


Seagate Microelectronics Limited

0.5 AMP, 3-TERMINAL POSITIVE REGULATORS

IP78M00 Series, IP78M00A Series, IP140M Series, IP140MA Series

DESCRIPTION

The IP78M00/A series of voltage regulators are fixed output regulators intended for local, on-card voltage regulation. These devices are available in 5, 12, and 15 volt options and are capable of delivering in excess of 500 mA over temperature. The A-suffix devices are fully specified at 0.5A, provide 0.01%/V line regulation, 0.3%/A load regulation, and $\pm 1\%$ output voltage tolerance at room temperature. Protection features include safe operating area, current limiting and thermal shutdown. The entire series of regulators is available in TO-39 and Ceramic DIP packages.

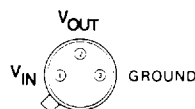
FEATURES

- 1% output voltage tolerance
- 5, 12 and 15V fixed output voltages available
- 0.01%/V line regulation
- 0.3%/A load regulation
- Thermal overload protection
- Short-circuit current limit protection
- Safe operating area protection
- Start-up with negative voltage ($\pm$ supplies) on output

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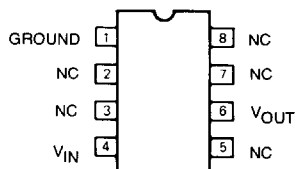
CONNECTIONS

(Bottom View)



TO-39

(Top View)



8 Pin J Package



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ABSOLUTE MAXIMUM RATINGS

T-58-11-23

Input Voltage ($V_O = 5V, 12V, 15V$)	35V	Maximum Junction Temperature	
Internal Power Dissipation (Note 1)	Internally Limited	H Package TO-39	150°C
		8 Pin Ceramic DIP Package J	150°C
Operating Temperature Range (T_j)		Storage Temperature Range	-65°C to 150°C
IP78M00A, IP78M00	-55°C to +150°C	Lead Temperature (Soldering, 10 sec.)	300°C
IP140MA, IP140M	-55°C to +150°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 (NOTE 2)

Parameter	Test Conditions	IP78M05A IP140MA-5			IP78M05 IP140M-5			Units
		Min	Typ	Max	Min	Typ	Max	
Output Voltage, V_O	$I_O = 100mA, V_{IN} = 10V$	4.95	5	5.05	4.80	5	5.20	V
	$P_D \leq P_{MAX}, 5mA \leq I_O \leq 350mA$ $7.5V \leq V_{IN} \leq 20V$	• 4.85		5.15	4.75		5.25	V
Line Regulation, ΔV_O	$I_O = 200mA$		3	10			50	mV
	$7V \leq V_{IN} \leq 25V$		3	10			25	mV
	$8V \leq V_{IN} \leq 25V$	•						
	$I_O = 500mA$		3	10			50	mV
	$8V \leq V_{IN} \leq 12V$							
Load Regulation, ΔV_O	$5mA \leq I_O \leq 500mA, V_{IN} = 10V$	•	5	50			50	mV
Quiescent Current, I_Q	$V_{IN} = 10V, I_O = 350mA$	•	4	6		4	6	mA
Quiescent Current Change, ΔI_Q	$5mA \leq I_O \leq 500mA, V_{IN} = 10V$	•	0.1	0.5			0.5	mA
	$8V \leq V_{IN} \leq 25V, I_O = 200mA$	•	0.2	0.8			0.8	mA
Output Noise Voltage, V_n	$10Hz \leq f \leq 100kHz$		40	200		40	200	μV
Ripple Rejection, $\Delta V_{IN}/\Delta V_{OUT}$	$f = 120Hz, I_O = 300mA$	65	80		62			dB
	$8V \leq V_{IN} \leq 18V, I_O = 100mA$	• 65	80		62			dB
Dropout Voltage	$I_O = 350mA$		2	2.5			2.5	V
Short Circuit Current, I_{SC}	$V_{IN} = 35V$		300	600		300	600	mA
Peak Output Current, I_{PK}	$V_{IN} = 10V$	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of Output Voltage	$I_O = 5mA$		0.5	2.0		0.5		mV/°C

The • denotes the specifications which apply over the full operating temperature range, all others apply at $T_j = 25^\circ C$ unless otherwise specified.

Note 1: Thermal resistance of the TO-39 package (H) is typically $20^\circ C/W$ junction to case and $120^\circ C/W$ case to ambient. Although power dissipation is internally limited, these specifications apply for up to 2W for the TO-39 package, and 1.05W for the J package. Thermal resistance of the J package is typically $119^\circ C/W$ junction to ambient. (Derate at $8.4mW/^\circ C$ for ambient temperatures above $25^\circ C$).

Note 2: All characteristics are measured with a capacitor across the input of $0.22\mu F$ 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 ($t_w \leq 10ms$, duty cycle $\leq 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.



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ELECTRICAL CHARACTERISTICS (CONTINUED)

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Parameter	Test Conditions	IP78M12A IP140MA-12			IP78M12 IP140M-12			Units
		Min	Typ	Max	Min	Typ	Max	
Output Voltage, V_O	$I_O = 100\text{mA}$, $V_{IN} = 19\text{V}$	11.88	12	12.12	11.50	12	12.50	V
	$P_D \leq P_{MAX}$, $5\text{mA} \leq I_O \leq 350\text{mA}$ $14.8\text{V} \leq V_{IN} \leq 27\text{V}$	11.64		12.36	11.40		12.60	V
Line Regulation, ΔV_O	$I_O = 200\text{mA}$, $14.5\text{V} \leq V_{IN} \leq 30\text{V}$		4	18			60	mV
	$16\text{V} \leq V_{IN} \leq 30\text{V}$		4	18			30	mV
	$I_O = 500\text{mA}$, $16\text{V} \leq V_{IN} \leq 22\text{V}$		4	18			120	mV
Load Regulation, ΔV_O	$5\text{mA} \leq I_O \leq 500\text{mA}$, $V_{IN} = 19\text{V}$		10	60			120	mV
Quiescent Current, I_Q	$V_{IN} = 19\text{V}$, $I_O = 350\text{mA}$		4	6		4	6	mA
Quiescent Current Change, ΔI_Q	$5\text{mA} \leq I_O \leq 500\text{mA}$, $V_{IN} = 19\text{V}$		0.1	0.5			0.5	mA
	$14.8\text{V} \leq V_{IN} \leq 30\text{V}$, $I_O = 200\text{mA}$		0.2	0.8			0.8	mA
Output Noise Voltage, V_n	$10\text{Hz} \leq f \leq 100\text{kHz}$		75	480		75	480	μV
Ripple Rejection, $\Delta V_{IN}/\Delta V_{OUT}$	$f = 120\text{Hz}$, $I_O = 300\text{mA}$	58	72		55			dB
	$15\text{V} \leq V_{IN} \leq 25\text{V}$, $I_O = 100\text{mA}$	58	72		55			dB
Dropout Voltage	$I_O = 350\text{mA}$		2	2.5			2.5	V
Short Circuit Current, I_{SC}	$V_{IN} = 35\text{V}$		300	600		300	600	mA
Peak Output Current, I_{PK}	$V_{IN} = 19\text{V}$	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of Output Voltage	$I_O = 5\text{mA}$		1.2	4.8		1.2		$\text{mV}/^\circ\text{C}$

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Parameter	Test Conditions	IP78M15A IP140MA-15			IP78M15 IP140M-15			Units
		Min	Typ	Max	Min	Typ	Max	
Output Voltage, V_O	$I_O = 100\text{mA}$, $V_{IN} = 23\text{V}$	14.85	15	15.15	14.40	15	15.60	V
	$P_D \leq P_{MAX}$, $5\text{mA} \leq I_O \leq 350\text{mA}$ $18\text{V} \leq V_{IN} \leq 30\text{V}$	14.55		15.45	14.25		15.75	V
Line Regulation, ΔV_O	$I_O = 200\text{mA}$, $17.5\text{V} \leq V_{IN} \leq 30\text{V}$		4	22			60	mV
	$20\text{V} \leq V_{IN} \leq 30\text{V}$		4	22			30	mV
	$I_O = 500\text{mA}$, $20\text{V} \leq V_{IN} \leq 26\text{V}$		4	22			150	mV
Load Regulation, ΔV_O	$5\text{mA} \leq I_O \leq 500\text{mA}$, $V_{IN} = 23\text{V}$		12	75			150	mV
Quiescent Current, I_Q	$V_{IN} = 23\text{V}$, $I_O = 350\text{mA}$		4	6		4	6	mA
Quiescent Current Change, ΔI_Q	$5\text{mA} \leq I_O \leq 500\text{mA}$, $V_{IN} = 23\text{V}$		0.1	0.5			0.5	mA
	$18\text{V} \leq V_{IN} \leq 30\text{V}$, $I_O = 200\text{mA}$		0.2	0.8			0.8	mA
Output Noise Voltage, V_n	$10\text{Hz} \leq f \leq 100\text{kHz}$		90	600		90	600	μV
Ripple Rejection, $\Delta V_{IN}/\Delta V_{OUT}$	$f = 120\text{Hz}$, $I_O = 300\text{mA}$	57	70		54			dB
	$18.5\text{V} \leq V_{IN} \leq 28.5\text{V}$, $I_O = 100\text{mA}$	57	70		54			dB
Dropout Voltage	$I_O = 350\text{mA}$		2	2.5			2.5	V
Short Circuit Current, I_{SC}	$V_{IN} = 35\text{V}$		300	600		300	600	mA
Peak Output Current, I_{PK}	$V_{IN} = 23\text{V}$	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of Output Voltage	$I_O = 5\text{mA}$		1.5	6.0		1.5		$\text{mV}/^\circ\text{C}$



*IP78M00 Series, IP78M00A Series, IP140M Series, IP140MA Series***0.5 AMP, 3-TERMINAL POSITIVE REGULATORS****ORDER INFORMATION****T-58-11-23**

Part Number	Temperature Range	Package
IP78M05AH	-55°C to +150°C	TO-39
IP78M05H	-55°C to +150°C	TO-39
IP78M12AH	-55°C to +150°C	TO-39
IP78M12H	-55°C to +150°C	TO-39
IP78M15AH	-55°C to +150°C	TO-39
IP78M15H	-55°C to +150°C	TO-39
IP78M05AJ	-55°C to +150°C	8 Pin Ceramic DIP
IP78M05J	-55°C to +150°C	8 Pin Ceramic DIP
IP78M12AJ	-55°C to +150°C	8 Pin Ceramic DIP
IP78M12J	-55°C to +150°C	8 Pin Ceramic DIP
IP78M15AJ	-55°C to +150°C	8 Pin Ceramic DIP
IP78M15J	-55°C to +150°C	8 Pin Ceramic DIP
IP140MAH-05	-55°C to +150°C	TO-39
IP140MH-05	-55°C to +150°C	TO-39
IP140MAH-12	-55°C to +150°C	TO-39
IP140MH-12	-55°C to +150°C	TO-39
IP140MAH-15	-55°C to +150°C	TO-39
IP140MH-15	-55°C to +150°C	TO-39

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