Seagate Microelectronics Limited

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

IP1R18A, IP3R18A, IP1R18, IP3R18

T-58-11-13

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 ±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 ±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
- ±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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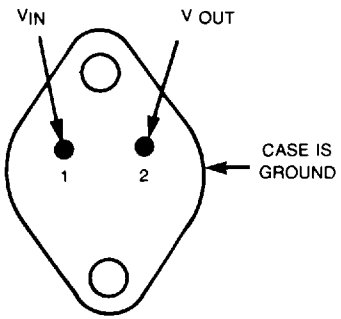
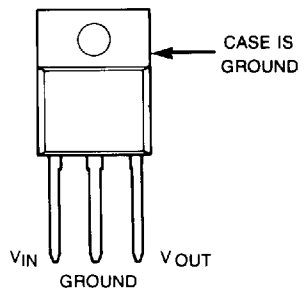
PACKAGE INFORMATION

BOTTOM VIEW
TO-3 (K PACKAGE)



TOP VIEW
TO-218 (V PACKAGE)



5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

ABSOLUTE MAXIMUM RATINGS

T-58-11-13

Input Voltage (V_{OUT} = 5, 12, or 15V) 35V

Power Dissipation Internally Limited

Storage Temperature Range −65°C to +150°C

Lead Temperature (Soldering, 10 sec) 300°C

Operating Junction Temperature Range

IP1R18A/IP1R18 −55°C to + 150°C

IP3R18A/IP3R18 0°C to +125°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 Min	Typ	Max	IP1R18-5 IP3R18-5 Min	Typ	Max	Units
V_{OUT}	Output Voltage			4.95	5.00	5.05	4.85		5.15	V
		5mA ≤ I_{OUT} ≤ 5A, 8V ≤ V_{IN} ≤ 20V, P ≤ 50W	•	4.85		5.15	4.75		5.25	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	I_{OUT} = 5mA (Note 2)			3	15		6	30	mV
		7.5V ≤ V_{IN} ≤ 35V	•		6	30		12	60	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	5mA ≤ I_{OUT} ≤ 5A			5	25		10	50	mV
		(Note 2)	•		10	50		20	100	mV
I_Q	Quiescent Current	I_{OUT} = 5mA	•			7			7	mA
ΔI_Q	Quiescent Current	5mA ≤ I_{OUT} ≤ 5A	•			10			10	mA
	Change (Load/Line)	I_{OUT} = 5mA, 7.5V ≤ V_{IN} ≤ 35V	•			3			3	mA
V_D	Dropout Voltage	I_{OUT} = 5A, ΔV_{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, ΔP = 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 ≤ f ≤ 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°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.

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ELECTRICAL CHARACTERISTICS (CONTINUED)

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Symbol	Parameter	Conditions (Note 1)		IP1R18A-12 IP3R18A-12 Min	Typ	Max	IP1R18-12 IP3R18-12 Min	Typ	Max	Units
V_{OUT}	Output Voltage			11.88	12.00	12.12	11.64	12.00	12.36	V
		$5mA \leq I_{OUT} \leq 5A$, $15V \leq V_{IN} \leq 27V$, $P \leq 50W$	•	11.64		12.36	11.40		12.60	V
$\frac{\triangle V_{OUT}}{\triangle V_{IN}}$	Line Regulation	$I_{OUT} = 5mA$ (Note 2)			5	30		10	60	mV
		$14.5V \leq V_{IN} \leq 35V$	•		10	60		20	120	mV
$\frac{\triangle V_{OUT}}{\triangle I_{OUT}}$	Load Regulation	$5mA \leq I_{OUT} \leq 5A$			10	60		20	120	mV
		(Note 2)	•		20	120		40	240	mV
I_Q	Quiescent Current	$I_{OUT} = 5mA$	•			7			7	mA
$\triangle I_Q$	Quiescent Current	$5mA \leq I_{OUT} \leq 5A$	•			10			10	mA
	Change (Load/Line)	$I_{OUT} = 5mA$, $14.5V \leq V_{IN} \leq 35V$	•			3			3	mA
V_D	Dropout Voltage	$I_{OUT} = 5A$, $\triangle V_{OUT} = 250mV$	•		2.5	3.0		2.5	3.0	V
	Ripple Rejection	$I_{OUT} = 1A$, $f = 120Hz$	•	52	72		52	72		dB
	Thermal Regulation	$t_{PULSE} = 20msec$, $\triangle P = 50W$			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	$V_{IN} = 17V$			4			4		A
	Current	$V_{IN} = 35V$			2			2		A
e_n	Output Noise Voltage				75			75		uV
	AVE TC of V_{OUT}									mV
θ_{JC}	Thermal Resistance,	K Package			1.0	1.5		1.0	1.5	°C/W
	Junction to Case	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.

5 AMP, 3-TERMINAL, FIXED POSITIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

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Symbol	Parameter	Conditions (Note 1)		IP1R18A-15 IP3R18A-15 Min	Typ	Max	IP1R18-15 IP3R18-15 Min	Typ	Max	Units
V_{OUT}	Output Voltage			14.85	15.00	15.15	14.55	15.00	15.45	V
		5mA ≤ I_{OUT} ≤ 5A, 18V ≤ V_{IN} ≤ 30V, P ≤ 50W	•	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	5mA ≤ I_{OUT} ≤ 5A	•			10			10	mA
	Change (Load/Line)	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		uV
	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	Temperature Range	Package
IP1R18AK-XX, IP1R18K-XX	−55°C to 150°C	TO-3
IP3R18AK-XX, IP3R18K-XX	0°C to 125°C	TO-3
IP3R18AV-XX, IP3R18V-XX	0°C to 125°C	TO-218