

Seagate Microelectronics Limited

5 AMP, 3-TERMINAL, FIXED NEGATIVE VOLTAGE REGULATORS

IP1R19A, IP3R19A, IP1R19, IP3R19

T-58-11-13

DESCRIPTION

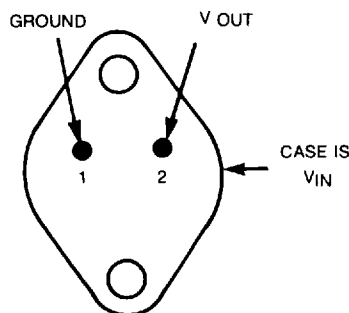
The IP1R19A/IP3R19A and IP1R19/IP3R19 series of fixed three terminal negative regulators are capable of delivering 5 amps of load current, and are available with several convenient output voltages. The A-suffix devices provide 0.01%/V line regulation, 0.5% load regulation, and a $\pm 1\%$ output voltage 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

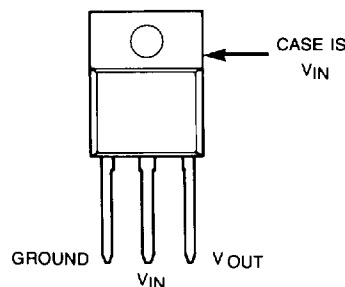
- 5 Amp output current capability
- $\pm 1\%$ Output tolerance at room temperature (A suffix)
- 0.01%/V Line regulation
- 0.5% Load regulation
- -5, -5.2, -12, -15 Volt fixed output voltages available
- Short circuit current limit protection
- Safe operating area protection
- Thermal shutdown protection
- Available in convenient, low cost plastic TO-218 package

PACKAGE INFORMATION

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



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



IP1R19A, IP3R19A, IP1R19, IP3R19

5 AMP, 3-TERMINAL, FIXED NEGATIVE VOLTAGE REGULATORS

ABSOLUTE MAXIMUM RATINGS

T-58-11-13

Input Voltage ($V_{OUT} = -5, -5.2, -12, \text{ or } -15V$)

35V

Operating Junction Temperature Range

IP1R19A/IP1R19

-55°C to + 150°C

IP3R19A/IP3R19

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)	P1R19A-5 IP3R19A-5			IP1R19-5 IP3R19-5			Units
			Min	Typ	Max	Min	Typ	Max	
V_{OUT}	Output Voltage	$-5mA \geq I_{OUT} \geq -5A$ $-8V \geq V_{IN} \geq -20V, P \leq 50W$	-5.05	-5.00	-4.95	-5.15	-5.00	-4.85	V
		•	-5.15		-4.85	-5.25		-4.75	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	$I_{OUT} = -5mA$ (Note 2) $-7.5V \geq V_{IN} \geq -35V$		3	15		6	30	mV
		•		6	30		12	60	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	$-5mA \geq I_{OUT} \geq -5A$ (Note 2)		5	25		10	50	mV
		•		10	50		20	100	mV
I_Q	Quiescent Current	$I_{OUT} = 5mA$			5			5	mA
ΔI_Q	Quiescent Current Change (Load/Line)	$-5mA \geq I_{OUT} \geq -5A$ $I_{OUT} = -5mA, -7.5V \geq V_{IN} \geq -35V$			10			10	mA
		•			5			5	mA
V_D	Dropout Voltage	$I_{OUT} = -5A, \Delta V_{OUT} = 100mV$		2.2	3.0		2.2	3.0	V
	Ripple Rejection	$I_{OUT} = -1A, f = 120Hz$	60	80		60	80		dB
	Thermal Regulation	$I_{PULSE} = 20msec, \Delta P = 50W$		0.002	0.01		0.002	0.02	%/W
I_{PEAK}	Peak Output Current (dc)	$V_{IN} = -10V$	-12	-8		-12	-8		A
I_{SC}	Short Circuit Current	$V_{IN} = -10V$ $V_{IN} = -35V$		-7			-7		A
				-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, $V_{IN} = -10V, I_{OUT} = -2.5A$. 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 the thermal regulation specification.



IP1R19A, IP3R19A, IP1R19, IP3R19

5 AMP, 3-TERMINAL, FIXED NEGATIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

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Symbol	Parameter	Conditions (Note 1)	IP1R19A-5.2 IP3R19A-5.2			IP1R19-5.2 IP3R19-5.2			Units
			Min	Typ	Max	Min	Typ	Max	
V _{OUT}	Output Voltage	-5mA ≥ I _{OUT} ≥ -5A -8.2V ≥ V _{IN} ≥ -20V, P ≤ 50W	• -5.25	-5.20	-5.15	-5.35	-5.20	-5.05	V
			• -5.35		-5.05	-5.45		-4.95	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	I _{OUT} = -5mA (Note 2) -7.7V ≥ V _{IN} ≥ -35V	•	3	15		6	30	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	-5mA ≥ I _{OUT} ≥ -5A (Note 2)	•	5	25		10	50	mV
I _Q	Quiescent Current	I _{OUT} = -5mA	•		5			5	mA
Δ I _Q	Quiescent Current Change (Load/Line)	-5mA ≥ I _{OUT} ≥ -5A I _{OUT} = -5mA, -7.7V ≥ V _{IN} ≥ -35V	•		10			10	mA
V _D	Dropout Voltage	I _{OUT} = -5A, ΔV _{OUT} = 100mV	•	2.2	3.0		2.2	3.0	V
	Ripple Rejection	I _{OUT} = -1A, f = 120Hz	•	60	80		60	80	dB
	Thermal Regulation	t _{PULSE} = 20msec, ΔP = 50W			0.002		0.002	0.02	%/W
I _{PEAK}	Peak Output Current (dc)	V _{IN} = -10V	•	-12	-8		-12	-8	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, 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 the thermal regulation specification.



IP1R19A, IP3R19A, IP1R19, IP3R19

5 AMP, 3-TERMINAL, FIXED NEGATIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

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Symbol	Parameter	Conditions (Note 1)	IP1R19A-12 IP3R19A-12			IP1R19-12 IP3R19-12			Units
			Min	Typ	Max	Min	Typ	Max	
V _{OUT}	Output Voltage	-5mA ≥ I _{OUT} ≥ -5A -15V ≥ V _{IN} ≥ -27V, P ≤ 50W	• -12.12	-12.00	-11.88	-12.36	-12.00	-11.64	V
			• -12.36		-11.64	-12.60		-11.40	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	I _{OUT} = -5mA (Note 2) -14.5V ≥ V _{IN} ≥ -35V		5	30		10	60	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	-5mA ≥ I _{OUT} ≥ -5A (Note 2)		10	60		20	120	mV
				20	120		40	240	mV
I _Q	Quiescent Current	I _{OUT} = -5mA	•		5			5	mA
Δ I _Q	Quiescent Current Change (Load/Line)	-5mA ≥ I _{OUT} ≥ -5A	•		10			10	mA
		I _{OUT} = -5mA, -14.5V ≥ V _{IN} ≥ -35V	•		5			5	mA
V _D	Dropout Voltage	I _{OUT} = -5A, ΔV _{OUT} = 250mV	•	2.2	3.0		2.2	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	•	-12	-8		-12	-8	A
I _{SC}	Short Circuit Current	V _{IN} = -17V		-4			-4		A
		V _{IN} = -35V		-2			-2		A
e _n	Output Noise Voltage	10Hz ≤ f ≤ 100kHz		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, 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 the thermal regulation specification.



IP1R19A, IP3R19A, IP1R19, IP3R19

5 AMP, 3-TERMINAL, FIXED NEGATIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS (CONTINUED)

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Symbol	Parameter	Conditions	IP1R19A-15 IP3R19A-15			IP1R19-15 IP3R19-15			Units
			Min	Typ	Max	Min	Typ	Max	
V _{OUT}	Output Voltage	-5mA ≥ I _{OUT} ≥ -5A -18V ≥ V _{IN} ≥ -30V, P ≤ 50W	-15.15	-15.00	-14.85	-15.45	-15.00	-14.55	V
ΔV _{OUT} ΔV _{IN}	Line Regulation	I _{OUT} = -5mA (Note 2) -17.5V ≥ V _{IN} ≥ -35V		8	40		16	80	mV
ΔV _{OUT} ΔI _{OUT}	Load Regulation	-5mA ≥ I _{OUT} ≥ -5A (Note 2)		16	80		32	160	mV
I _Q	Quiescent Current	I _{OUT} = -5mA		16	80		32	160	mV
ΔI _Q	Quiescent Current Change (Load/Line)	I _{OUT} = -5mA, -17.5V ≥ V _{IN} ≥ -35V		32	160		64	320	mV
V _D	Dropout Voltage	I _{OUT} = -5A, ΔV _{OUT} = 300mV		5			5		mA
	Ripple Rejection	I _{OUT} = -1A, f = 120Hz		10			10		mA
	Thermal Regulation	t _{PULSE} = 20msec, ΔP = 50W		5			5		mA
I _{PEAK}	Peak Output Current (dc)	V _{IN} = -20V	-12	-8		-12	-8		A
I _{SC}	Short Circuit Current	V _{IN} = -20V V _{IN} = -35V		-3.5			3.5		A
e _n	Output Noise Voltage	10Hz ≤ f ≤ 10kHz		90			90		μV
	AVE TC of V _{OUT}								mV
θ _{JC}	Thermal Resistance, Junction to Case	K Package V Package		1.0 1.0	1.5 1.5		1.0 *1.0	1.5 1.5	°C/W °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, 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 the thermal regulation specification.

ORDER INFORMATION

Part Number

IP1R19AK-XX

IP1R19K-XX

IP3R19AK-XX

IP3R19K-XX

IP3R19AV-XX

IP3R19V-XX

Temperature Range

-55°C to 150°C

-55°C to 150°C

0°C to 125°C

0°C to 125°C

0°C to 125°C

0°C to 125°C

Package

TO-3

TO-3

TO-3

TO-3

TO-218

TO-218

