

# MC78XX/LM78XX

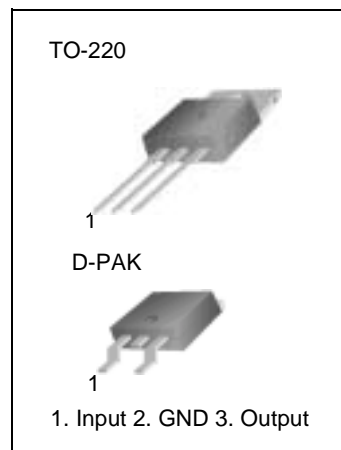
## 3-terminal 1A positive voltage regulator

### Features

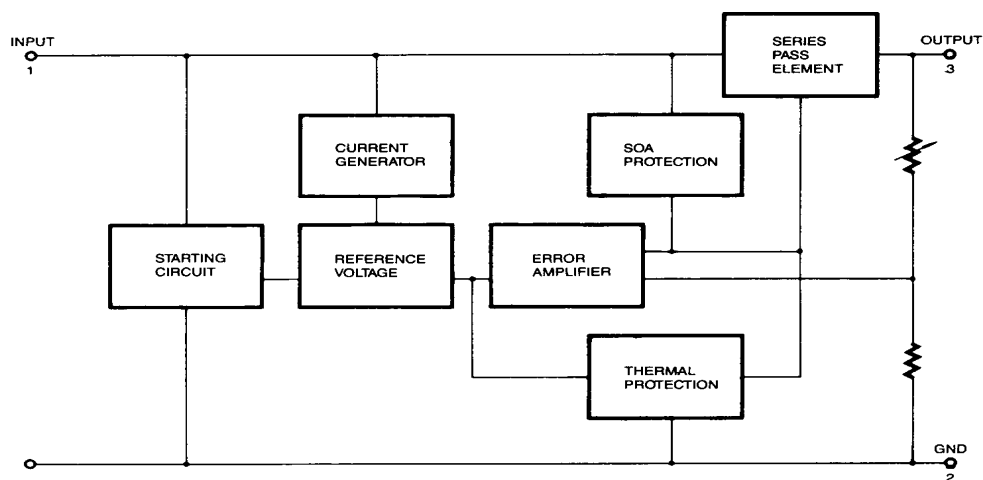
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 11, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating area Protection

### Description

The MC78XX/LM78XX 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 $V_O = 24V$ )	$V_I$ $V_I$	35 40	V V
Thermal Resistance Junction-Cases	$R_{\theta JC}$	5	$^{\circ}C/W$
Thermal Resistance Junction-Air	$R_{\theta JA}$	65	$^{\circ}C/W$
Operating Temperature Range (MC78XXCT/LM78XXCT/MC78XXCDT)	$T_{OPR}$	0 ~ +125	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	-65 ~ +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	$V_O$	$T_J = +25^{\circ}C$	4.8	5.0	5.2	V	
		$5.0mA \leq I_O \leq 1.0A$ , $P_O \leq 15W$ $V_I = 7V$ to $20V$ $V_I = 8V$ to $20V$	4.75	5.0	5.25		
Line Regulation	$\Delta V_O$	$T_J = +25^{\circ}C$	$V_O = 7V$ to $25V$	-	4.0	100	mV
			$V_I = 8V$ to $12V$	-	1.6	50	
Load Regulation	$\Delta V_O$	$T_J = +25^{\circ}C$	$I_O = 5.0mA$ 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	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	$\Delta V_O / \Delta T$	$I_O = 5mA$	-	-0.8	-	mV/ $^{\circ}C$	
Output Noise Voltage	$V_N$	$f = 10Hz$ to $100KHz$ , $T_A = +25^{\circ}C$	-	42	-	$\mu V$	
Ripple Rejection	RR	$f = 120Hz$ $V_O = 8V$ to $18V$	62	73	-	dB	
Dropout Voltage	$V_O$	$I_O = 1A$ , $T_J = +25^{\circ}C$	-	2	-	V	
Output Resistance	$R_O$	$f = 1KHz$	-	15	-	$m\Omega$	
Short Circuit Current	$I_{SC}$	$V_I = 35V$ , $T_A = +25^{\circ}C$	-	230	-	mA	
Peak Current	$I_{PK}$	$T_J = +25^{\circ}C$	-	2.2	-	A	

- 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°C < T<sub>J</sub> < +125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 11V, C<sub>I</sub>= 0.33μF, C<sub>O</sub>= 0.1μF, 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>D</sub> ≤ 15W V <sub>I</sub> = 8.0V to 21V V <sub>I</sub> = 9.0V to 21V	5.7	6.0	6.3		
Line Regulation	ΔV <sub>O</sub>	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	ΔV <sub>O</sub>	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	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	
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 9V to 19V	59	75	-	dB	
Dropout Voltage	V <sub>O</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	

- 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 (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	
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$ , $P_O \leq 15\text{W}$ $V_I = 10.5\text{V to } 23\text{V}$ $V_I = 11.5\text{V to } 23\text{V}$	7.6	8.0	8.4		
Line Regulation	$\Delta V_O$	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{V to } 25\text{V}$	-	5.0	160	mV
			$V_I = 11.5\text{V to } 17\text{V}$	-	2.0	80	
Load Regulation	$\Delta V_O$	$T_J = +25^{\circ}\text{C}$	$I_O = 5.0\text{mA to } 1.5\text{A}$	-	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	mA	
Quiescent Current Change	$\Delta I_Q$		$I_O = 5\text{mA to } 1.0\text{A}$	-	0.05	0.5	mA
			$V_I = 10.5\text{A to } 25\text{V}$	-	0.5	1.0	
			$V_I = 11.5\text{V to } 25\text{V}$	-	-	-	
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	-	$\mu\text{V}$	
Ripple Rejection	RR	$f = 120\text{Hz}$ , $V_I = 11.5\text{V to } 21.5$	56	73	-	dB	
Dropout Voltage	$V_O$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance	$R_O$	$f = 1\text{KHz}$	-	17	-	$\text{m}\Omega$	
Short Circuit Current	$I_{SC}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	230	-	mA	
Peak Current	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

- 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>D</sub> ≤ 15W V <sub>I</sub> = 11.5V to 24V V <sub>I</sub> = 12.5V to 24V	8.6	9	9.4		
Line Regulation	ΔV <sub>O</sub>	T <sub>J</sub> = +25 °C	V <sub>I</sub> = 11.5V to 25V	-	6	180	mV
			V <sub>I</sub> = 12V to 25V	-	2	90	
Load Regulation	ΔV <sub>O</sub>	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	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		
		V <sub>I</sub> = 12.5V to 26V	-	-	-		
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	
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 13V to 23V	56	71	-	dB	
Dropout Voltage	V <sub>O</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	

- 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>D</sub> ≤ 15W V <sub>I</sub> = 14.5V to 27V V <sub>I</sub> = 15.5V to 27V	11.4	12	12.6		
Line Regulation	ΔV <sub>O</sub>	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	ΔV <sub>O</sub>	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	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		
		V <sub>I</sub> = 15V to 30V	-	-	-		
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	
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 15V to 25V	55	71	-	dB	
Dropout Voltage	V <sub>O</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	

- 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°C < T<sub>J</sub> < +125°C, I<sub>O</sub> = 500mA, V<sub>I</sub> = 23V, C<sub>I</sub>= 0.33μF, C<sub>O</sub>= 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions	MC7815			Unit	
			Min.	Typ.	Max.		
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = +25 °C	14.4	15	15.6	V	
		5.0mA ≤ I <sub>O</sub> ≤ 1.0A, P <sub>D</sub> ≤ 15W V <sub>I</sub> = 17.5V to 30V V <sub>I</sub> = 18.5V to 30V	14.25	15	15.75		
Line Regulation	ΔV <sub>O</sub>	T <sub>J</sub> = +25 °C	V <sub>I</sub> = 17.5V to 30V	-	11	300	mV
			V <sub>I</sub> = 20V to 26V	-	3	150	
Load Regulation	ΔV <sub>O</sub>	T <sub>J</sub> = +25 °C	I <sub>O</sub> = 5mA to 1.5A	-	12	300	mV
			I <sub>O</sub> = 250mA to 750mA	-	4	150	
Quiescent Current	I <sub>Q</sub>	T <sub>J</sub> = +25 °C	-	5.2	8	mA	
Quiescent Current Change	ΔI <sub>Q</sub>	I <sub>O</sub> = 5mA to 1.0A	-	-	0.5	mA	
		V <sub>I</sub> = 17.5V to 30V	-	-	1.0		
		V <sub>I</sub> = 18.5V to 30V	-	-	-		
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	-	90	-	μV	
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 18.5V to 28.5V	54	70	-	dB	
Dropout Voltage	V <sub>O</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	

- 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 (MC7818)

(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	MC7818			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>D</sub> ≤ 15W V <sub>I</sub> = 21V to 33V V <sub>I</sub> = 22V to 33V	17.1	18	18.9		
Line Regulation	ΔV <sub>O</sub>	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	ΔV <sub>O</sub>	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	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		
		V <sub>I</sub> = 22V to 33V	-	-			
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	-	110	-	μV	
Ripple Rejection	RR	f = 120Hz V <sub>I</sub> = 22V to 32V	53	69	-	dB	
Dropout Voltage	V <sub>O</sub>	I <sub>O</sub> = 1A, T <sub>J</sub> = +25 °C	-	2	-	V	
Output Resistance	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	I <sub>PK</sub>	T <sub>J</sub> = +25 °C	-	2.2	-	A	

- 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 (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	
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$ , $P_D \leq 15\text{W}$ $V_I = 27\text{V to } 38\text{V}$ $V_I = 28\text{V to } 38\text{V}$	22.8	24	25.25		
Line Regulation	$\Delta V_O$	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{V to } 38\text{V}$	-	17	480	mV
			$V_I = 30\text{V to } 36\text{V}$	-	6	240	
Load Regulation	$\Delta V_O$	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	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	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		
		$V_I = 28\text{V to } 38\text{V}$	-	-	-		
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	-	$\mu\text{V}$	
Ripple Rejection	RR	$f = 120\text{Hz}$ $V_I = 28\text{V to } 38\text{V}$	50	67	-	dB	
Dropout Voltage	$V_O$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2	-	V	
Output Resistance	$R_O$	$f = 1\text{KHz}$	-	28	-	$\text{m}\Omega$	
Short Circuit Current	ISC	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	230	-	mA	
Peak Current	IPK	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

- 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.

## Typical Performance Characteristics

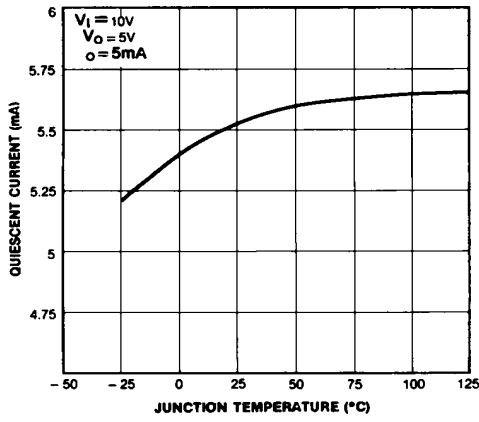


Figure 1. Quiescent Current

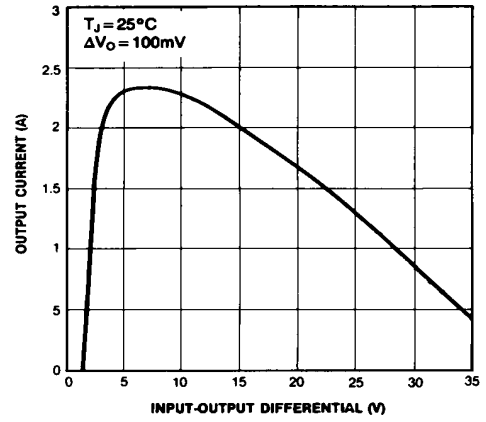


Figure 2. Peak Output Current

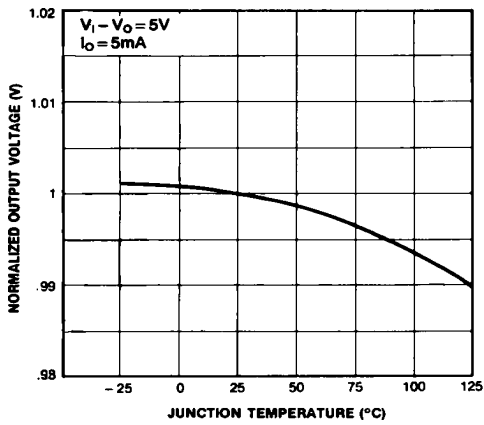


Figure 3. Output Voltage

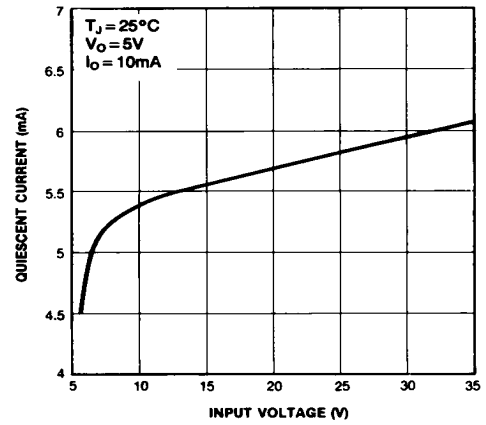


Figure 4. Quiescent Current

## Typical Applications

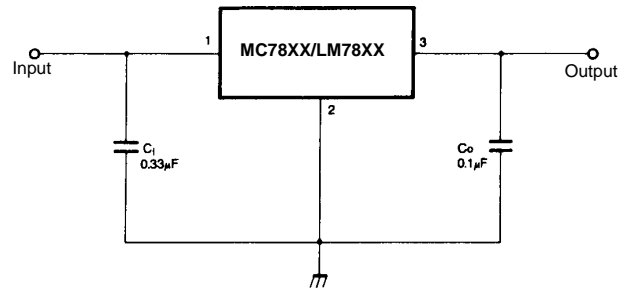


Figure 5. DC Parameters

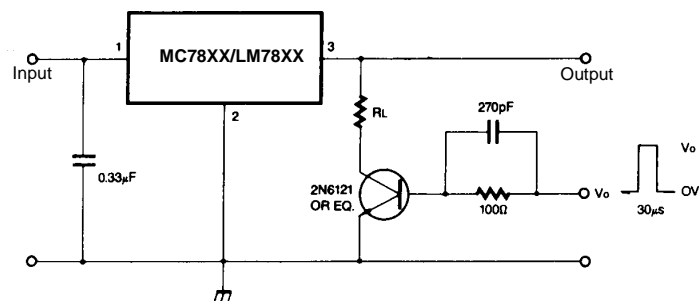


Figure 6. Load Regulation

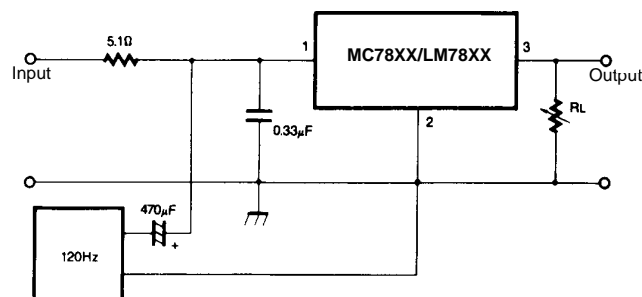


Figure 7. Ripple Rejection

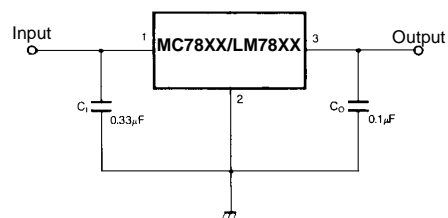


Figure 8. Fixed Output Regulator

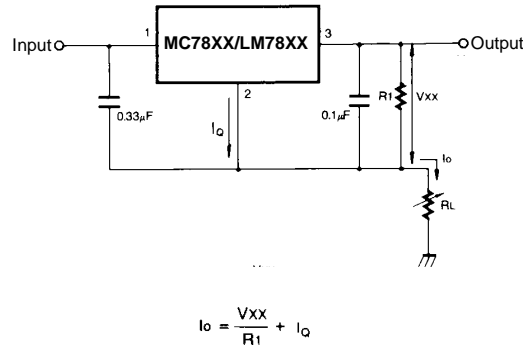


Figure 9. Constant Current Regulator

**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.

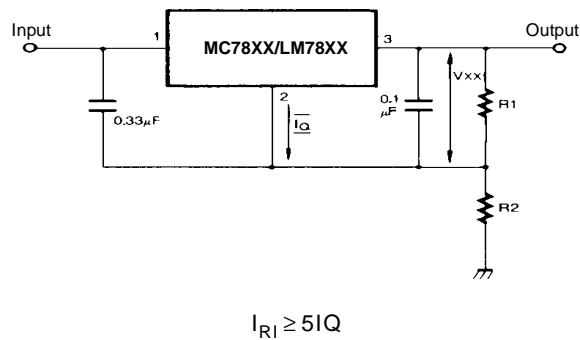


Figure 10. Circuit for Increasing Output Voltage

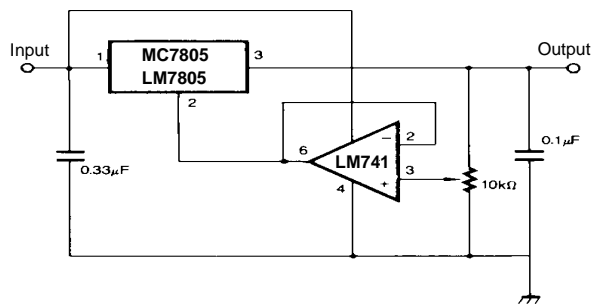


Figure 11. Adjustable Output Regulator (7 to 30V)

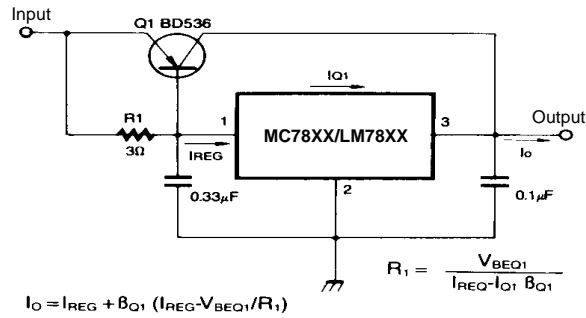


Figure 12. High Current Voltage Regulator

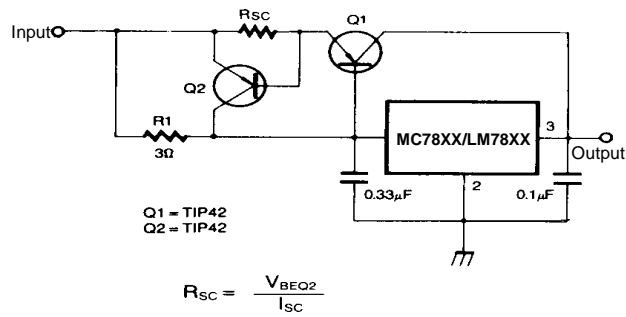


Figure 13. High Output Current with Short Circuit Protection

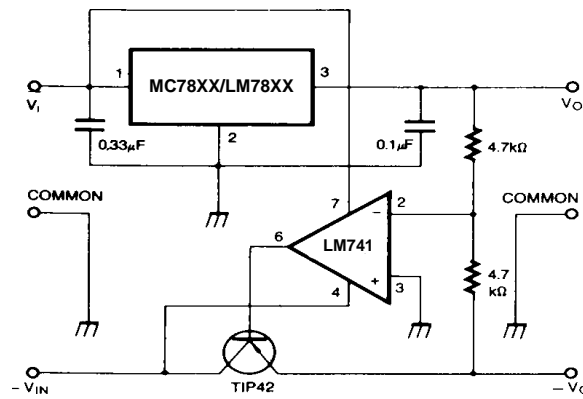


Figure 14. Tracking Voltage Regulator

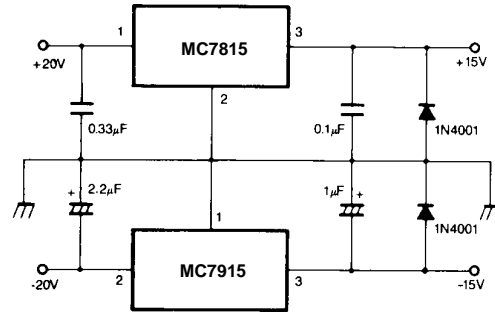


Figure 15. Split Power Supply (±15V-1A)

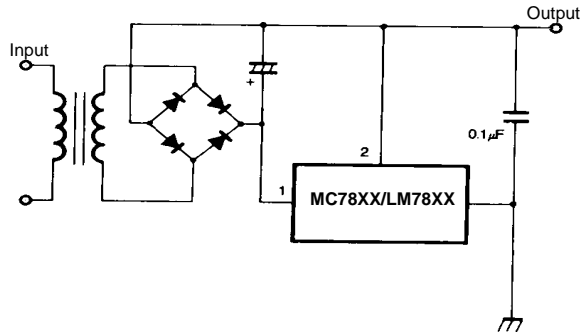


Figure 16. Negative Output Voltage Circuit

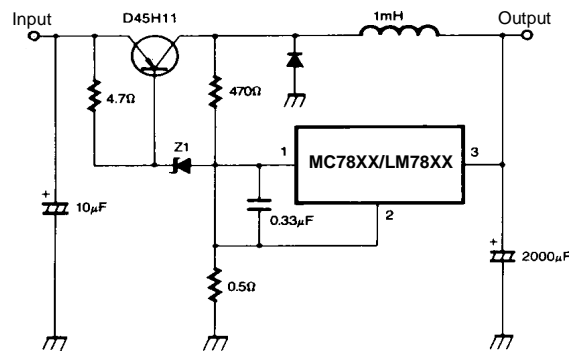
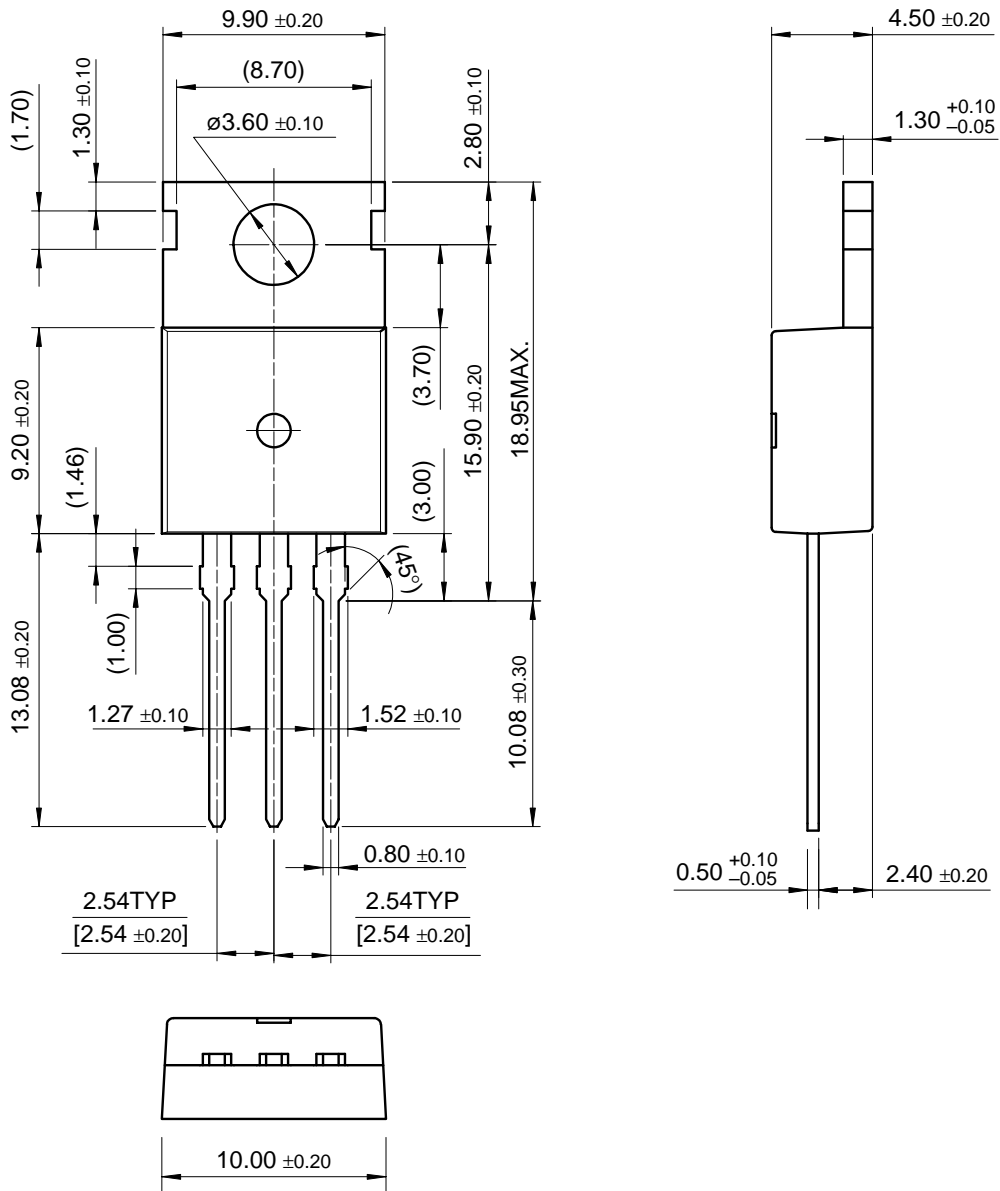


Figure 17. Switching Regulator

# Mechanical Dimensions

## Package

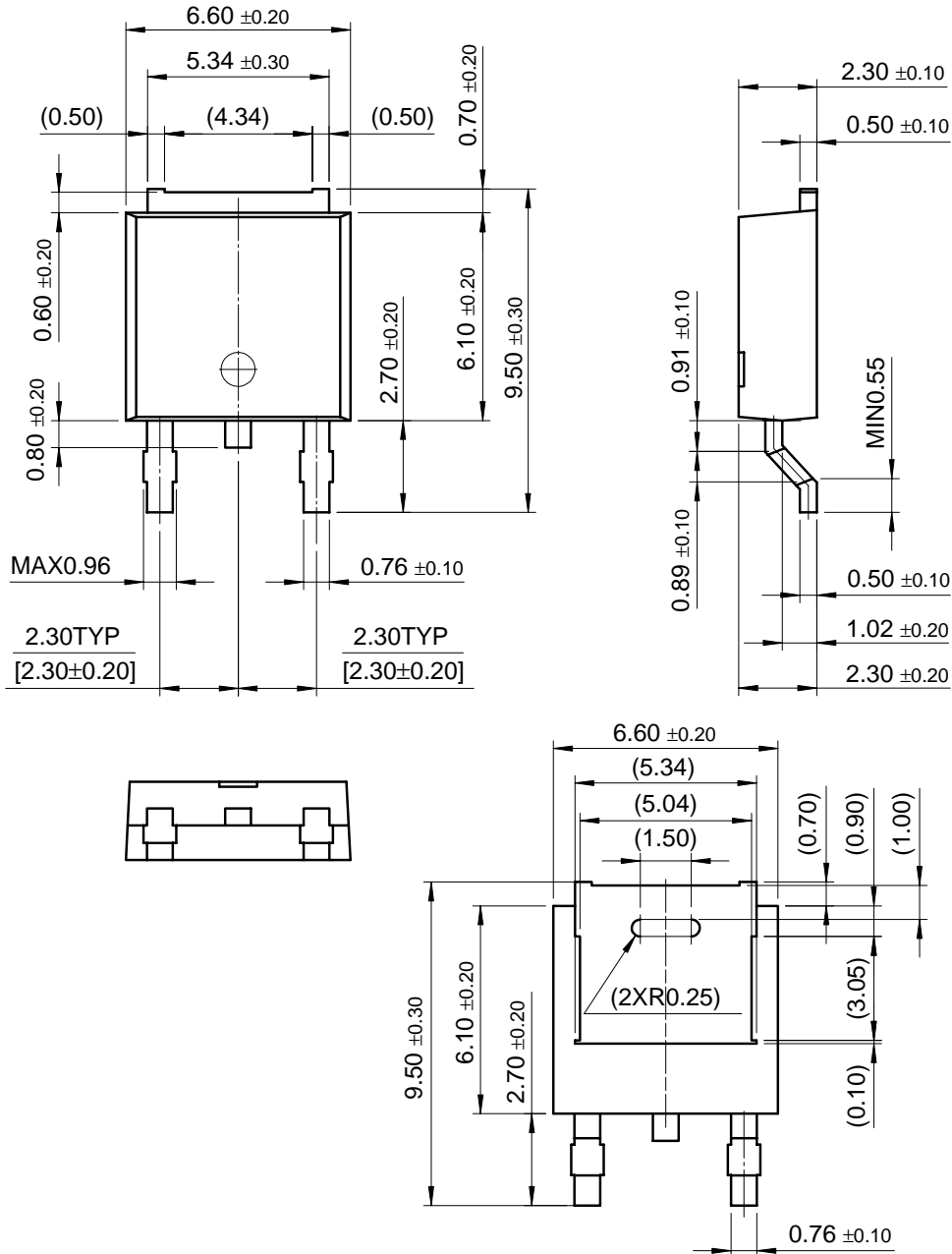
### TO-220



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			
MC7812CT			
MC7815CT			
MC7818CT			
MC7824CT			
MC7809CDT		D-PAK	

**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 INTERNATIONAL. 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.