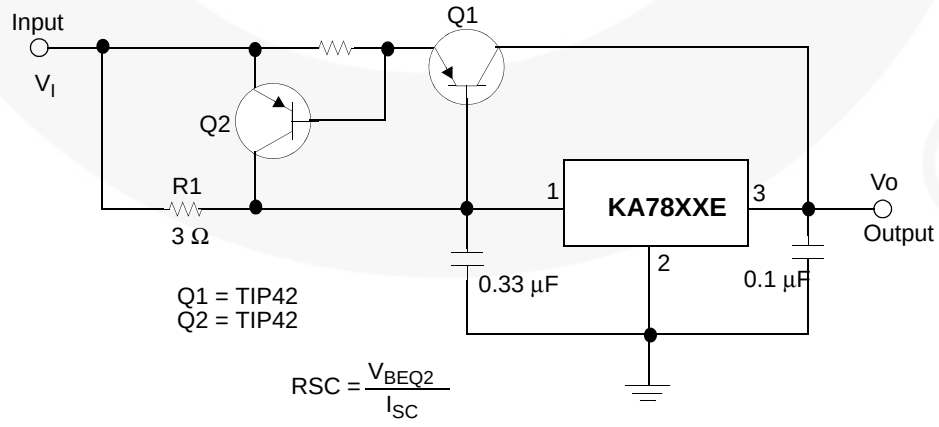
$V_O = V_{XX}(1+R_2/R_1) + I_Q R_2$

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



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

Figure 14. High Output Current with Short-Circuit Protection

Typical Applications (Continued)

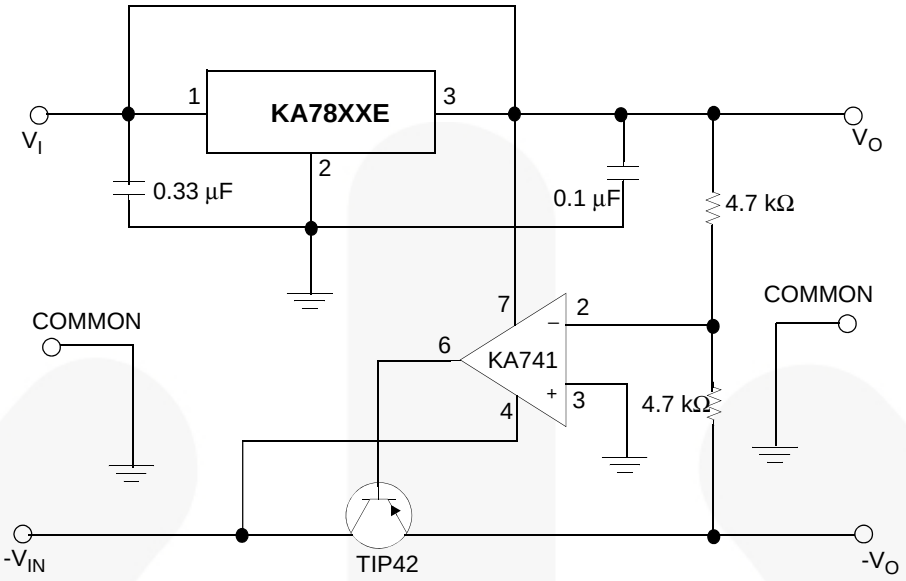


Figure 15. Tracking Voltage Regulator

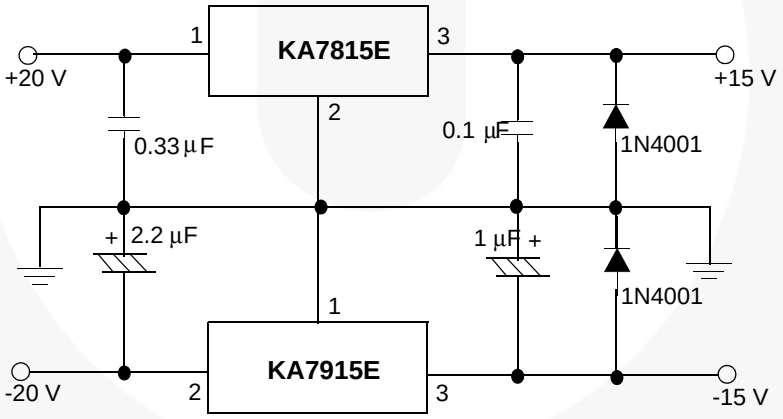


Figure 16. Split-Power Supply (±15 V - 1 A)

Typical Applications (Continued)

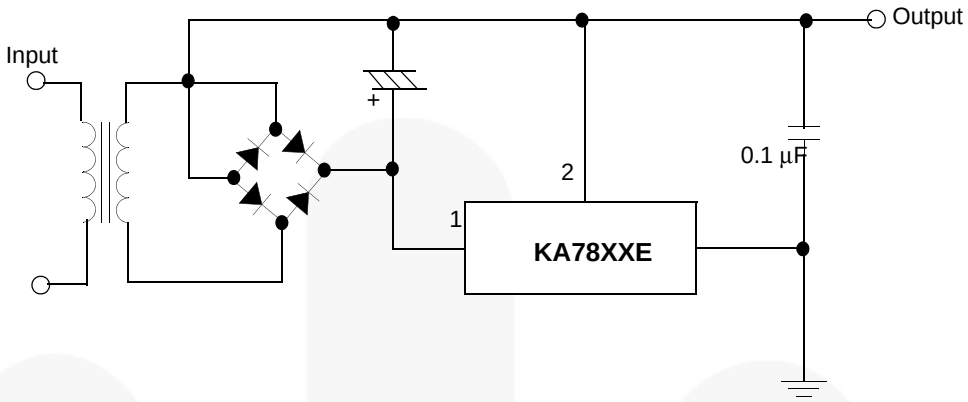


Figure 17. Negative Output Voltage Circuit

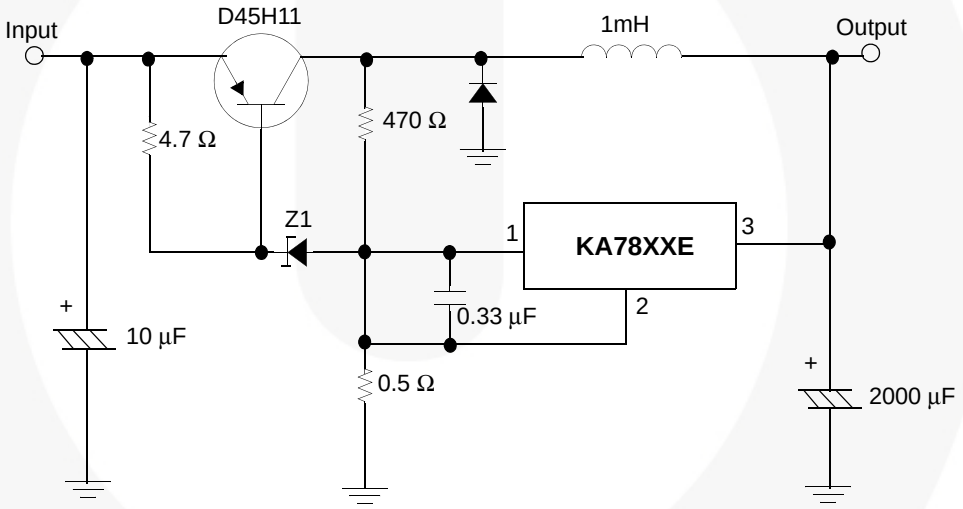


Figure 18. Switching Regulator

Physical Dimensions

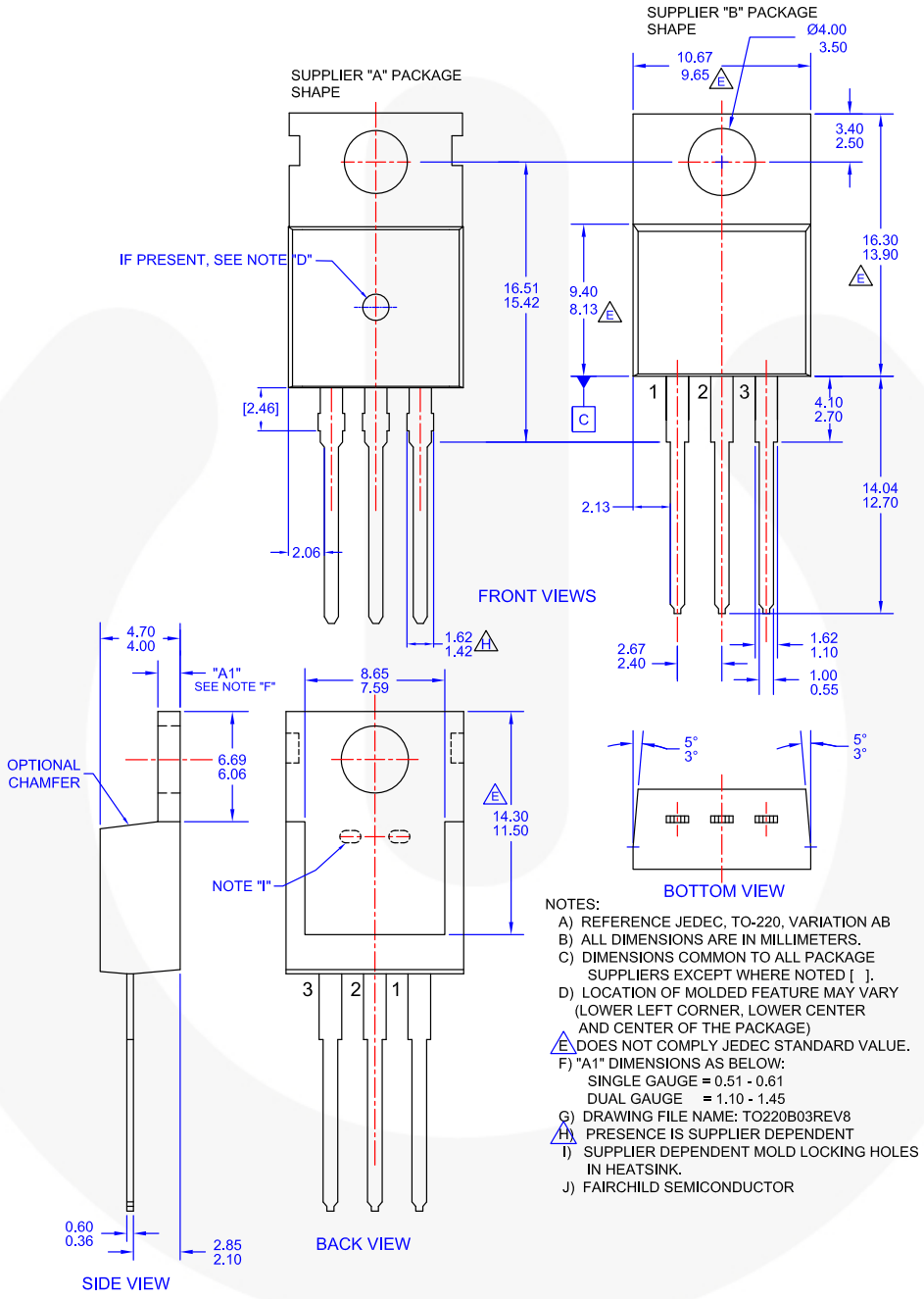
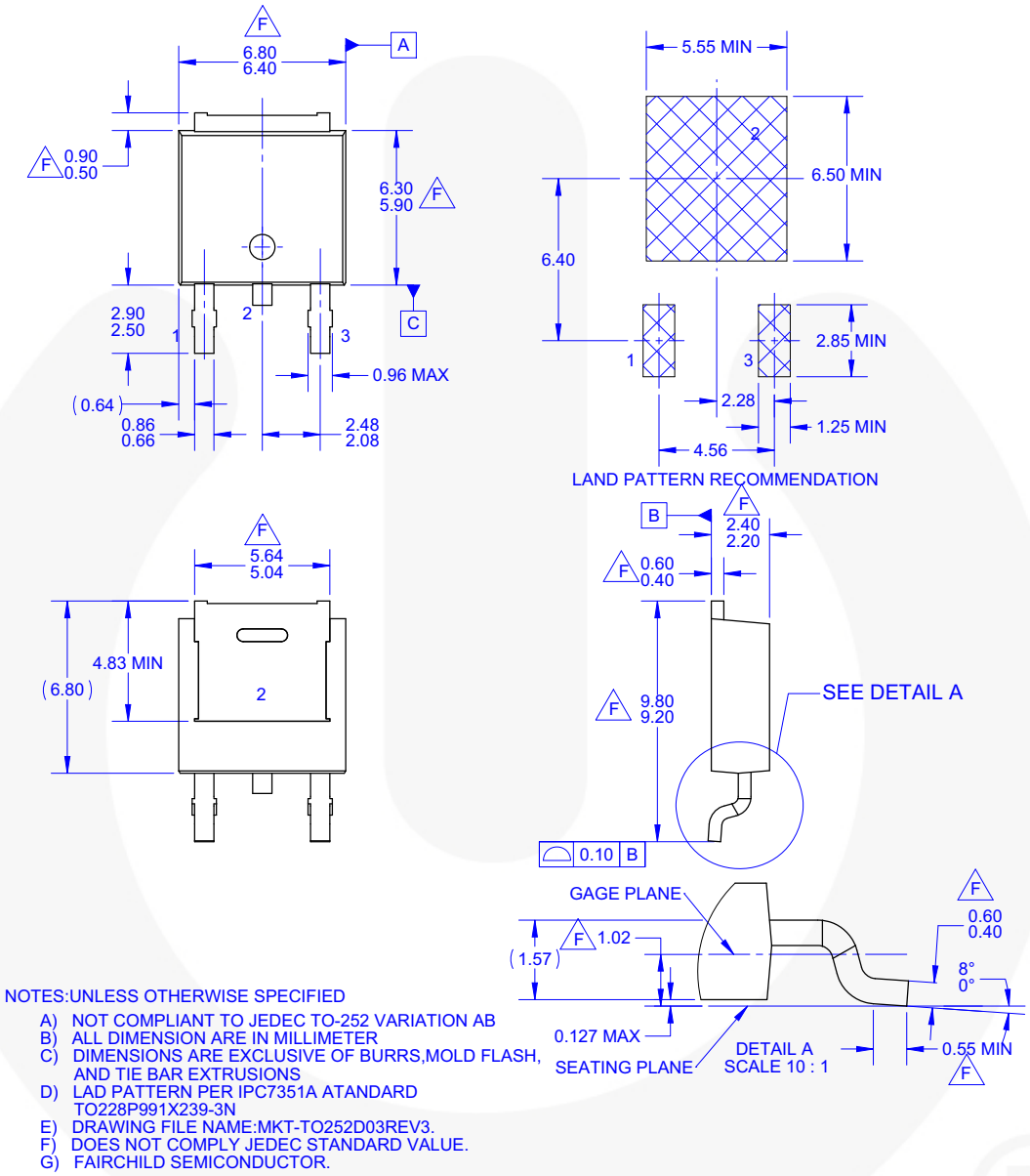


Figure 19. TO-220, MOLDED, 3-LEAD, NON-JEDEC, VARIATION AB (DUAL GUAGE)

Physical Dimensions (Continued)



NOTES:UNLESS OTHERWISE SPECIFIED

A) NOT COMPLIANT TO JEDEC TO-252 VARIATION AB
B) ALL DIMENSION ARE IN MILLIMETER
C) DIMENSIONS ARE EXCLUSIVE OF BURRS,MOLD FLASH, AND TIE BAR EXTRUSIONS
D) LAD PATTERN PER IPC7351A ATANDARD TO228P991X239-3N
E) DRAWING FILE NAME:MKT-TO252D03REV3.
F) DOES NOT COMPLY JEDEC STANDARD VALUE.
G) FAIRCHILD SEMICONDUCTOR.

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

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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

Mouser Electronics

Authorized Distributor

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Fairchild Semiconductor:

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