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# MC78XXE/LM78XXE/MC78XXAE

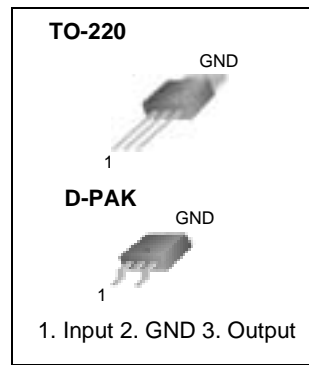
## 3-Terminal 1A Positive Voltage Regulator

### Features

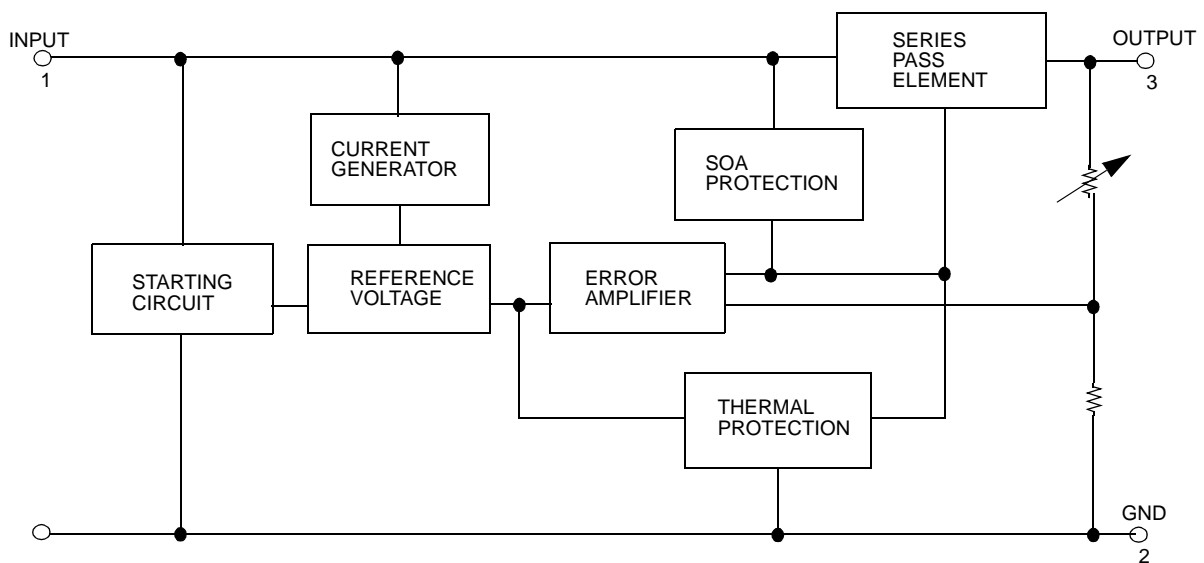
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

### Description

The MC78XXE/LM78XXE/MC78XXAE series of three terminal positive regulators 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.



### Internal Block Diagram



## Absolute Maximum Ratings

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

## Electrical Characteristics (MC7805E/LM7805E)

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

Parameter	Symbol	Conditions	MC7805E/LM7805E			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_O$	$T_J = +25^{\circ}C$	4.8	5.0	5.2	V	
		$5.0mA \leq I_O \leq 1.0A$ , $P_O \leq 15W$ $V_I = 7V$ to $20V$	4.75	5.0	5.25		
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}C$	$V_O = 7V$ to $25V$	-	4.0	100	mV
			$V_I = 8V$ to $12V$	-	1.6	50	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}C$	$I_O = 5.0mA$ to $1.5A$	-	9	100	mV
			$I_O = 250mA$ to $750mA$	-	4	50	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}C$	-	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5mA$ to $1.0A$	-	0.03	0.5	mA	
		$V_I = 7V$ to $25V$	-	0.3	1.3		
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5mA$	-	-0.8	-	$mV/^{\circ}C$	
Output Noise Voltage	$V_N$	$f = 10Hz$ to $100kHz$ , $T_A = +25^{\circ}C$	-	42	-	$\mu V/V_O$	
Ripple Rejection (Note2)	RR	$f = 120Hz$ $V_O = 8V$ to $18V$	62	73	-	dB	
Dropout Voltage	$V_{Drop}$	$I_O = 1A$ , $T_J = +25^{\circ}C$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1kHz$	-	15	-	$m\Omega$	
Short Circuit Current	$I_{SC}$	$V_I = 35V$ , $T_A = +25^{\circ}C$	-	230	-	mA	
Peak Current (Note2)	$I_{PK}$	$T_J = +25^{\circ}C$	-	2.2	-	A	

### Note:

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 (MC7806E)** (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)

Parameter	Symbol	Conditions	MC7806E			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 8\text{V to } 25\text{V}$	-	5	120	mV
			$V_I = 9\text{V to } 13\text{V}$	-	1.5	60	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	9	120	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	3	60	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	-	-	0.5	mA	
		$V_I = 8\text{V to } 25\text{V}$	-	-	1.3		
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	-	45	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 9\text{V to } 19\text{V}$	59	75	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

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 (MC7808E)** (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)

Parameter	Symbol	Conditions	MC7808E			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{V to } 25\text{V}$	-	5.0	160	mV
			$V_I = 11.5\text{V to } 17\text{V}$	-	2.0	80	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5.0\text{mA to } 1.5\text{A}$	-	10	160	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	80	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1.0\text{A}$	-	0.05	0.5	mA	
		$V_I = 10.5\text{V to } 25\text{V}$	-	0.5	1.0		
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	-	52	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $V_I = 11.5\text{V to } 21.5\text{V}$	56	73	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$	
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	230	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

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 (MC7809E)** (Continued)(Refer to test circuit ,0°C < T<sub>J</sub> < 125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> =15V, C<sub>I</sub>= 0.33μF, C<sub>O</sub>= 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions	MC7809E			Unit	
			Min.	Typ.	Max.		
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25°C	8.65	9	9.35	V	
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 11.5V to 24V	8.6	9	9.4		
Line Regulation (Note1)	Regline	T <sub>J</sub> = +25°C	V <sub>I</sub> = 11.5V to 25V	-	6	180	mV
			V <sub>I</sub> = 12V to 17V	-	2	90	
Load Regulation (Note1)	Regload	T <sub>J</sub> = +25°C	I <sub>O</sub> = 5mA to 1.5A	-	12	180	mV
			I <sub>O</sub> = 250mA to 750mA	-	4	90	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25°C	-	5.0	8.0	mA	
Quiescent Current Change	ΔI <sub>Q</sub>	I <sub>O</sub> = 5mA to 1.0A	-	-	0.5	mA	
		V <sub>I</sub> = 11.5V to 26V	-	-	1.3		
Output Voltage Drift (Note2)	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5mA	-	-1	-	mV/°C	
Output Noise Voltage	V <sub>N</sub>	f = 10Hz to 100kHz, T <sub>A</sub> = +25°C	-	58	-	μV/V <sub>O</sub>	
Ripple Rejection (Note2)	RR	f = 120Hz V <sub>I</sub> = 13V to 23V	56	71	-	dB	
Dropout Voltage	V <sub>Drop</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> = +25°C	-	2	-	V	
Output Resistance (Note2)	r <sub>O</sub>	f = 1kHz	-	17	-	mΩ	
Short Circuit Current	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>A</sub> = +25°C	-	250	-	mA	
Peak Current (Note2)	I <sub>PK</sub>	T <sub>J</sub> = +25°C	-	2.2	-	A	

**Note:**

1. Load and line regulation are specified at constant junction temperature. Changes in V<sub>O</sub> 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 (MC7812E)** (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)

Parameter	Symbol	Conditions	MC7812E			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 30\text{V}$	-	10	240	mV
			$V_I = 16\text{V to } 22\text{V}$	-	3.0	120	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	11	240	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	120	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.1	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1.0\text{A}$	-	0.1	0.5	mA	
		$V_I = 14.5\text{V to } 30\text{V}$	-	0.5	1.0		
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	-	-1	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	-	76	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 15\text{V to } 25\text{V}$	55	71	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	18	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	230	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

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 (MC7815E)** (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)

Parameter	Symbol	Conditions	MC7815E			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{V to } 30\text{V}$	-	11	300	mV
			$V_I = 20\text{V to } 26\text{V}$	-	3	150	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	12	300	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	4	150	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1.0\text{A}$	-	-	0.5	mA	
		$V_I = 17.5\text{V to } 30\text{V}$	-	-	1.0		
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	-	-1	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	-	90	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 18.5\text{V to } 28.5\text{V}$	54	70	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

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 (MC7818E)** (Continued)(Refer to test circuit ,0°C < T<sub>J</sub> < 125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 27V, C<sub>I</sub> = 0.33μF, C<sub>O</sub> = 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions		MC7818E			Unit
				Min.	Typ.	Max.	
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25°C		17.3	18	18.7	V
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 21V to 33V		17.1	18	18.9	
Line Regulation (Note1)	Regline	T <sub>J</sub> = +25°C	V <sub>I</sub> = 21V to 33V	-	15	360	mV
			V <sub>I</sub> = 24V to 30V	-	5	180	
Load Regulation (Note1)	Regload	T <sub>J</sub> = +25°C	I <sub>O</sub> = 5mA to 1.5A	-	15	360	mV
			I <sub>O</sub> = 250mA to 750mA	-	5.0	180	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25°C		-	5.2	8.0	mA
Quiescent Current Change	ΔI <sub>Q</sub>	I <sub>O</sub> = 5mA to 1.0A		-	-	0.5	mA
		V <sub>I</sub> = 21V to 33V		-	-	1	
Output Voltage Drift (Note2)	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5mA		-	-1	-	mV/°C
Output Noise Voltage	V <sub>N</sub>	f = 10Hz to 100kHz, T <sub>A</sub> = +25°C		-	110	-	μV/V <sub>O</sub>
Ripple Rejection (Note2)	RR	f = 120Hz V <sub>I</sub> = 22V to 32V		53	69	-	dB
Dropout Voltage	V <sub>Drop</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> = +25°C		-	2	-	V
Output Resistance (Note2)	r <sub>O</sub>	f = 1kHz		-	22	-	mΩ
Short Circuit Current	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>A</sub> = +25°C		-	250	-	mA
Peak Current (Note2)	I <sub>PK</sub>	T <sub>J</sub> = +25°C		-	2.2	-	A

**Note:**

1. Load and line regulation are specified at constant junction temperature. Changes in V<sub>O</sub> 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 (MC7824E)** (Continued)(Refer to test circuit ,0°C < T<sub>J</sub> < 125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 33V, C<sub>I</sub> = 0.33μF, C<sub>O</sub> = 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions	MC7824E			Unit	
			Min.	Typ.	Max.		
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25°C	23	24	25	V	
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 27V to 38V	22.8	24	25.25		
Line Regulation (Note1)	Regline	T <sub>J</sub> = +25°C	V <sub>I</sub> = 27V to 38V	-	17	480	mV
			V <sub>I</sub> = 30V to 36V	-	6	240	
Load Regulation (Note1)	Regload	T <sub>J</sub> = +25°C	I <sub>O</sub> = 5mA to 1.5A	-	15	480	mV
			I <sub>O</sub> = 250mA to 750mA	-	5.0	240	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25°C	-	5.2	8.0	mA	
Quiescent Current Change	ΔI <sub>Q</sub>	I <sub>O</sub> = 5mA to 1.0A	-	0.1	0.5	mA	
		V <sub>I</sub> = 27V to 38V	-	0.5	1		
Output Voltage Drift (Note2)	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5mA	-	-1.5	-	mV/°C	
Output Noise Voltage	V <sub>N</sub>	f = 10Hz to 100kHz, T <sub>A</sub> = +25°C	-	60	-	μV/V <sub>O</sub>	
Ripple Rejection (Note2)	RR	f = 120Hz V <sub>I</sub> = 28V to 38V	50	67	-	dB	
Dropout Voltage	V <sub>Drop</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> = +25°C	-	2	-	V	
Output Resistance (Note2)	r <sub>O</sub>	f = 1kHz	-	28	-	mΩ	
Short Circuit Current	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>A</sub> = +25°C	-	230	-	mA	
Peak Current (Note2)	I <sub>PK</sub>	T <sub>J</sub> = +25°C	-	2.2	-	A	

**Note:**

1. Load and line regulation are specified at constant junction temperature. Changes in V<sub>O</sub> 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 (MC7805AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 7.5\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	-	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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	-	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		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	6	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	-	-	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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 8\text{V to } 18\text{V}$	-	68	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7806AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 8.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	-	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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	-	9	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	-	4	100		
		$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	50		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	4.3	6	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	-	-	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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 9\text{V to } 19\text{V}$	-	65	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7808AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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	
Line Regulation (Note1)	Regline	$V_I = 10.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	-	6	80	mV
		$V_I = 11\text{V to } 17\text{V}$	-	3	80	
		$T_J = +25^{\circ}\text{C}$ , $V_I = 10.4\text{V to } 23\text{V}$	-	6	80	
		$V_I = 11\text{V to } 17\text{V}$	-	2	40	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	-	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	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	-	-	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	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 11.5\text{V to } 21.5\text{V}$	-	62	-	dB
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	18	-	$\text{m}\Omega$
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7809AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 11.7\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	-	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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.0\text{A}$	-	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		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$V_I = 11.7\text{V to } 25\text{V}$ , $T_J = +25^{\circ}\text{C}$	-	-	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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 12\text{V to } 22\text{V}$	-	62	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7812AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 14.8\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	-	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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	-	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		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.1	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$V_I = 15\text{V to } 30\text{V}$ , $T_J = +25^{\circ}\text{C}$	-		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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 14\text{V to } 24\text{V}$	-	60	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	18	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7815AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 17.9\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	-	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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	-	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		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$V_I = 17.5\text{V to } 30\text{V}$ , $T_J = +25^{\circ}\text{C}$	-	-	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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 18.5\text{V to } 28.5\text{V}$	-	58	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7818AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	17.64	18	18.36	V	
		$I_O = 5\text{mA}$ to 1A, $P_O \leq 15\text{W}$ $V_I = 21\text{V}$ to 33V	17.3	18	18.7		
Line Regulation (Note1)	Regline	$V_I = 21\text{V}$ to 33V, $I_O = 500\text{mA}$	-	15	180	mV	
		$V_I = 21\text{V}$ to 33V	-	5	180		
		$T_J = +25^{\circ}\text{C}$	$V_I = 20.6\text{V}$ to 33V	-	15		180
			$V_I = 24\text{V}$ to 30V	-	5		90
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA}$ to 1.5A	-	15	100	mV	
		$I_O = 5\text{mA}$ to 1.0A	-	15	100		
		$I_O = 250\text{mA}$ to 750mA	-	7	50		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$V_I = 21\text{V}$ to 33V, $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA	
		$V_I = 21\text{V}$ to 33V, $I_O = 500\text{mA}$	-	-	0.8		
		$I_O = 5\text{mA}$ to 1.0A	-	-	0.5		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to 100kHz $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 22\text{V}$ to 32V	-	57	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (MC7824AE)** (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)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note1)	Regline	$V_I = 27\text{V}$ 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
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA}$ 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		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$V_I = 27.3\text{V}$ 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		
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.5	-	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ $T_A = 25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 28\text{V}$ to $38\text{V}$	-	54	-	dB	
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note2)	$r_O$	$f = 1\text{kHz}$	-	20	-	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA	
Peak Current (Note2)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

## Typical Performance Characteristics

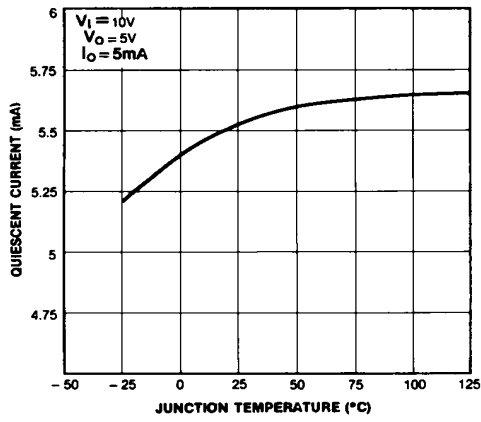


Figure 1. Quiescent Current

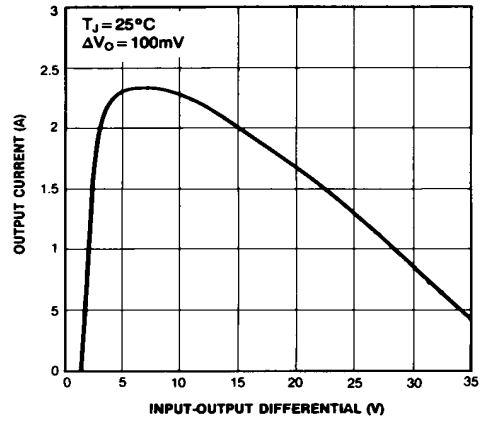


Figure 2. Peak Output Current

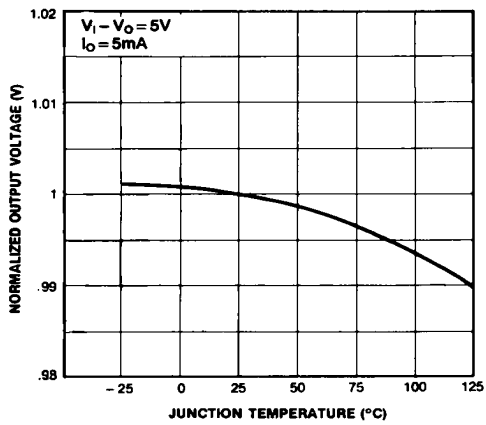


Figure 3. Output Voltage

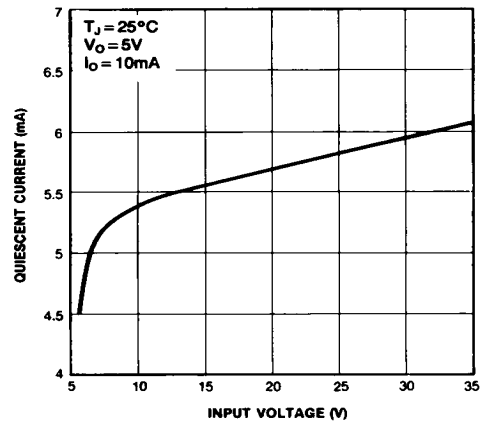


Figure 4. Quiescent Current

## Typical Applications

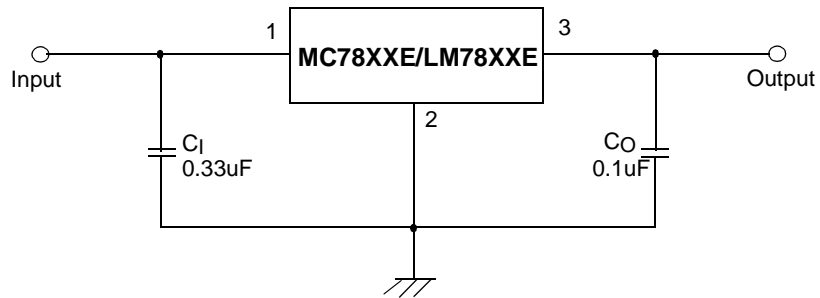


Figure 5. DC Parameters

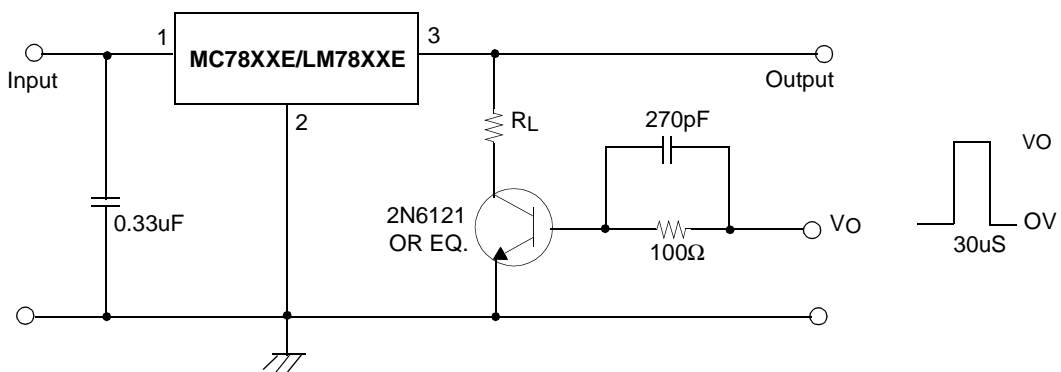


Figure 6. Load Regulation

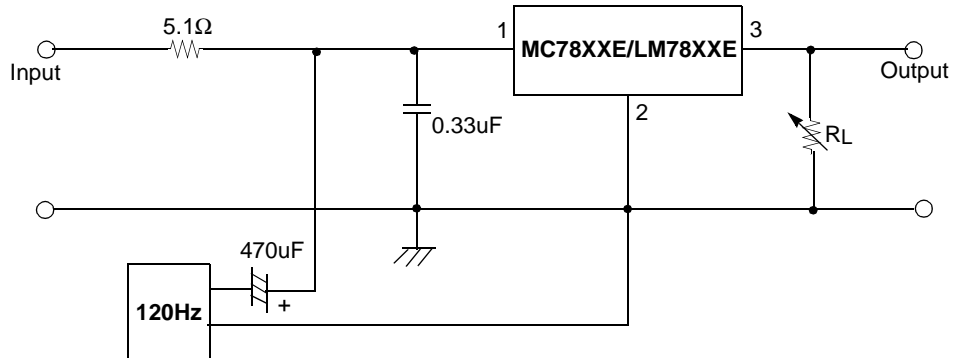


Figure 7. Ripple Rejection

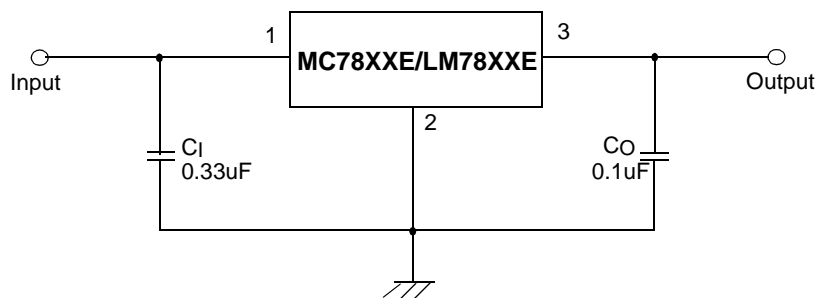


Figure 8. Fixed Output Regulator

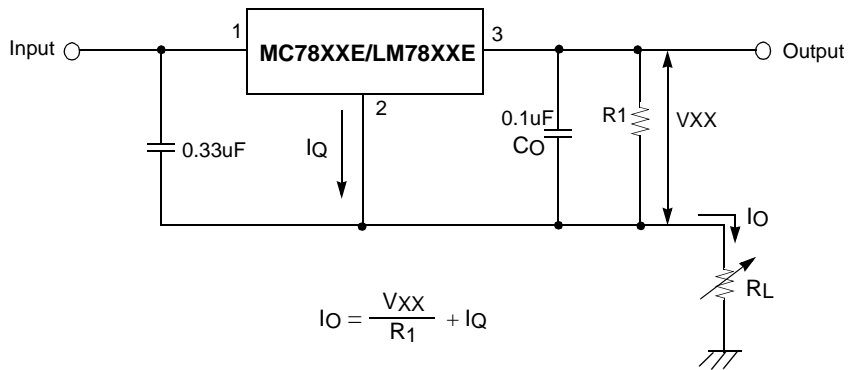


Figure 9. Constant Current Regulator

**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<sub>I</sub> is required if regulator is located an appreciable distance from power Supply filter.
- (3) C<sub>O</sub> improves stability and transient response.

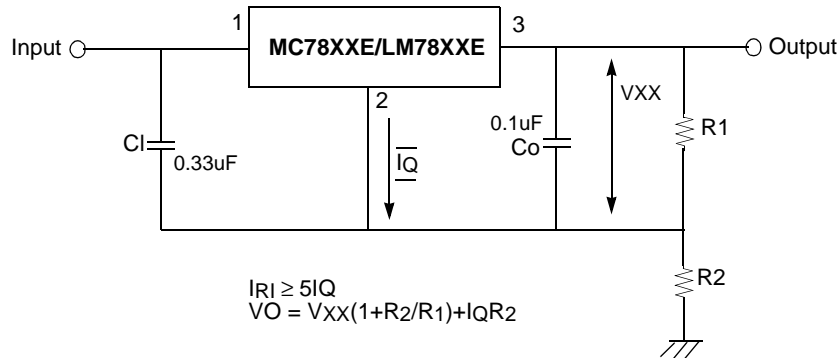


Figure 10. Circuit for Increasing Output Voltage

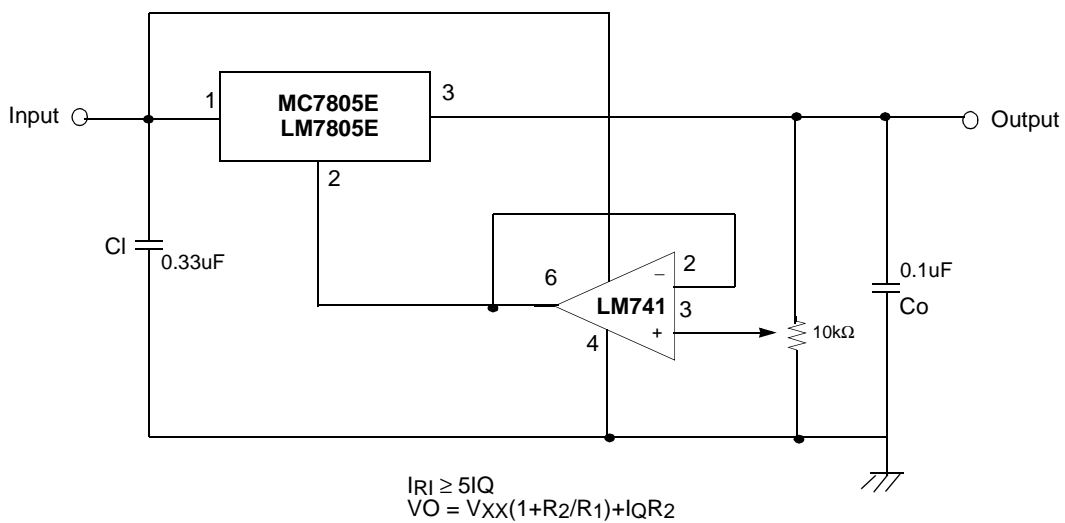


Figure 11. Adjustable Output Regulator (7 to 30V)

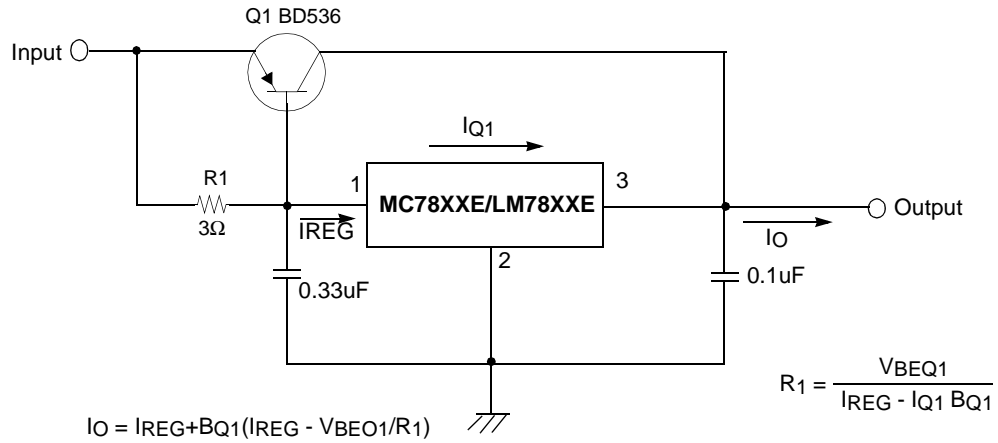


Figure 12. High Current Voltage Regulator

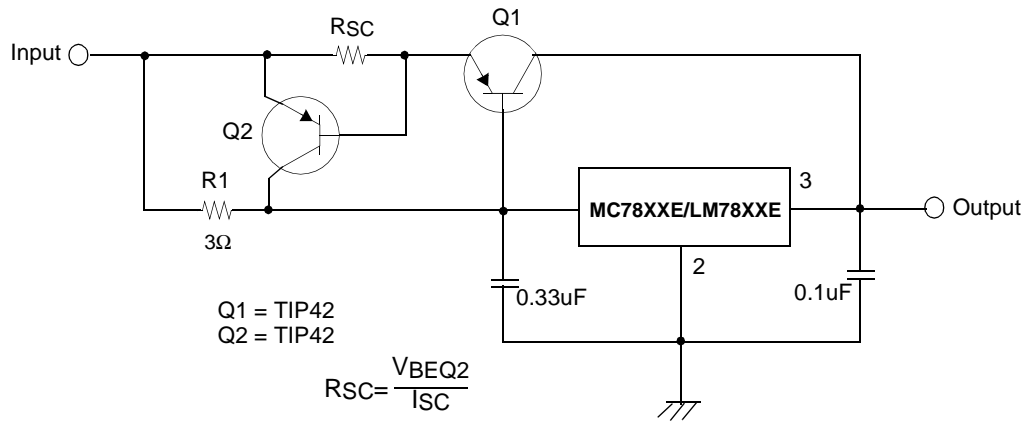


Figure 13. High Output Current with Short Circuit Protection

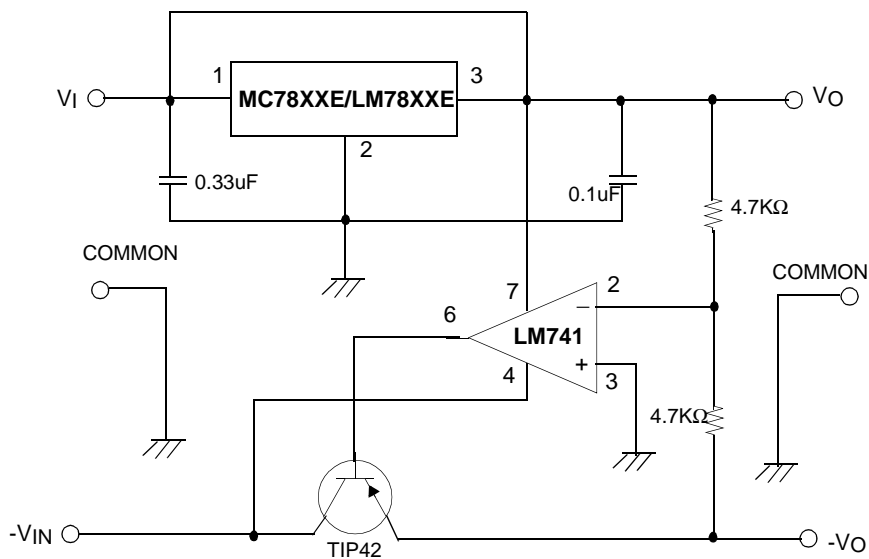


Figure 14. Tracking Voltage Regulator

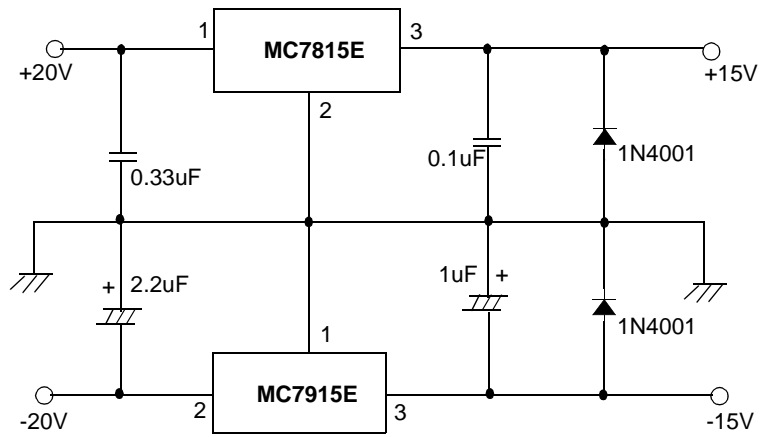


Figure 15. Split Power Supply ( ±15V-1A)

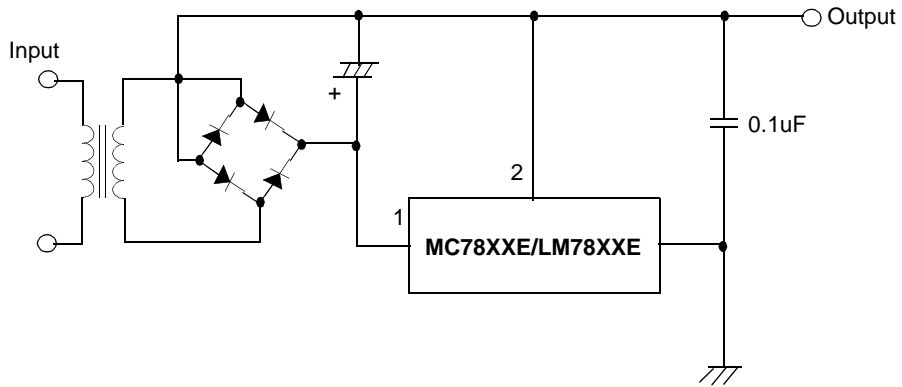


Figure 16. Negative Output Voltage Circuit

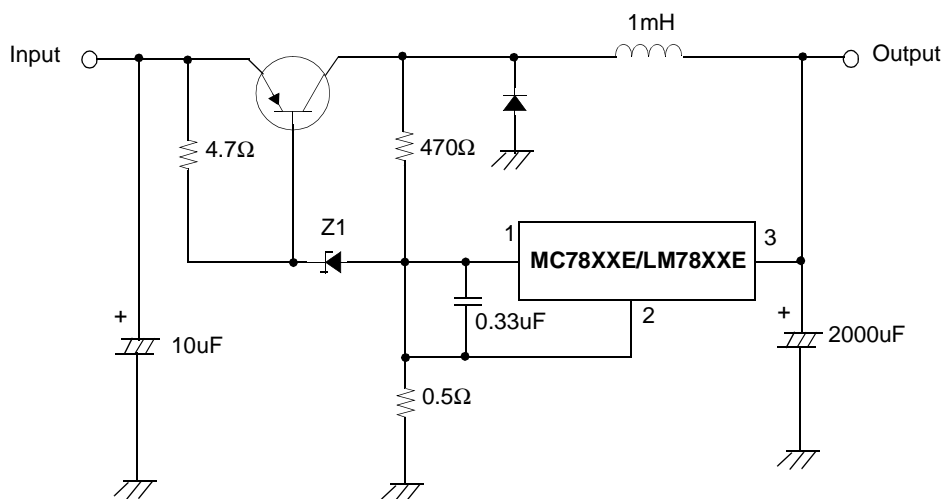


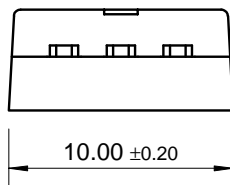
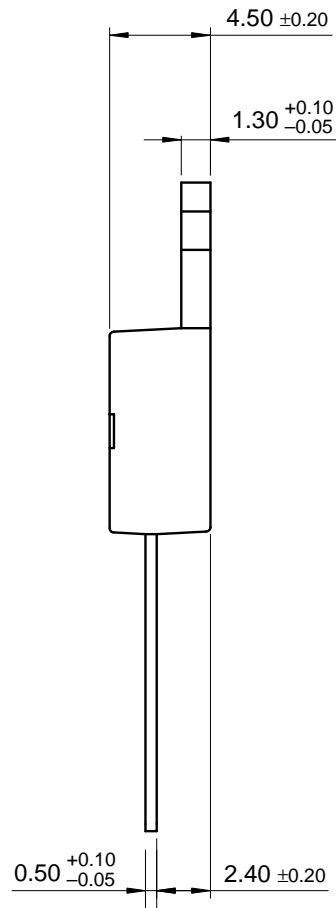
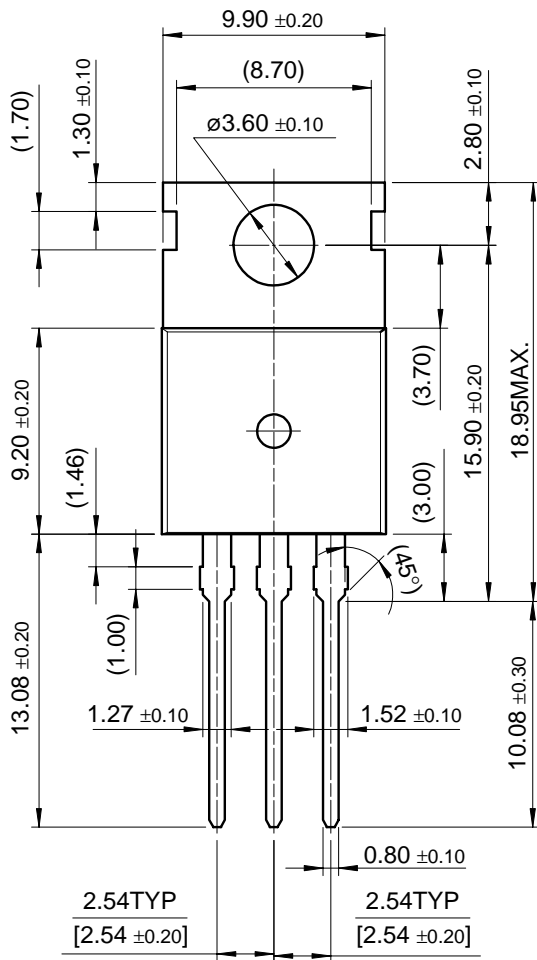
Figure 17. Switching Regulator

# Mechanical Dimensions

## Package

Dimensions in millimeters

### TO-220

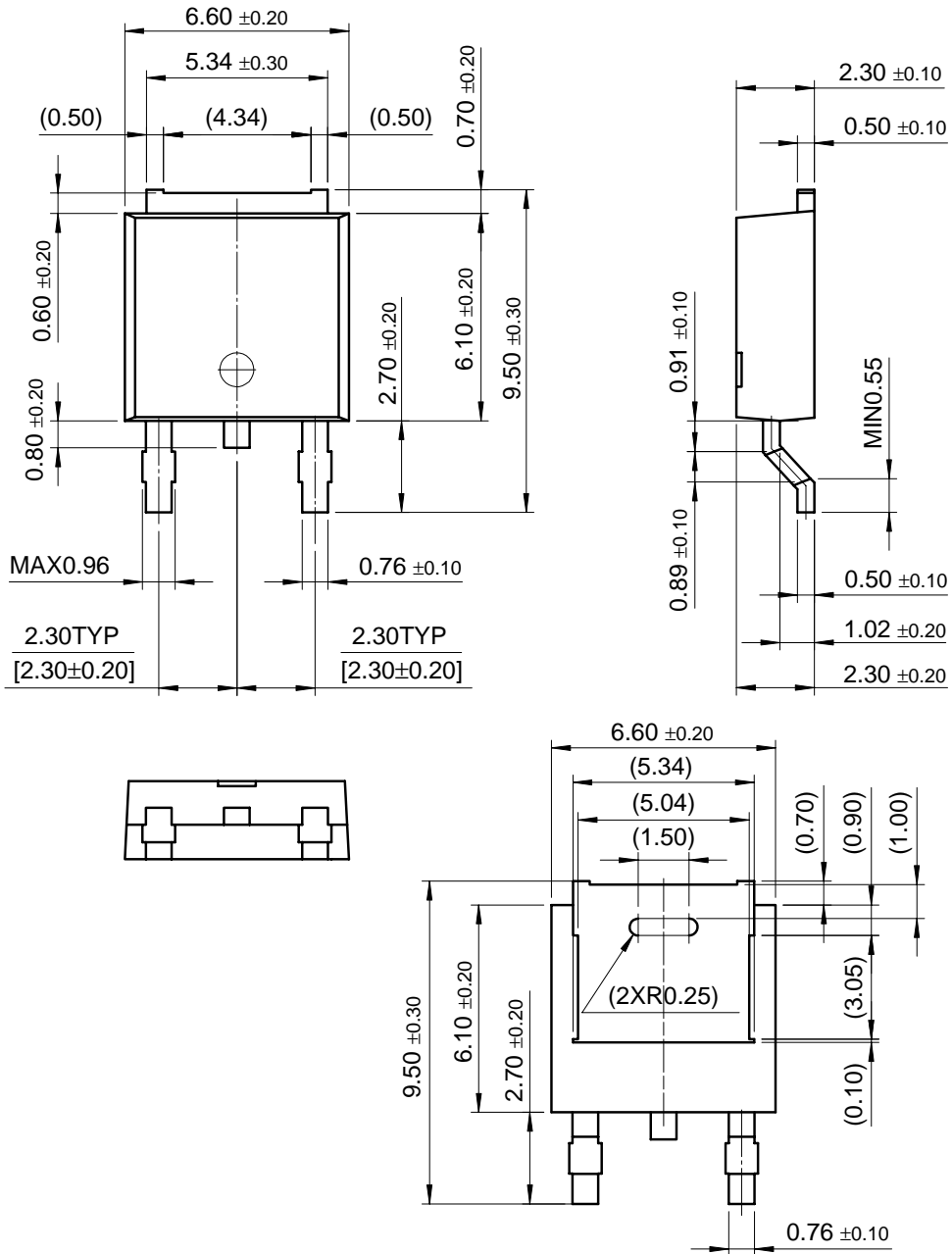


**Mechanical Dimensions** (Continued)

**Package**

Dimensions in millimeters

**D-PAK**



## Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
LM7805ECT	±4%	TO-220	0 ~ +125°C
Product Number	Output Voltage Tolerance	Package	Operating Temperature
MC7805ECT	±4%	TO-220	0 ~ +125°C
MC7806ECT			
MC7808ECT			
MC7809ECT			
MC7812ECT			
MC7815ECT			
MC7818ECT			
MC7824ECT			
MC7805ECDT		D-PAK	
MC7806ECDT			
MC7808ECDT			
MC7809ECDT			
MC7812ECDT	TO-220		
MC7805AECT			
MC7806AECT			
MC7808AECT			
MC7809AECT			
MC7812AECT			
MC7815AECT			
MC7818AECT			
MC7824AECT			

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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.

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## MC7809AE

3-Terminal 1A Positive Voltage Regulator

### Contents

- [General description](#)
- [Features](#)
- [Product status/pricing/packaging](#)
- [Order Samples](#)
- [Qualification Support](#)

### General description

The MC78XXE/LM78XXE/MC78XXAE series of three terminal positive regulators 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.

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### Features

- Output current up to 1A
- Output voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal overload protection
- Short circuit protection
- Output transistor safe operating area protection

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**Product status/pricing/packaging**

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Product	Product status	Pb-free Status	Package type	Leads	Packing method
MC7809AECT	Lifetime Buy		TO-220	3	RAIL

MC7809AECTBU	Lifetime Buy		TO-220	3	BULK
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 Indicates product with Pb-free second-level interconnect. For more information [click here](#).

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### Qualification Support

Click on a product for detailed qualification data

Product
<a href="#">MC7809AECT</a>
<a href="#">MC7809AECTBU</a>

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