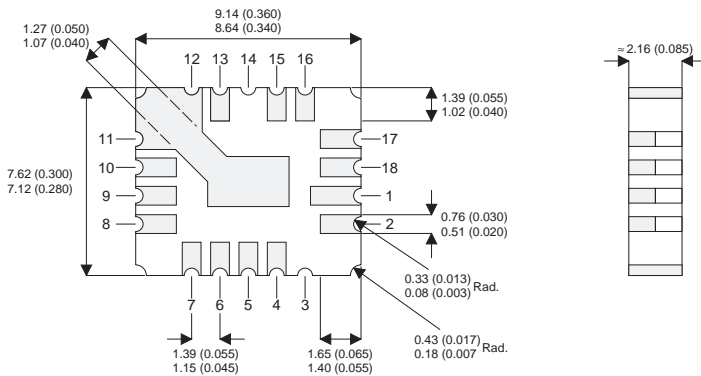


**0.5 AMP
 POSITIVE
 VOLTAGE REGULATOR
 IN A CERAMIC SURFACE
 MOUNT PACKAGE**



Pins 4,5 – V_{IN}
 6,7,8,9,10,11,12,13 – V_{OUT}
 Pins 15,16,17,18,1,2 – GND

FEATURES

- OUTPUT CURRENT UP TO 0.5A
- OUTPUT VOLTAGES OF 5, 12, 15V
- 0.01% / V LINE REGULATION
- 0.3% / A LOAD REGULATION
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SOA PROTECTION
- 1% VOLTAGE TOLERANCE (–A VERSIONS)

DESCRIPTION

The IP78M00A 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 500mA 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.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise stated)

V_I	DC Input Voltage	(for $V_O = 5, 12, 15\text{V}$)	35V
I_O	Output Current		Internally limited
P_D	Power Dissipation		Internally limited
T_J	Operating Junction Temperature Range		-55 to 150°C
T_{stg}	Storage Temperature		-65 to 150°C

ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	IP78M05A-LCC4			IP78M05-LCC4			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_O Output Voltage	$I_O = 100\text{mA}$ $V_{IN} = 10\text{V}$	4.95	5	5.05	4.8	5	5.2	V
	$I_O = 5\text{mA to } 350\text{mA}$ $P_D \leq P_{MAX}$ $V_{IN} = 7.5\text{V to } 20\text{V}$ $T_J = -55\text{ to } 150^\circ\text{C}$	4.85		5.15	4.75		5.25	
ΔV_O Line Regulation	$I_O = 200\text{mA}$ $V_{IN} = 7\text{V to } 25\text{V}$ $V_{IN} = 8\text{V to } 25\text{V}$ $T_J = -55\text{ to } 150^\circ\text{C}$	3	10		50	mV		
		3	10		25			
	$I_O = 500\text{mA}$ $V_{IN} = 8\text{V to } 12\text{V}$	3	10		50			
ΔV_O Load Regulation	$I_O = 5\text{mA to } 500\text{mA}$ $V_{IN} = 10\text{V}$ $T_J = -55\text{ to } 150^\circ\text{C}$		5	50		50	mV	
I_Q Quiescent Current	$V_{IN} = 10\text{V}$ $I_O = 350\text{mA}$ $T_J = -55\text{ to } 150^\circ\text{C}$		4	6		4	6	mA
ΔI_Q Quiescent Current Change	$I_O = 5\text{mA to } 500\text{mA}$ $V_{IN} = 10\text{V}$ $T_J = -55\text{ to } 150^\circ\text{C}$		0.1	0.5			0.5	mA
	$I_O = 200\text{mA}$ $V_{IN} = 8\text{V to } 25\text{V}$ $T_J = -55\text{ to } 150^\circ\text{C}$		0.2	0.8			0.8	
V_N Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$		40	200		40	200	μV
$\frac{\Delta V_{IN}}{\Delta V_O}$ Ripple Rejection	$f = 120\text{Hz}$ $V_{IN} = 8\text{V to } 18\text{V}$	$I_O = 300\text{mA}$	65	80	62		dB	
		$I_O = 100\text{mA}$ $T_J = -55\text{ to } 150^\circ\text{C}$	65	80	62			
Dropout Voltage	$I_O = 350\text{mA}$		2	2.5		2.5	V	
I_{SC} Short Circuit Current	$V_{IN} = 35\text{V}$		300	600		300	600	mA
I_{pk} Peak Output Current	$V_{IN} = 10\text{V}$	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of V_O	$I_O = 5\text{mA}$		0.5	2.0		0.5		$\frac{\text{mV}}{^\circ\text{C}}$
$R_{\theta JC}$ Thermal Resistance Junction to Case				13			13	$^\circ\text{C/W}$

1) All characteristics are measured with a capacitor across the input of $0.22\mu\text{F}$ 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 ($t_p \leq 10\text{ms}$, $\delta \leq 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.

ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	IP78M12A-LCC4			IP78M12-LCC4			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V _O Output Voltage	I _O = 100mA V _{IN} = 19V	11.88	12	12.12	11.50	12	12.50	V
	I _O = 5mA to 350mA P _D ≤ P _{MAX} V _{IN} = 14.8V to 27V T _J = -55 to 150°C	11.64		12.36	11.40		12.60	
ΔV _O Line Regulation	I _O = 200mA V _{IN} = 14.5V to 30V V _{IN} = 16V to 30V T _J = -55 to 150°C		4	18			60	mV
			4	18			30	
	I _O = 500mA V _{IN} = 16V to 22V		4	18			120	
ΔV _O Load Regulation	I _O = 5mA to 500mA V _{IN} = 19V T _J = -55 to 150°C		10	60			120	mV
I _Q Quiescent Current	V _{IN} = 19V I _O = 350mA T _J = -55 to 150°C		4	6		4	6	mA
ΔI _Q Quiescent Current Change	I _O = 5mA to 500mA V _{IN} = 19V T _J = -55 to 150°C		0.1	0.5			0.5	mA
	I _O = 200mA V _{IN} = 14.8V to 30V T _J = -55 to 150°C		0.2	0.8			0.8	
V _N Output Noise Voltage	f = 10Hz to 100kHz		75	480		75	480	μV
$\frac{\Delta V_{IN}}{\Delta V_O}$ Ripple Rejection	f = 120Hz V _{IN} = 15V to 25V	I _O = 300mA	58	72			55	dB
		I _O = 100mA T _J = -55 to 150°C	58	72			55	
Dropout Voltage	I _O = 350mA		2	2.5			2.5	V
I _{sc} Short Circuit Current	V _{IN} = 35V		300	600		300	600	mA
I _{pk} Peak Output Current	V _{IN} = 19V	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of V _O	I _O = 5mA		1.2	4.8		1.2		mV/°C
R _{θJC} Thermal Resistance Junction to Case				13			13	°C/W

1) All characteristics are measured with a capacitor across the input of 0.22μF and a capacitor across the output of 0.1μF.

All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (t_p ≤ 10ms, δ ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	IP78M15A-LCC4			IP78M15-LCC4			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V _O Output Voltage	I _O = 100mA V _{IN} = 23V	14.85	15	15.15	14.40	15	15.60	V
	I _O = 5mA to 350mA P _D ≤ P _{MAX} V _{IN} = 18V to 30V T _J = -55 to 150°C	14.55		15.45	14.25		15.75	
ΔV _O Line Regulation	I _O = 200mA V _{IN} = 17.5V to 30V V _{IN} = 20V to 30V T _J = -55 to 150°C		4	22			60	mV
			4	22			30	
	I _O = 500mA V _{IN} = 20V to 26V		4	22			150	
ΔV _O Load Regulation	I _O = 5mA to 500mA V _{IN} = 23V T _J = -55 to 150°C		12	75			150	mV
I _Q Quiescent Current	V _{IN} = 23V I _O = 350mA T _J = -55 to 150°C		4	6		4	6	mA
ΔI _Q Quiescent Current Change	I _O = 5mA to 500mA V _{IN} = 23V T _J = -55 to 150°C		0.1	0.5			0.5	mA
	I _O = 200mA V _{IN} = 18V to 30V T _J = -55 to 150°C		0.2	0.8			0.8	
V _N Output Noise Voltage	f = 10Hz to 100kHz		90	600		90	600	μV
ΔV _{IN} / ΔV _O Ripple Rejection	f = 120Hz V _{IN} = 18.5V to 28.5V I _O = 300mA I _O = 100mA T _J = -55 to 150°C		57	70			54	dB
			57	70			54	
Dropout Voltage	I _O = 350mA		2	2.5			2.5	V
I _{sc} Short Circuit Current	V _{IN} = 35V		300	600		300	600	mA
I _{pk} Peak Output Current	V _{IN} = 23V	0.7	1.0	1.4	0.7	1.0	1.6	A
Average Temperature Coefficient of V _O	I _O = 5mA		1.5	6.0		1.5		mV / °C
R _{θJC} Thermal Resistance Junction to Case				13			13	°C/W

- 1) All characteristics are measured with a capacitor across the input of 0.22μF and a capacitor across the output of 0.1μF.
All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (t_p ≤ 10ms, δ ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.