

# MC78XX/LM78XX/MC78XXA

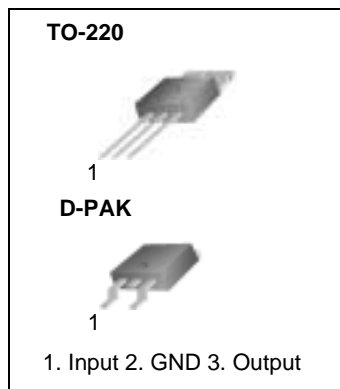
## 3-Terminal 1A Positive Voltage Regulator

### Features

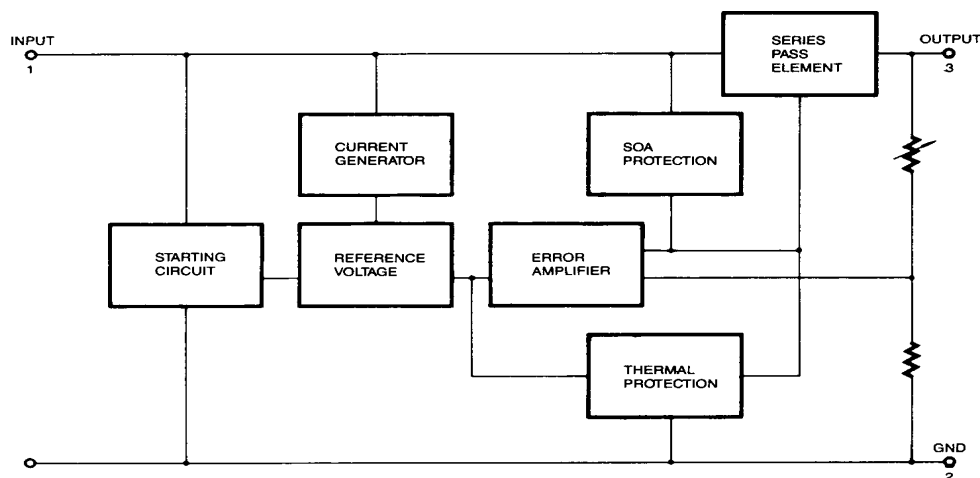
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

### Description

The MC78XX/LM78XX/MC78XXA 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 $18V$ )	$V_I$	35	V
(for $V_O = 24V$ )	$V_I$	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	$T_{OPR}$	$0 \sim +125$	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	$-65 \sim +150$	$^{\circ}C$

## Electrical Characteristics (MC7805/LM7805)

(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		MC7805/LM7805			Unit
				Min.	Typ.	Max.	
Output Voltage	VO	TJ =+25 °C		4.8	5.0	5.2	V
		5.0mA ≤ IO ≤ 1.0A, PO ≤ 15W VI = 7V to 20V		4.75	5.0	5.25	
Line Regulation (Note1)	Regline	TJ=+25 °C	VO = 7V to 25V	-	4.0	100	mV
			VI = 8V to 12V	-	1.6	50	
Load Regulation (Note1)	Regload	TJ=+25 °C	IO = 5.0mA to1.5A	-	9	100	mV
			IO =250mA to 750mA	-	4	50	
Quiescent Current	IQ	TJ =+25 °C		-	5.0	8.0	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 1.0A		-	0.03	0.5	mA
		VI= 7V to 25V		-	0.3	1.3	
Output Voltage Drift	ΔVO/ΔT	IO= 5mA		-	-0.8	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz, TA=+25 °C		-	42	-	μV/VO
Ripple Rejection	RR	f = 120Hz VO = 8V to 18V		62	73	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+25 °C		-	2	-	V
Output Resistance	ro	f = 1KHz		-	15	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =+25 °C		-	230	-	mA
Peak Current	IPK	TJ =+25 °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.

## Electrical Characteristics (MC7806)

(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		MC7806			Unit
				Min.	Typ.	Max.	
Output Voltage	V <sub>O</sub>	T <sub>J</sub> =+25 °C		5.75	6.0	6.25	V
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 8.0V to 21V		5.7	6.0	6.3	
Line Regulation (Note1)	Regline	T <sub>J</sub> =+25 °C	V <sub>I</sub> = 8V to 25V	-	5	120	mV
			V <sub>I</sub> = 9V to 13V	-	1.5	60	
Load Regulation (Note1)	Regload	T <sub>J</sub> =+25 °C	I <sub>O</sub> =5mA to 1.5A	-	9	120	mV
			I <sub>O</sub> =250mA to 750A	-	3	60	
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 1A		-	-	0.5	mA
		V <sub>I</sub> = 8V to 25V		-	-	1.3	
Output Voltage Drift	ΔV <sub>O</sub> /ΔT	I <sub>O</sub> = 5mA		-	-0.8	-	mV/ °C
Output Noise Voltage	V <sub>N</sub>	f = 10Hz to 100KHz, T <sub>A</sub> =+25 °C		-	45	-	μV/V <sub>O</sub>
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 9V to 19V		59	75	-	dB
Dropout Voltage	V <sub>Drop</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> =+25 °C		-	2	-	V
Output Resistance	r <sub>O</sub>	f = 1KHz		-	19	-	mΩ
Short Circuit Current	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>A</sub> =+25 °C		-	250	-	mA
Peak Current	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  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (MC7808)

(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		MC7808			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	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-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	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	$r_O$	$f = 1\text{KHz}$		-	17	-	$\text{m}\Omega$
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		-	230	-	mA
Peak Current	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$		-	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.

## Electrical Characteristics (MC7809)

(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		MC7809			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	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	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	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	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.

## Electrical Characteristics (MC7810)

(Refer to test circuit ,0°C < T<sub>J</sub> < 125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 16V, C<sub>I</sub> = 0.33μF, C<sub>O</sub> = 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions		MC7810			Unit
				Min.	Typ.	Max.	
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25 °C		9.6	10	10.4	V
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 12.5V to 25V		9.5	10	10.5	
Line Regulation (Note1)	Regline	T <sub>J</sub> = +25 °C	V <sub>I</sub> = 12.5V to 25V	-	10	200	mV
			V <sub>I</sub> = 13V to 25V	-	3	100	
Load Regulation (Note1)	Regload	T <sub>J</sub> = +25 °C	I <sub>O</sub> = 5mA to 1.5A	-	12	200	mV
			I <sub>O</sub> = 250mA to 750mA	-	4	400	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25 °C		-	5.1	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> = 12.5V to 29V		-	-	1.0	
Output Voltage Drift	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	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	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	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.

## Electrical Characteristics (MC7812)

(Refer to test circuit ,0°C < T<sub>J</sub> < 125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 19V, C<sub>I</sub> = 0.33μF, C<sub>O</sub> = 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions		MC7812			Unit
				Min.	Typ.	Max.	
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25 °C		11.5	12	12.5	V
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>O</sub> ≤ 15W V <sub>I</sub> = 14.5V to 27V		11.4	12	12.6	
Line Regulation (Note1)	Regline	T <sub>J</sub> = +25 °C	V <sub>I</sub> = 14.5V to 30V	-	10	240	mV
			V <sub>I</sub> = 16V to 22V	-	3.0	120	
Load Regulation (Note1)	Regload	T <sub>J</sub> = +25 °C	I <sub>O</sub> = 5mA to 1.5A	-	11	240	mV
			I <sub>O</sub> = 250mA to 750mA	-	5.0	120	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25 °C		-	5.1	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> = 14.5V to 30V		-	0.5	1.0	
Output Voltage Drift	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		-	76	-	μV/V <sub>O</sub>
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 15V to 25V		55	71	-	dB
Dropout Voltage	V <sub>Drop</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> = +25 °C		-	2	-	V
Output Resistance	r <sub>O</sub>	f = 1KHz		-	18	-	mΩ
Short Circuit Current	I <sub>SC</sub>	V <sub>I</sub> = 35V, T <sub>A</sub> = +25 °C		-	230	-	mA
Peak Current	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.

## Electrical Characteristics (MC7815)

(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		MC7815			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	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-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	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	$r_O$	$f = 1\text{KHz}$		-	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	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$		-	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.



## Electrical Characteristics (MC7818)

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

Parameter	Symbol	Conditions		MC7818			Unit
				Min.	Typ.	Max.	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$		17.3	18	18.7	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$ , $P_O \leq 15\text{W}$ $V_I = 21\text{V to } 33\text{V}$		17.1	18	18.9	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 21\text{V to } 33\text{V}$	-	15	360	mV
			$V_I = 24\text{V to } 30\text{V}$	-	5	180	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	15	360	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	180	
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
		$V_I = 21\text{V to } 33\text{V}$		-	-	1	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$		-	110	-	$\mu\text{V}/V_O$
Ripple Rejection	RR	$f = 120\text{Hz}$ $V_I = 22\text{V to } 32\text{V}$		53	69	-	dB
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance	$r_O$	$f = 1\text{KHz}$		-	22	-	$\text{m}\Omega$
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		-	250	-	mA
Peak Current	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$		-	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.

## Electrical Characteristics (MC7824)

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

Parameter	Symbol	Conditions		MC7824			Unit
				Min.	Typ.	Max.	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$		23	24	25	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$ , $P_O \leq 15\text{W}$ $V_I = 27\text{V to } 38\text{V}$		22.8	24	25.25	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{V to } 38\text{V}$	-	17	480	mV
			$V_I = 30\text{V to } 36\text{V}$	-	6	240	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	15	480	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	240	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$		-	5.2	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1.0\text{A}$		-	0.1	0.5	mA
		$V_I = 27\text{V to } 38\text{V}$		-	0.5	1	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1.5	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$		-	60	-	$\mu\text{V}/V_O$
Ripple Rejection	RR	$f = 120\text{Hz}$ $V_I = 28\text{V to } 38\text{V}$		50	67	-	dB
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance	$r_O$	$f = 1\text{kHz}$		-	28	-	$\text{m}\Omega$
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		-	230	-	mA
Peak Current	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$		-	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.

## Electrical Characteristics (MC7805A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	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	$r_O$	$f = 1\text{KHz}$	-	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	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7806A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	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	$r_O$	$f = 1\text{KHz}$	-	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	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7808A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	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	$r_O$	$f = 1\text{KHz}$	-	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	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7809A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	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	$r_O$	$f = 1\text{KHz}$	-	17	-	$\text{m}\Omega$
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7810A)

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	9.8	10	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	10.4	
Line Regulation (Note1)	Regline	$V_I = 12.8\text{V to } 26\text{V}$ $I_O = 500\text{mA}$	-	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	
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	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	6.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I = 13\text{V to } 26\text{V}$ , $T_J = +25^{\circ}\text{C}$	-	-	0.5	mA
		$V_I = 12.8\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	-	-	0.5	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 14\text{V to } 24\text{V}$	-	62	-	dB
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance	$r_O$	$f = 1\text{KHz}$	-	17	-	m $\Omega$
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7812A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	$\text{mV}/^{\circ}\text{C}$
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	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	$r_O$	$f = 1\text{KHz}$	-	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	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	-	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.



## Electrical Characteristics (MC7815A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	$\text{mV}/^{\circ}\text{C}$
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	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	$r_O$	$f = 1\text{KHz}$	-	19	-	$\text{m}\Omega$
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current	IPK	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7818A)

(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
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ $V_I = 21\text{V to } 33\text{V}$	17.3	18	18.7	
Line Regulation (Note1)	Regline	$V_I = 21\text{V to } 33\text{V}$ $I_O = 500\text{mA}$	-	15	180	mV
		$V_I = 21\text{V to } 33\text{V}$	-	5	180	
		$T_J = +25^{\circ}\text{C}$	$V_I = 20.6\text{V to } 33\text{V}$	-	15	180
			$V_I = 24\text{V to } 30\text{V}$	-	5	90
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	$\Delta I_Q$	$V_I = 21\text{V to } 33\text{V}$ , $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA
		$V_I = 21\text{V to } 33\text{V}$ , $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	-	-	0.5	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ $V_I = 22\text{V to } 32\text{V}$	-	57	-	dB
Dropout Voltage	$V_{\text{Drop}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance	$r_O$	$f = 1\text{KHz}$	-	19	-	$\text{m}\Omega$
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Electrical Characteristics (MC7824A)

(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	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-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	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	$r_O$	$f = 1\text{KHz}$	-	20	-	$\text{m}\Omega$
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	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.

## Typical Performance Characteristics

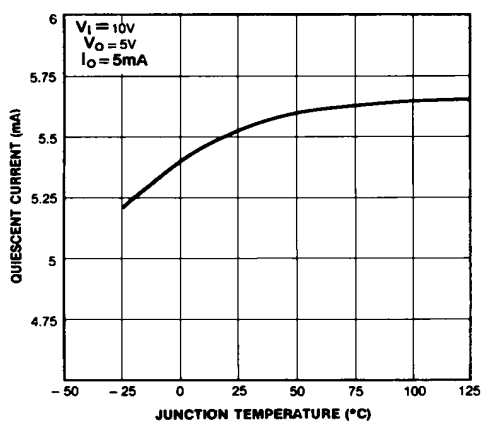


Figure 1. Quiescent Current

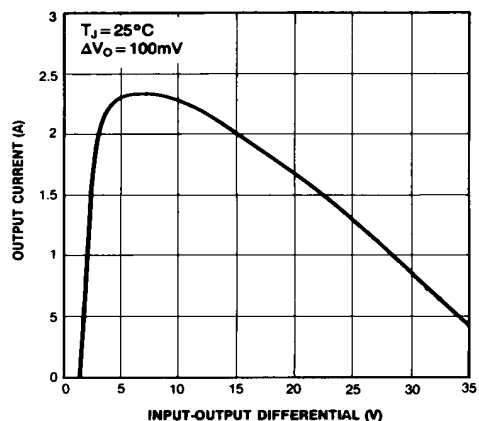


Figure 2. Peak Output Current

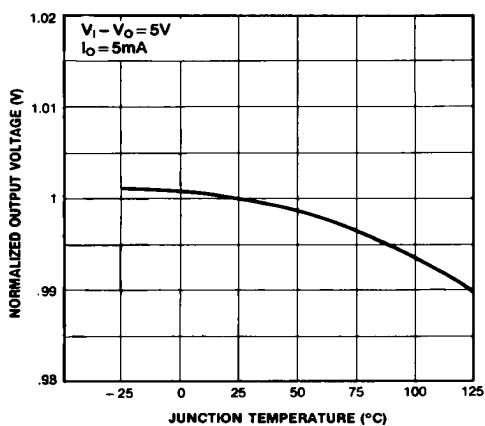


Figure 3. Output Voltage

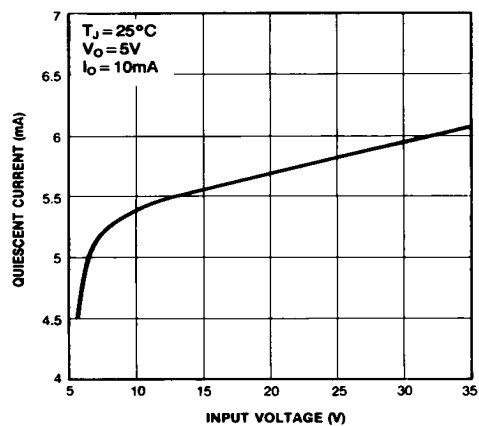


Figure 4. Quiescent Current

## Typical Applications

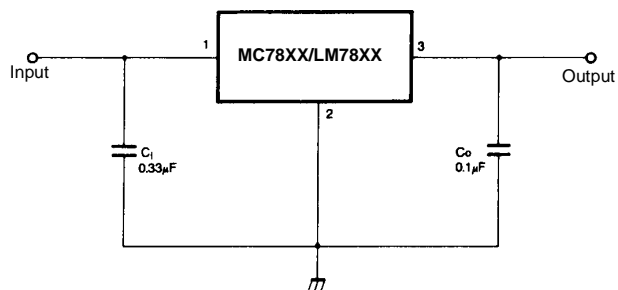


Figure 5. DC Parameters

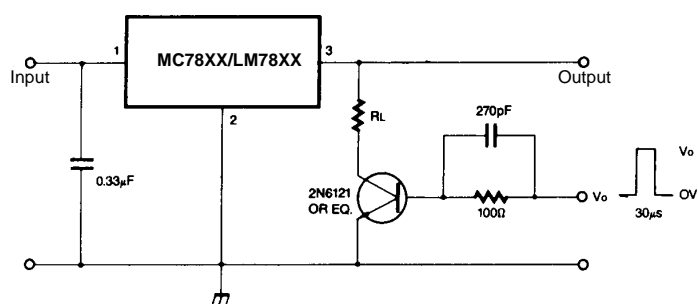


Figure 6. Load Regulation

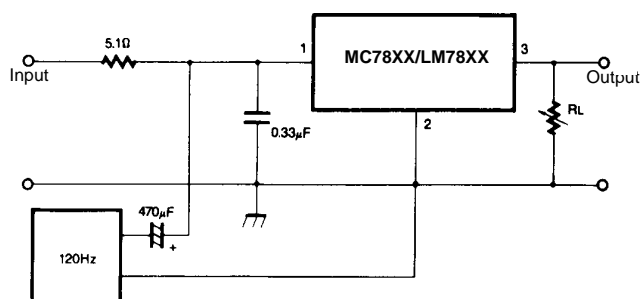


Figure 7. Ripple Rejection

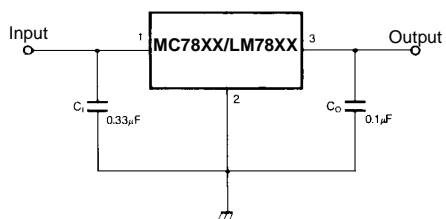


Figure 8. Fixed Output Regulator

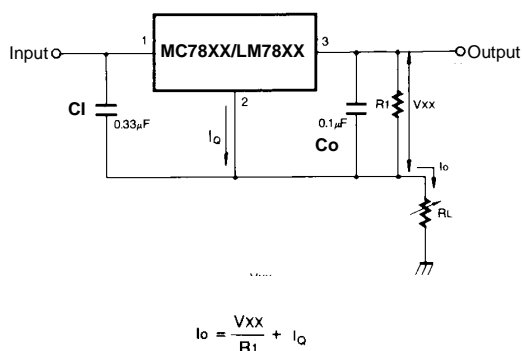


Figure 9. Constant Current Regulator

**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) C1 is required if regulator is located an appreciable distance from power Supply filter.
- (3) Co improves stability and transient response.

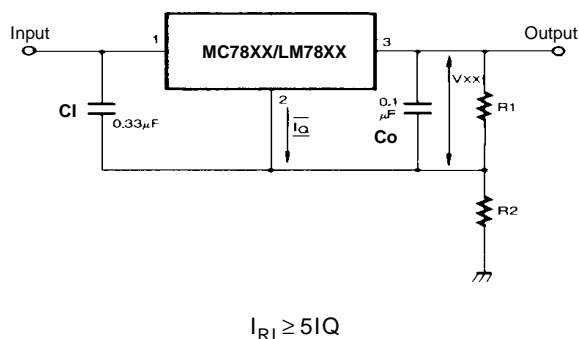


Figure 10. Circuit for Increasing Output Voltage

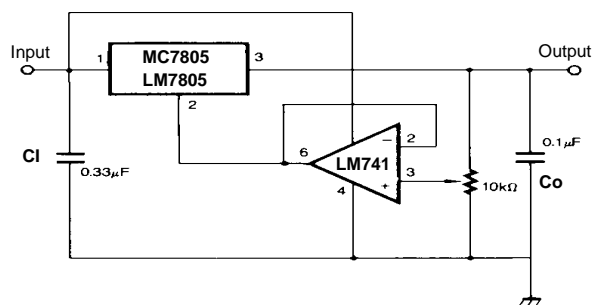


Figure 11. Adjustable Output Regulator (7 to 30V)

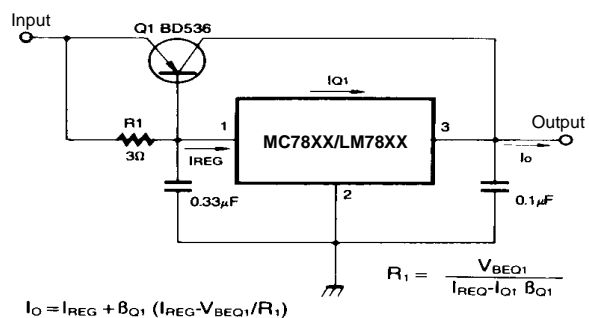


Figure 12. High Current Voltage Regulator

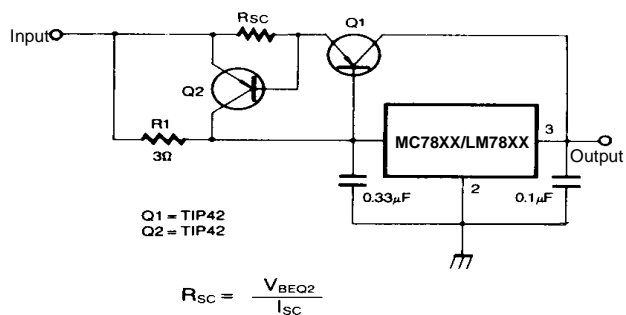


Figure 13. High Output Current with Short Circuit Protection

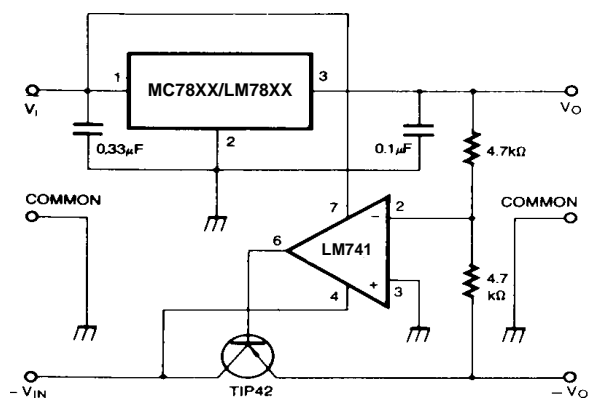


Figure 14. Tracking Voltage Regulator

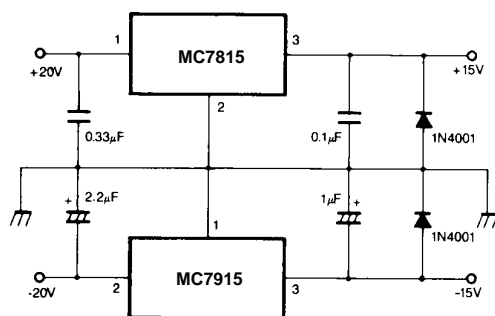
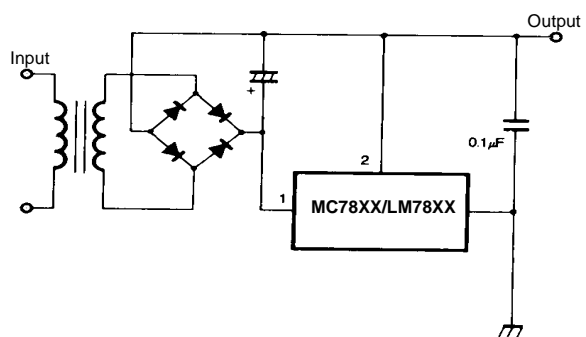
Figure 15. Split Power Supply (  $\pm 15\text{V}$ -1A)

Figure 16. Negative Output Voltage Circuit

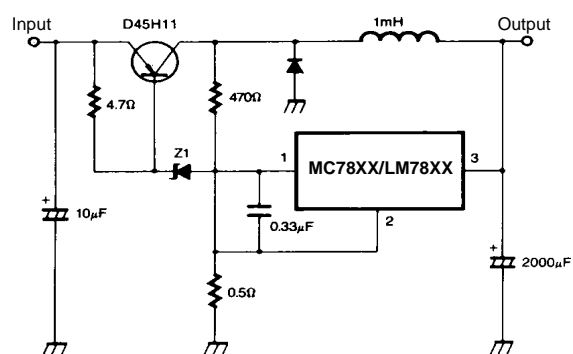


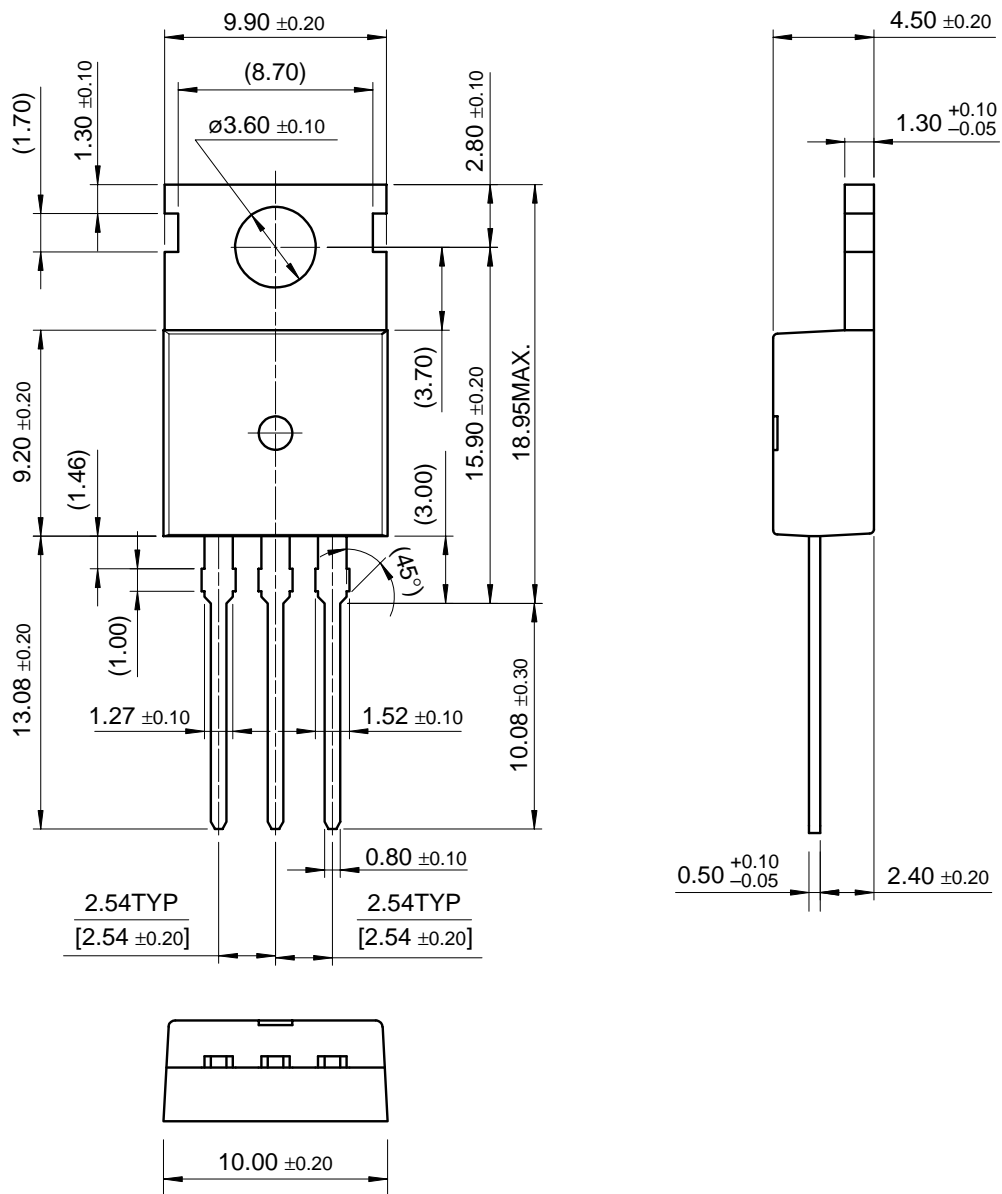
Figure 17. Switching Regulator



## Mechanical Dimensions

### Package

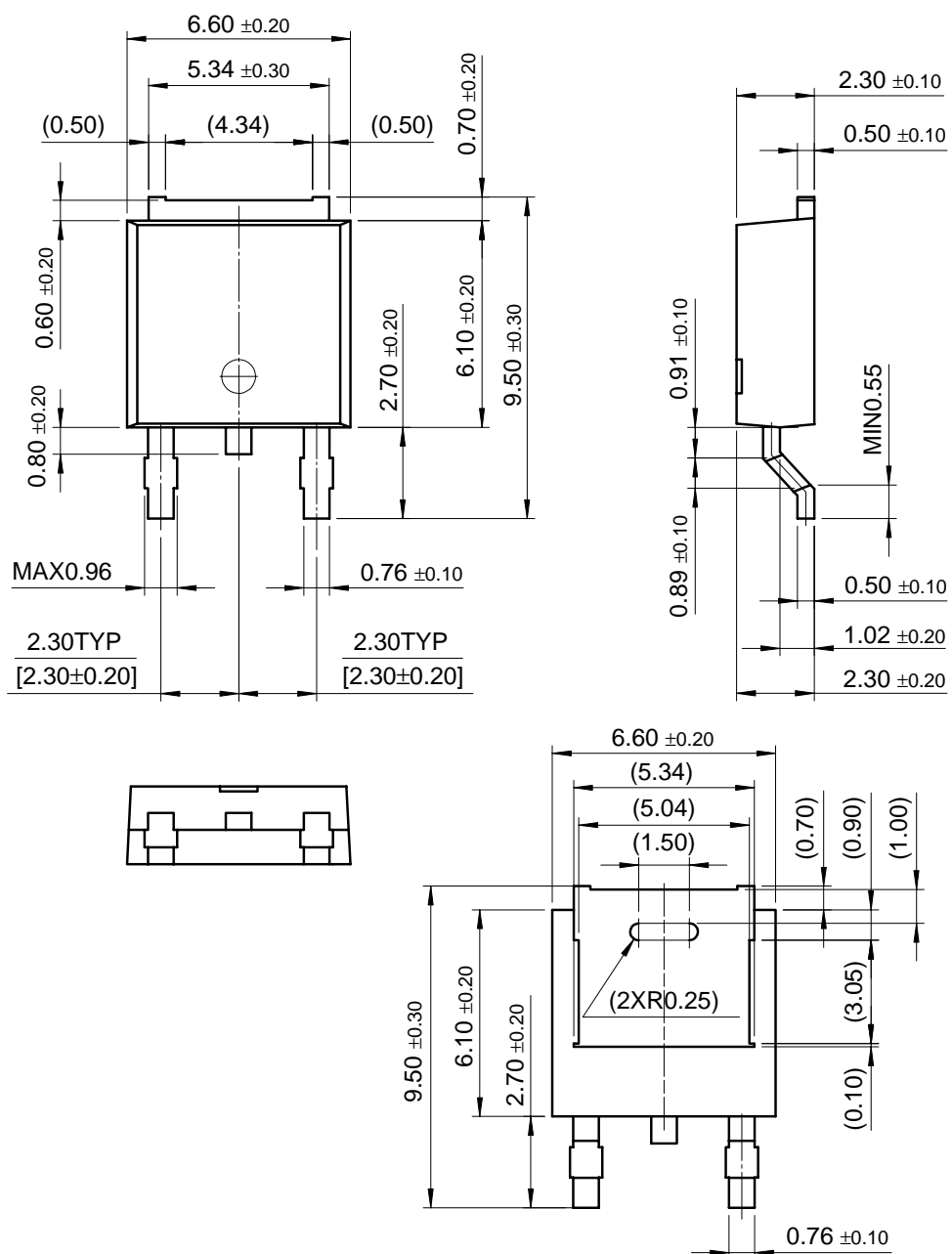
## TO-220



# Mechanical Dimensions (Continued)

## Package

### D-PAK



## Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
LM7805CT	±4%	TO-220	0 ~ + 125°C

Product Number	Output Voltage Tolerance	Package	Operating Temperature
MC7805CT	±4%	TO-220	0 ~ + 125°C
MC7806CT			
MC7808CT			
MC7809CT			
MC7810CT			
MC7812CT			
MC7815CT			
MC7818CT			
MC7824CT			
MC7805CDT		D-PAK	
MC7806CDT			
MC7808CDT			
MC7809CDT			
MC7810CDT			
MC7812CDT			
MC7805ACT	±2%	TO-220	
MC7806ACT			
MC7808ACT			
MC7809ACT			
MC7810ACT			
MC7812ACT			
MC7815ACT			
MC7818ACT			
MC7824ACT			

#### **DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

#### **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 THE PRESIDENT 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.