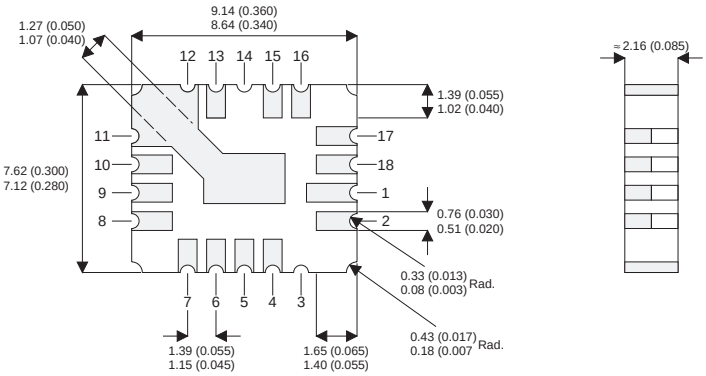
IP78M00A-LCC4 SERIES
IP78M00-LCC4 SERIES

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 ±1% output voltage tolerance at room temperature. Protection features include safe operating area, current limiting and thermal shutdown.

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise stated)

V_I	DC Input Voltage	(for V_O = 5, 12, 15V)	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

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ELECTRICAL CHARACTERISTICS

Parameter		Test Conditions		IP78M05A-LCC4 Min.	IP78M05A-LCC4 Typ.	IP78M05A-LCC4 Max.	IP78M05-LCC4 Min.	IP78M05-LCC4 Typ.	IP78M05-LCC4 Max.	Units
V_O	Output Voltage	I_O = 100mA	V_{IN} = 10V	4.95	5	5.05	4.8	5	5.2	V
		I_O = 5mA to 350mA $P_D \le P_{MAX}$ V_{IN} = 7.5V to 20V	T_J = -55 to 150°C	4.85		5.15	4.75		5.25	
ΔV_O	Line Regulation	I_O = 200mA	V_{IN} = 7V to 25V		3	10			50	mV
			V_{IN} = 8V to 25V T_J = -55 to 150°C		3	10			25	
		I_O = 500mA	V_{IN} = 8V to 12V		3	10			50	
ΔV_O	Load Regulation	I_O = 5mA to 500mA V_{IN} = 10V	T_J = -55 to 150°C		5	50			50	mV
I_Q	Quiescent Current	V_{IN} = 10V	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} = 10V	T_J = -55 to 150°C		0.1	0.5			0.5	mA
		I_O = 200mA	V_{IN} = 8V to 25V T_J = -55 to 150°C		0.2	0.8			0.8	
V_N	Output Noise Voltage	f = 10Hz to 100kHz			40	200		40	200	µV
$\frac{\Delta V_{IN}}{\Delta V_O}$	Ripple Rejection	f = 120Hz V_{IN} = 8V to 18V	I_O = 300mA	65	80		62			dB
			I_O = 100mA T_J = -55 to 150°C	65	80		62			
	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} = 10V		0.7	1.0	1.4	0.7	1.0	1.6	A
	Average Temperature Coefficient of V_O	I_O = 5mA			0.5	2.0		0.5		mV/°C
$R_{\theta JC}$	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 ($t_p \le 10ms$, $\delta \le 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.

ELECTRICAL CHARACTERISTICS

Parameter		Test Conditions		IP78M12A-LCC4 Min.	IP78M12A-LCC4 Typ.	IP78M12A-LCC4 Max.	IP78M12-LCC4 Min.	IP78M12-LCC4 Typ.	IP78M12-LCC4 Max.	Unit
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 $P_D \le P_{MAX}$ T_J = -55 to 150°C	V_{IN} = 14.8V to 27V	11.64		12.36	11.40		12.60	
ΔV_O	Line Regulation	I_O = 200mA	V_{IN} = 14.5V to 30V		4	18			60	mV
			V_{IN} = 16V to 30V T_J = -55 to 150°C		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
$R_{\theta JC}$	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 ($t_p \le 10$ms, $\delta \le 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.

ELECTRICAL CHARACTERISTICS

Parameter		Test Conditions		IP78M15A-LCC4 Min.	IP78M15A-LCC4 Typ.	IP78M15A-LCC4 Max.	IP78M15-LCC4 Min.	IP78M15-LCC4 Typ.	IP78M15-LCC4 Max.	Units
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 $P_D \le P_{MAX}$ 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		4	22			60	mV
			V_{IN} = 20V to 30V T_J = -55 to 150°C		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
$\frac{\Delta V_{IN}}{\Delta V_O}$	Ripple Rejection	f = 120Hz V_{IN} = 18.5V to 28.5V	I_O = 300mA	57	70		54			dB
			I_O = 100mA T_J = -55 to 150°C	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
$R_{\theta JC}$	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 ($t_p \le 10ms$, $\delta \le 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.