

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

IP1R18A, IP3R18A, IP1R18, IP3R18

DESCRIPTION

The IP1R18A/IP3R18A and IP1R18/IP3R18 series of fixed three terminal positive regulators are capable of delivering 5 amps of load current, and are available with several convenient output voltage options. The A-suffix devices provide 0.01%/V line regulation, 0.5% load regulation, and a $\pm 1\%$ output voltage tolerance at room temperature. Over all specified operating conditions (load, line, power, and temperature), the output voltage is guaranteed not to vary by more than $\pm 3\%$. Protection features include safe operating area current limiting for the output power transistor, and thermal shutdown. The entire series of regulators is available in a TO-3 package, and the commercial version is also available in a convenient, low cost plastic TO-218 package.

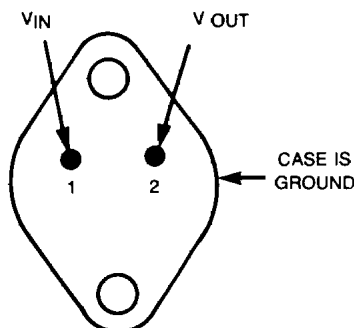
FEATURES

- 5 Amp output current capability
- $\pm 1\%$ Output tolerance at room temperature (A suffix)
- 0.01%/V Line regulation
- 0.5% Load regulation
- 5, 12, 15 Volt fixed output voltages available
- Short circuit current limit protection
- Safe operating area protection
- Thermal shutdown protection
- Available in convenient, low cost plastic TO-218 package

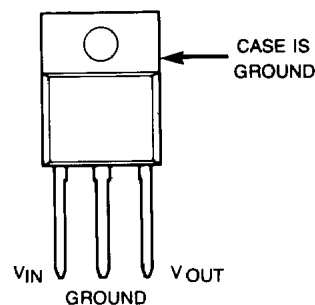
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PACKAGE INFORMATION

**BOTTOM VIEW
TO-3 (K PACKAGE)**



**TOP VIEW
TO-218 (V PACKAGE)**



IP1R18A, IP3R18A, IP1R18, IP3R18

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

ABSOLUTE MAXIMUM RATINGS

Input Voltage ($V_{OUT} = 5, 12, \text{ or } 15V$)

35V

Operating Junction Temperature Range

IP1R18A/IP1R18

-55°C to + 150°C

IP3R18A/IP3R18

0°C to + 125°C

Power Dissipation

Internally Limited

Storage Temperature Range

- 65°C to + 150°C

Lead Temperature (Soldering, 10 sec)

300°C

Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The electrical characteristics provide conditions for actual device operation.

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions (Note 1)		IP1R18A-5 IP3R18A-5			IP1R18-5 IP3R18-5			Units
				Min	Typ	Max	Min	Typ	Max	
V_{OUT}	Output Voltage	$5mA \leq I_{OUT} \leq 5A$ $8V \leq V_{IN} \leq 20V, P \leq 50W$	•	4.95	5.00	5.05	4.85		5.15	V
			•	4.85		5.15	4.75		5.25	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	$I_{OUT} = 5mA$ (Note 2) $7.5V \leq V_{IN} \leq 35V$	•		3	15		6	30	mV
			•		6	30		12	60	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	$5mA \leq I_{OUT} \leq 5A$ (Note 2)	•		5	25		10	50	mV
			•		10	50		20	100	mV
I_Q	Quiescent Current	$I_{OUT} = 5mA$	•			7			7	mA
ΔI_Q	Quiescent Current Change (Load/Line)	$5mA \leq I_{OUT} \leq 5A$	•			10			10	mA
		$I_{OUT} = 5mA, 7.5V \leq V_{IN} \leq 35V$	•			3			3	mA
V_D	Dropout Voltage	$I_{OUT} = 5A, \Delta V_{OUT} = 100mV$	•		2.5	3.0		2.5	3.0	V
	Ripple Rejection	$I_{OUT} = 1A, f = 120Hz$	•	60	80		60	80		dB
	Thermal Regulation	$t_{PULSE} = 20msec, \Delta P = 50W$			0.002	0.01		0.002	0.02	%/W
I_{PEAK}	Peak Output Current (dc)	$V_{IN} = 10V$	•		8	12		8	12	A
I_{SC}	Short Circuit Current	$V_{IN} = 10V$			7			7		A
		$V_{IN} = 35V$			2			2		A
e_n	Output Noise Voltage	$10Hz \leq f \leq 100kHz$			40			40		μV
	AVE TC of V_{OUT}									mV
θ_{JC}	Thermal Resistance, Junction to Case	K Package			1.0	1.5		1.0	1.5	°C/W
		V Package			1.0	1.5		1.0	1.5	°C/W
										°C/W

The • denotes specifications which apply over the full operating junction temperature range. All others apply at $T_{CASE} = 25^\circ C$ unless otherwise specified.

Note 1: Unless otherwise specified, $V_{IN} = 10V$, and $I_{OUT} = 2.5A$. Although power dissipation is internally limited, these specifications apply for dissipations up to 50W.

Note 2: Load and line regulation are electrically independent and are measured using pulse testing techniques at low duty cycle in order to maintain constant junction temperature. To determine the effects on the output voltage due to device heating refer to thermal regulation specification.



IP1R18A, IP3R18A, IP1R18, IP3R18

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

Symbol	Parameter	Conditions (Note 1)		IP1R18A-12 IP3R18A-12			IP1R18-12 IP3R18-12			Units
				Min	Typ	Max	Min	Typ	Max	
V _{OUT}	Output Voltage			11.88	12.00	12.12	11.64	12.00	12.36	V
		5mA ≤ I _{OUT} ≤ 5A 15V ≤ V _{IN} ≤ 27V, P ≤ 50W	•	11.64		12.36	11.40		12.60	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	I _{OUT} = 5mA (Note 2)			5	30		10	60	mV
		14.5V ≤ V _{IN} ≤ 35V	•		10	60		20	120	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	5mA ≤ I _{OUT} ≤ 5A			10	60		20	120	mV
		(Note 2)	•		20	120		40	240	mV
I _Q	Quiescent Current	I _{OUT} = 5mA	•			7			7	mA
ΔI_Q	Quiescent Current Change (Load/Line)	5mA ≤ I _{OUT} ≤ 5A	•			10			10	mA
		I _{OUT} = 5mA, 14.5V ≤ V _{IN} ≤ 35V	•			3			3	mA
V _D	Dropout Voltage	I _{OUT} = 5A, ΔV_{OUT} = 250mV	•		2.5	3.0		2.5	3.0	V
	Ripple Rejection	I _{OUT} = 1A, f = 120Hz	•	52	72		52	72		dB
	Thermal Regulation	t _{PULSE} = 20msec, ΔP = 50W			0.002	0.01		0.002	0.02	%/W
I _{PEAK}	Peak Output Current (dc)	V _{IN} = 17V	•		8	12		8	12	A
I _{SC}	Short Circuit Current	V _{IN} = 17V			4			4		A
		V _{IN} = 35V			2			2		A
e _n	Output Noise Voltage				75			75		μV
	AVE TC of V _{OUT}									mV
θ _{JC}	Thermal Resistance, Junction to Case	K Package			1.0	1.5		1.0	1.5	°C/W
		V Package			1.0	1.5		1.0	1.5	°C/W
										°C/W

The • denotes specifications which apply over the full operating junction temperature range. All others apply at T_{CASE} = 25°C unless otherwise specified.

Note 1: Unless otherwise specified, V_{IN} = 17V, and I_{OUT} = 2.5A. Although power dissipation is internally limited, these specifications apply for dissipations up to 50W.

Note 2: Load and line regulation are electrically independent and are measured using pulse testing techniques at low duty cycle in order to maintain constant junction temperature. To determine the effects on the output voltage due to device heating refer to thermal regulation specification.



IP1R18A, IP3R18A, IP1R18, IP3R18

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

Symbol	Parameter	Conditions (Note 1)		IP1R18A-15 IP3R18A-15			IP1R18-15 IP3R18-15			Units
				Min	Typ	Max	Min	Typ	Max	
V _{OUT}	Output Voltage	5mA ≤ I _{OUT} ≤ 5A 18V ≤ V _{IN} ≤ 30V, P ≤ 50W		14.85	15.00	15.15	14.55	15.00	15.45	V
			●	14.55		15.45	14.25		15.75	V
ΔV _{OUT} ΔV _{IN}	Line Regulation	I _{OUT} = 5mA (Note 2)			8	40		16	80	mV
		17.5V ≤ V _{IN} ≤ 35V	●		16	80		32	160	mV
ΔV _{OUT} ΔI _{OUT}	Load Regulation	5mA ≤ I _{OUT} ≤ 5A			16	80		32	160	mV
		(Note 2)	●		32	160		64	320	mV
I _Q	Quiescent Current	I _{OUT} = 5mA	●			7			7	mA
ΔI _Q	Quiescent Current Change (Load/Line)	5mA ≤ I _{OUT} ≤ 5A	●			10			10	mA
		I _{OUT} = 5mA, 17.5V ≤ V _{IN} ≤ 35V	●			3			3	mA
V _D	Dropout Voltage	I _{OUT} = 5A, ΔV _{OUT} = 300mV	●		2.5	3.0		2.5	3.0	V
	Ripple Rejection	I _{OUT} = 1A, f = 120Hz	●	50	70		50	70		dB
	Thermal Regulation	t _{PULSE} = 20msec, ΔP = 50W			0.002	0.01		0.002	0.02	%/W
I _{PEAK}	Peak Output Current (dc)	V _{IN} = 20V	●		8	12		8	12	A
I _{SC}	Short Circuit Current	V _{IN} = 20V			3.5			3.5		A
		V _{IN} = 35V			2			2		A
e _n	Output Noise Voltage				90			90		μV
	AVE TC of V _{OUT}									mV
θ _{JC}	Thermal Resistance, Junction to Case	K Package			1.0	1.5		1.0	1.5	°C/W
		V Package			1.0	1.5		1.0	1.5	°C/W
										°C/W

The ● denotes specifications which apply over the full operating junction temperature range. All others apply at T_{CASE} = 25°C unless otherwise specified.

Note 1: Unless otherwise specified, V_{IN} = 20V, and I_{OUT} = 2.5A. Although power dissipation is internally limited, these specifications apply for dissipations up to 50W.

Note 2: Load and line regulation are electrically independent and are measured using pulse testing techniques at low duty cycle in order to maintain constant junction temperature. To determine the effects on the output voltage due to device heating refer to thermal regulation specification.

ORDER INFORMATION

Part Number

IP1R18AK-XX, IP1R18K-XX
IP3R18AK-XX, IP3R18K-XX
IP3R18AV-XX, IP3R18V-XX

Temperature Range

–55°C to 150°C
0°C to 125°C
0°C to 125°C

Package

TO-3
TO-3
TO-218

