

- 3-Terminal Regulators
- Output Current up to 1.5 A
- No External Components
- Internal Thermal Overload Protection
- Direct Replacements for Fairchild  $\mu$ A7800 Series
- High Power Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation

NOMINAL OUTPUT VOLTAGE	REGULATOR
5 V	$\mu$ A7805C
6 V	$\mu$ A7806C
8 V	$\mu$ A7808C
8.5 V	$\mu$ A7885C
10 V	$\mu$ A7810C
12 V	$\mu$ A7812C
15 V	$\mu$ A7815C
18 V	$\mu$ A7818C
22 V	$\mu$ A7822C
24 V	$\mu$ A7824C

**description**

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. One of these regulators can deliver up to 1.5 amperes of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents and also as the power-pass element in precision regulators.

**KC PACKAGE**

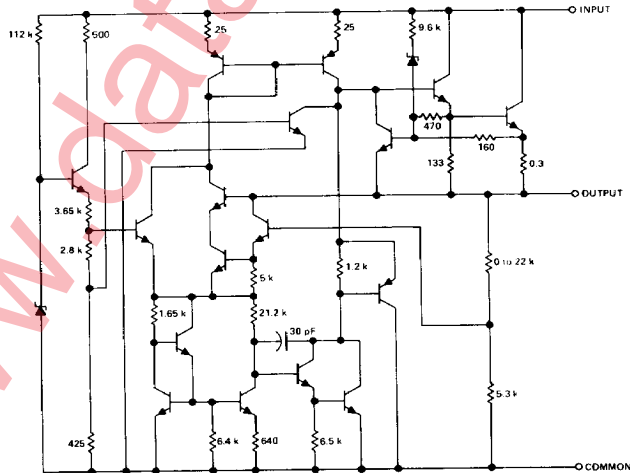
(TOP VIEW)



**TO-220AB**



**schematic**



Resistor values shown are nominal and in ohms.

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# SERIES $\mu$ A7800

## POSITIVE-VOLTAGE REGULATORS

absolute maximum ratings over operating temperature range (unless otherwise noted)

	$\mu$ A78__C	UNIT
Input voltage	$\mu$ A7822C, $\mu$ A7824C	40
	All others	35
Continuous total dissipation at 25°C free-air temperature (see Note 1)	2	W
Continuous total dissipation at (or below) 25°C case temperature (see Note 1)	15	W
Operating free-air, case, or virtual junction temperature range	0 to 150	°C
Storage temperature range	-65 to 150	°C
Lead temperature 1/16 inch from case for 10 seconds	260	°C

Note 1: For operation above 25°C free-air or case temperature, refer to Dissipation Derating Curves, Figure 1 and Figure 2.

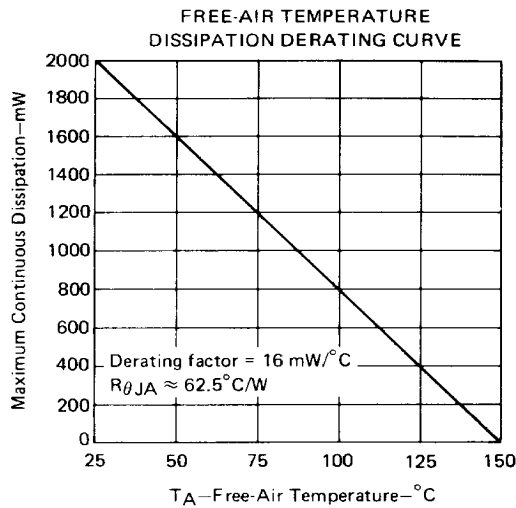


FIGURE 1

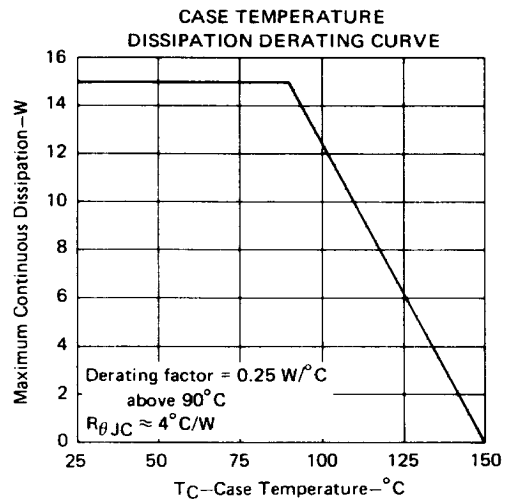


FIGURE 2

### recommended operating conditions

	MIN	MAX	UNIT
Input voltage, $V_I$	$\mu$ A7805C	7	25
	$\mu$ A7806C	8	25
	$\mu$ A7808C	10.5	25
	$\mu$ A7885C	10.5	25
	$\mu$ A7810C	12.5	28
	$\mu$ A7812C	14.5	30
	$\mu$ A7815C	17.5	30
	$\mu$ A7818C	21	33
	$\mu$ A7822C	25	36
$\mu$ A7824C	27	38	
Output current, $I_O$		1.5	A
Operating virtual junction temperature, $T_J$	0	125	°C

# TYPES $\mu$ A7805C, $\mu$ A7806C POSITIVE-VOLTAGE REGULATORS

$\mu$ A7805C electrical characteristics at specified virtual junction temperature,  
 $V_I = 10\text{ V}$ ,  $I_O = 500\text{ mA}$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	$\mu$ A7805C			UNIT	
		MIN	TYP	MAX		
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$ , $V_I = 7\text{ V to }20\text{ V}$ , $P \leq 15\text{ W}$	25°C	4.8	5	5.2	V
		0°C to 125°C	4.75		5.25	
Input regulation	$V_I = 7\text{ V to }25\text{ V}$	25°C		3	100	mV
	$V_I = 8\text{ V to }12\text{ V}$			1	50	
Ripple rejection	$V_I = 8\text{ V to }18\text{ V}$ , $f = 120\text{ Hz}$	0°C to 125°C	62	78		dB
Output regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		15	100	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			5	50	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.017		$\Omega$
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		-1.1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		40		$\mu$ V
Dropout voltage	$I_O = 1\text{ A}$	25°C		2.0		V
Bias current		25°C		4.2	8	mA
Bias current change	$V_I = 7\text{ V to }25\text{ V}$	0°C to 125°C			1.3	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		750		mA
Peak output current		25°C		2.2		A

$\mu$ A7806C electrical characteristics at specified virtual junction temperature,  
 $V_I = 11\text{ V}$ ,  $I_O = 500\text{ mA}$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	$\mu$ A7806C			UNIT	
		MIN	TYP	MAX		
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$ , $V_I = 8\text{ V to }21\text{ V}$ , $P \leq 15\text{ W}$	25°C	5.75	6	6.25	V
		0°C to 125°C	5.7		6.3	
Input regulation	$V_I = 8\text{ V to }25\text{ V}$	25°C		5	120	mV
	$V_I = 9\text{ V to }13\text{ V}$			1.5	60	
Ripple rejection	$V_I = 9\text{ V to }19\text{ V}$ , $f = 120\text{ Hz}$	0°C to 125°C	59	75		dB
Output regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		14	120	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	60	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.019		$\Omega$
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		-0.8		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		45		$\mu$ V
Dropout voltage	$I_O = 1\text{ A}$	25°C		2.0		V
Bias current		25°C		4.3	8	mA
Bias current change	$V_I = 8\text{ V to }25\text{ V}$	0°C to 125°C			1.3	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		550		mA
Peak output current		25°C		2.2		A

† All characteristics are measured with a capacitor across the input of 0.33  $\mu$ F and a capacitor across the output of 0.1  $\mu$ F. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_W \leq 10\text{ ms}$ , duty cycles  $\leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.

# TYPES $\mu$ A7808C, $\mu$ A7885C

## POSITIVE-VOLTAGE REGULATORS

$\mu$ A7808C electrical characteristics at specified virtual junction temperature,  
 $V_I = 14$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS <sup>†</sup>	$\mu$ A7808C			UNIT	
		MIN	TYP	MAX		
Output voltage	$I_O = 5$ mA to 1 A, $V_I = 10.5$ V to 23 V, $P \leq 15$ W	25°C	7.7	8	8.3	V
		0°C to 125°C	7.6		8.4	
Input regulation	$V_I = 10.5$ V to 25 V	25°C		6	160	mV
	$V_I = 11$ V to 17 V			2	80	
Ripple rejection	$V_I = 11.5$ V to 21.5 V, $f = 120$ Hz	0°C to 125°C	56	72		dB
Output regulation	$I_O = 5$ mA to 1.5 A	25°C		12	160	mV
	$I_O = 250$ mA to 750 mA			4	80	
Output resistance	$f = 1$ kHz	0°C to 125°C	0.016			$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C	-0.8			mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C	52			$\mu$ V
Dropout voltage	$I_O = 1$ A	25°C	2.0			V
Bias current		25°C	4.3	8		mA
Bias current change	$V_I = 10.5$ V to 25 V	0°C to 125°C			1	mA
	$I_O = 5$ mA to 1 A				0.5	
Short-circuit output current		25°C	450			mA
Peak output current		25°C	2.2			A

$\mu$ A7885C electrical characteristics at specified virtual junction temperature,  
 $V_I = 15$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS <sup>†</sup>	$\mu$ A7885C			UNIT	
		MIN	TYP	MAX		
Output voltage	$I_O = 5$ mA to 1 A, $V_I = 11$ V to 23.5 V, $P \leq 15$ W	25°C	8.15	8.5	8.85	V
		0°C to 125°C	8.1		8.9	
Input regulation	$V_I = 10.5$ V to 25 V	25°C		6	170	mV
	$V_I = 11$ V to 17 V			2	85	
Ripple rejection	$V_I = 11.5$ V to 21.5 V, $f = 120$ Hz	0°C to 125°C	54	70		dB
Output regulation	$I_O = 5$ mA to 1.5 A	25°C		12	170	mV
	$I_O = 250$ mA to 750 mA			4	85	
Output resistance	$f = 1$ kHz	0°C to 125°C	0.016			$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	0°C to 125°C	-0.8			mV/°C
Output noise voltage	$f = 10$ Hz to 100 kHz	25°C	55			$\mu$ V
Dropout voltage	$I_O = 1$ A	25°C	2.0			V
Bias current		25°C	4.3	8		mA
Bias current change	$V_I = 10.5$ V to 25 V	0°C to 125°C			1	mA
	$I_O = 5$ mA to 1 A				0.5	
Short-circuit output current		25°C	450			mA
Peak output current		25°C	2.2			A

<sup>†</sup> All characteristics are measured with a capacitor across the input of 0.33  $\mu$ F and a capacitor across the output of 0.1  $\mu$ F. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_w \leq 10$  ms, duty cycles  $\leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.

## TYPES $\mu$ A7810C, $\mu$ A7812C POSITIVE-VOLTAGE REGULATORS

$\mu$ A7810C electrical characteristics at specified virtual junction temperature,  
 $V_I = 17$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7810C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 12.5$ V to 25 V, $0^\circ\text{C}$ to $125^\circ\text{C}$	$25^\circ\text{C}$			V
			9.6	10	10.4	
Input regulation	$V_I = 12.5$ V to 28 V	$25^\circ\text{C}$	7			mV
	$V_I = 14$ V to 20 V		2			
Ripple rejection	$V_I = 13$ V to 23 V, $f = 120$ Hz	$0^\circ\text{C}$ to $125^\circ\text{C}$	55	71		dB
Output regulation	$I_O = 5$ mA to 1.5 A	$25^\circ\text{C}$	12			mV
	$I_O = 250$ mA to 750 mA		4			
Output resistance	$f = 1$ kHz	$0^\circ\text{C}$ to $125^\circ\text{C}$	0.018			$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	$0^\circ\text{C}$ to $125^\circ\text{C}$	-1.0			$\text{mV}/^\circ\text{C}$
Output noise voltage	$f = 10$ Hz to 100 kHz	$25^\circ\text{C}$	70			$\mu\text{V}$
Dropout voltage	$I_O = 1$ A	$25^\circ\text{C}$	2.0			V
Bias current		$25^\circ\text{C}$	4.3			8 mA
Bias current change	$V_I = 12.5$ V to 28 V	$0^\circ\text{C}$ to $125^\circ\text{C}$	1			mA
	$I_O = 5$ mA to 1 A		0.5			
Short-circuit output current		$25^\circ\text{C}$	400			mA
Peak output current		$25^\circ\text{C}$	2.2			A

$\mu$ A7812C electrical characteristics at specified virtual junction temperature,  
 $V_I = 19$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7812C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 14.5$ V to 27 V, $0^\circ\text{C}$ to $125^\circ\text{C}$	$25^\circ\text{C}$			V
			11.5	12	12.5	
Input regulation	$V_I = 14.5$ V to 30 V	$25^\circ\text{C}$	10			mV
	$V_I = 16$ V to 22 V		3			
Ripple rejection	$V_I = 15$ V to 25 V, $f = 120$ Hz	$0^\circ\text{C}$ to $125^\circ\text{C}$	55	71		dB
Output regulation	$I_O = 5$ mA to 1.5 A	$25^\circ\text{C}$	12			mV
	$I_O = 250$ mA to 750 mA		4			
Output resistance	$f = 1$ kHz	$0^\circ\text{C}$ to $125^\circ\text{C}$	0.018			$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	$0^\circ\text{C}$ to $125^\circ\text{C}$	-1.0			$\text{mV}/^\circ\text{C}$
Output noise voltage	$f = 10$ Hz to 100 kHz	$25^\circ\text{C}$	75			$\mu\text{V}$
Dropout voltage	$I_O = 1$ A	$25^\circ\text{C}$	2.0			V
Bias current		$25^\circ\text{C}$	4.3			8 mA
Bias current change	$V_I = 14.5$ V to 30 V	$0^\circ\text{C}$ to $125^\circ\text{C}$	1			mA
	$I_O = 5$ mA to 1 A		0.5			
Short-circuit output current		$25^\circ\text{C}$	350			mA
Peak output current		$25^\circ\text{C}$	2.2			A

† All characteristics are measured with a capacitor across the input of 0.33  $\mu\text{F}$  and a capacitor across the output of 0.1  $\mu\text{F}$ . All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_w < 10$  ms, duty cycles  $\leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.

# TYPES $\mu$ A7815C, $\mu$ A7818C

## POSITIVE-VOLTAGE REGULATORS

$\mu$ A7815C electrical characteristics at specified virtual junction temperature,  
 $V_I = 23$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7815C			UNIT
			MIN	TYP	MAX	
Output voltage	25°C		14.4	15	15.6	V
	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 17.5$ V to 30 V, 0°C to 125°C	14.25		15.75	
Input regulation	25°C			11	300	mV
	$V_I = 17.5$ V to 30 V			3	150	
Ripple rejection	$V_I = 18.5$ V to 28.5 V, $f = 120$ Hz	0°C to 125°C	54	70		dB
Output regulation	25°C			12	300	mV
	$I_O = 5$ mA to 1.5 A			4	150	
Output resistance	$I_O = 250$ mA to 750 mA	0°C to 125°C		0.019		$\Omega$
Temperature coefficient of output voltage	$f = 1$ kHz	0°C to 125°C		-1.0		mV/°C
Output noise voltage	$I_O = 5$ mA	0°C to 125°C				
Dropout voltage	$f = 10$ Hz to 100 kHz	25°C		90		$\mu$ V
Bias current	$I_O = 1$ A	25°C		2.0		V
Bias current change	25°C			4.4	8	mA
	$V_I = 17.5$ V to 30 V				1	
Short-circuit output current	0°C to 125°C				0.5	mA
	$I_O = 5$ mA to 1 A					
Peak output current		25°C		230		mA
		25°C		2.1		A

$\mu$ A7818C electrical characteristics at specified virtual junction temperature,  
 $V_I = 27$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7818C			UNIT
			MIN	TYP	MAX	
Output voltage	25°C		17.3	18	18.7	V
	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 21$ V to 33 V, 0°C to 125°C	17.1		18.9	
Input regulation	25°C			15	360	mV
	$V_I = 21$ V to 33 V			5	180	
Ripple rejection	$V_I = 24$ V to 30 V					
Output regulation	25°C			12	360	mV
	$V_I = 22$ V to 32 V, $f = 120$ Hz	0°C to 125°C	53	69		
Output resistance	$I_O = 5$ mA to 1.5 A	0°C to 125°C		0.022		$\Omega$
Temperature coefficient of output voltage	$I_O = 250$ mA to 750 mA	0°C to 125°C				
Output noise voltage	$f = 1$ kHz	0°C to 125°C		-1.0		mV/°C
Dropout voltage	$f = 10$ Hz to 100 kHz	25°C		110		$\mu$ V
Bias current	$I_O = 1$ A	25°C		2.0		V
Bias current change	25°C			4.5	8	mA
	$V_I = 21$ V to 33 V				1	
Short-circuit output current	0°C to 125°C				0.5	mA
	$I_O = 5$ mA to 1 A					
Peak output current		25°C		200		mA
		25°C		2.1		A

† All characteristics are measured with a capacitor across the input of 0.33  $\mu$ F and a capacitor across the output of 0.1  $\mu$ F. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_w \leq 10$  ms, duty cycles  $\leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.

## TYPES $\mu$ A7822C, $\mu$ A7824C POSITIVE-VOLTAGE REGULATORS

$\mu$ A7822C electrical characteristics at specified virtual junction temperature,  
 $V_I = 31$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7822C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 25$ V to 36 V, $0^\circ\text{C}$ to $125^\circ\text{C}$	21.1	22	22.9	V
		$25^\circ\text{C}$	20.9		23.1	
Input regulation	$V_I = 25$ V to 36 V	$25^\circ\text{C}$		17	440	mV
	$V_I = 26$ V to 34 V			6	220	
Ripple rejection	$V_I = 26$ V to 36 V, $f = 120$ Hz	$0^\circ\text{C}$ to $125^\circ\text{C}$	51	67		dB
Output regulation	$I_O = 5$ mA to 1.5 A	$25^\circ\text{C}$		12	440	mV
	$I_O = 250$ mA to 750 mA			4	220	
Output resistance	$f = 1$ kHz	$0^\circ\text{C}$ to $125^\circ\text{C}$		0.028		$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	$0^\circ\text{C}$ to $125^\circ\text{C}$		-1.3		$\text{mV}/^\circ\text{C}$
Output noise voltage	$f = 10$ Hz to 100 kHz	$25^\circ\text{C}$		160		$\mu\text{V}$
Dropout voltage	$I_O = 1$ A	$25^\circ\text{C}$		2.0		V
Bias current		$25^\circ\text{C}$		4.6	8	mA
Bias current change	$V_I = 25$ V to 36 V	$0^\circ\text{C}$ to $125^\circ\text{C}$			1	mA
	$I_O = 5$ mA to 1 A				0.5	
Short-circuit output current		$25^\circ\text{C}$		175		mA
Peak output current		$25^\circ\text{C}$		2.1		A

$\mu$ A7824C electrical characteristics at specified virtual junction temperature,  
 $V_I = 33$  V,  $I_O = 500$  mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		$\mu$ A7824C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5$ mA to 1 A, $P \leq 15$ W	$V_I = 27$ V to 38 V, $0^\circ\text{C}$ to $125^\circ\text{C}$	23	24	25	V
		$25^\circ\text{C}$	22.8		25.2	
Input regulation	$V_I = 27$ V to 38 V	$25^\circ\text{C}$		18	480	mV
	$V_I = 30$ V to 36 V			6	240	
Ripple rejection	$V_I = 28$ V to 38 V, $f = 120$ Hz	$0^\circ\text{C}$ to $125^\circ\text{C}$	50	66		dB
Output regulation	$I_O = 5$ mA to 1.5 A	$25^\circ\text{C}$		12	480	mV
	$I_O = 250$ mA to 750 mA			4	240	
Output resistance	$f = 1$ kHz	$0^\circ\text{C}$ to $125^\circ\text{C}$		0.028		$\Omega$
Temperature coefficient of output voltage	$I_O = 5$ mA	$0^\circ\text{C}$ to $125^\circ\text{C}$		-1.5		$\text{mV}/^\circ\text{C}$
Output noise voltage	$f = 10$ Hz to 100 kHz	$25^\circ\text{C}$		170		$\mu\text{V}$
Dropout voltage	$I_O = 1$ A	$25^\circ\text{C}$		2.0		V
Bias current		$25^\circ\text{C}$		4.6	8	mA
Bias current change	$V_I = 27$ V to 38 V	$0^\circ\text{C}$ to $125^\circ\text{C}$			1	mA
	$I_O = 5$ mA to 1 A				0.5	
Short-circuit output current		$25^\circ\text{C}$		150		mA
Peak output current		$25^\circ\text{C}$		2.1		A

† All characteristics are measured with a capacitor across the input of 0.33  $\mu\text{F}$  and a capacitor across the output of 0.1  $\mu\text{F}$ . All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_w \leq 10$  ms, duty cycles  $\leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.