

Description

The GM78L00 series in positive voltage regulators are cost effective devices to provide a simple solution for a wide variety of application, which requires a regulated supply of up to 100mA

These virtually indestructible positive voltage regulators are protected by thermal shut down and internal current limiting. Most applications require no external components.

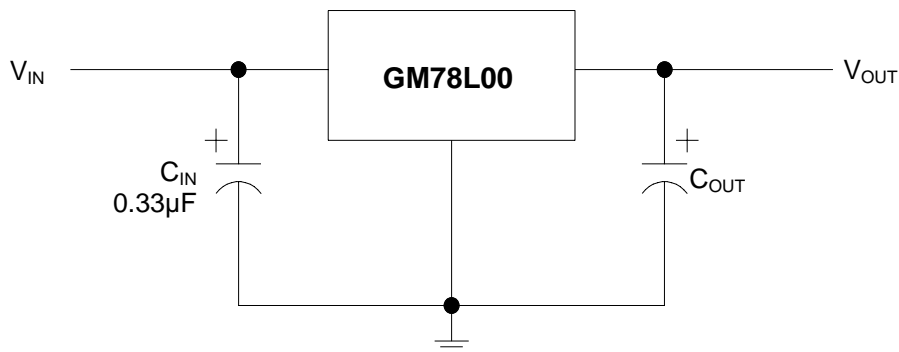
The GM78L00 is very versatile, which can be used as fixed voltage regulators in a wide range of application, including both local and on-card regulation for elimination of noise and distribution problems associated with single-point regulation. They can also be used with power pass elements to make high current voltage regulators.

The GM78L00 series offer impressive performance advantages over traditional zener diode and resistor combinations, provide lower output impedance and reduced quiescent current.

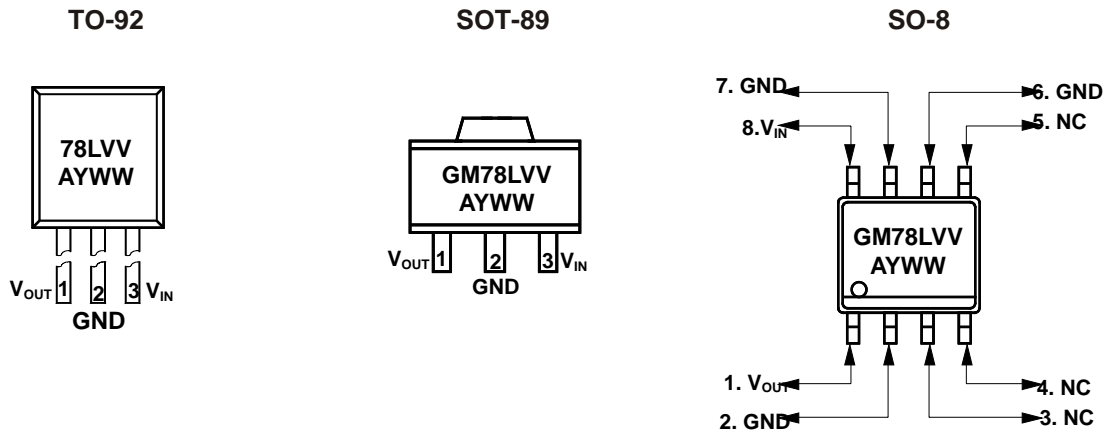
Features

- ◆ Maximum output current up to 100mA
- ◆ Fixed output voltage options: 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V
- ◆ No external components required
- ◆ Internal thermal overload protection
- ◆ Internal short circuit current limiting
- ◆ Available in TO-92, SOT-89 and SOP-8 packages

Typical Application Circuit



Marking Information and Pin Configurations (Top View)



VV: Output Voltage Codes (05: 5.0V, ...12:12V)
 A: Assembly/Test Site Code
 Y: Year
 WW: Week

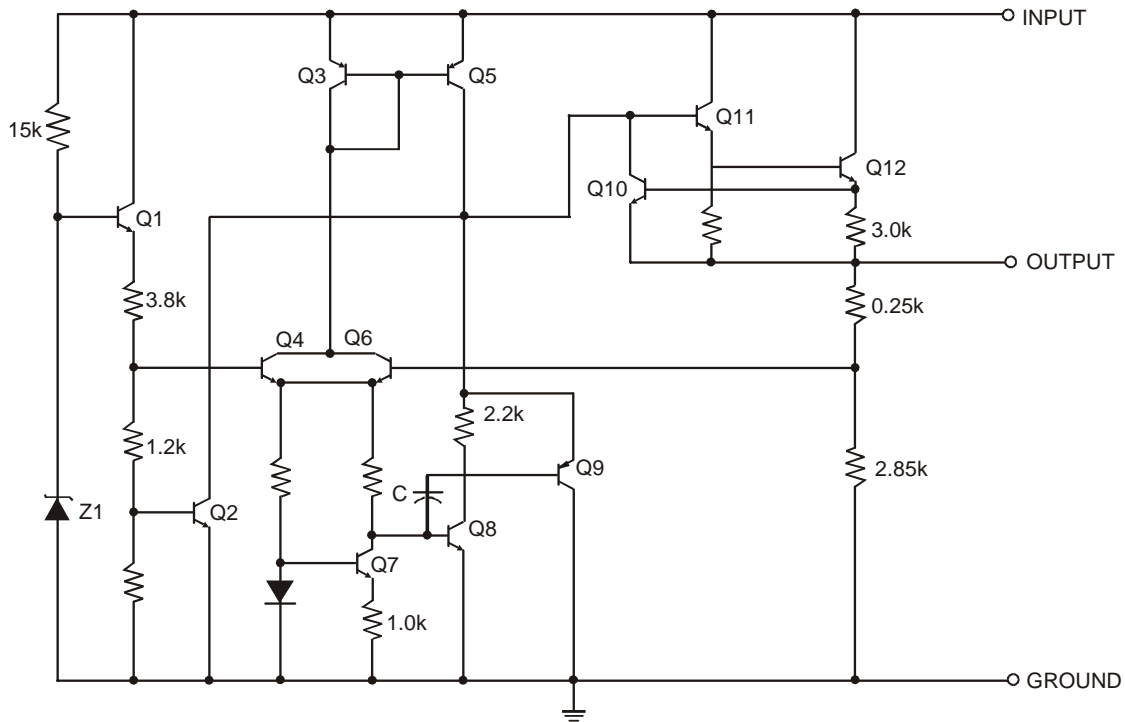
Ordering Information

Ordering Number	V _{OUT}	Package	Shipping
GM78L00T92B	00 = 5.0V 6.0V 8.0V 9.0V	TO-92	1,000 Units/ESD Bag
GM78L00T92RL		TO-92	2,000 Units/Ammo Pack (Tape)
GM78L00ST89R		SOT-89	1,000 Units/Tape and Reel
GM78L00S8T	15.0V 18.0V	SO-8	100 Units/Tube
GM78L00S8R	24.0V	SO-8	2,500 Units/Tape & Reel

Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V_{IN}	30	V
		35	
		40	
Output Current	I_{OUT}	150	mA
Operating Ambient Temperature	T_A	- 40 to 125	
Storage Temperature	T_{stg}	- 60 to 150	

Block Diagram



GM78L05 Electrical Characteristics ($V_I = 10V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition	Min	Typ	Max	Unit	
Output Voltage		25	4.8	5.0	5.2	V
	$I_O = 1mA$ to $40mA$ $V_I = 7V$ to $20V$	0 to 125	4.75	5.0	5.25	
	$I_O = 1mA$ to $70mA$		4.75	5.0	5.25	
Input Regulation	$V_I = 7V$ to $20V$	25		32	150	mV
	$V_I = 8V$ to $20V$			26	100	
Ripple Rejection	$V_I = 8V$ to $18V$, $f = 120KHz$	25	41	49	dB	
Output Regulation	$I_O = 1mA$ to $100mA$	25		15	60	mV
	$I_O = 1mA$ to $40mA$			8	30	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		42	μV	
Bias Current		25		3.8	6	mA
		125			5.5	
Bias Current Change	$V_I = 8V$ to $20V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L06 Electrical Characteristics ($V_I = 11V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition	Min	Typ	Max	Unit	
Output Voltage		25	5.75	6.0	6.25	V
	$I_O = 1mA$ to $40mA$ $V_I = 8V$ to $20V$	0 to 125	5.70	6.0	6.30	
	$I_O = 1mA$ to $70mA$		5.70	6.0	6.30	
Input Regulation	$V_I = 8V$ to $20V$	25		35	175	mV
	$V_I = 9V$ to $20V$			29	125	
Ripple Rejection	$V_I = 9V$ to $18V$, $f = 120KHz$	25	10	18	dB	
Output Regulation	$I_O = 1mA$ to $100mA$	25		16	80	mV
	$I_O = 1mA$ to $40mA$			9	40	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		46	μV	
Bias Current		25		3.9	6	mA
		125			5.5	
Bias Current Change	$V_I = 9V$ to $20V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L08 Electrical Characteristics ($V_I = 14V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition		Min	Typ	Max	Unit
Output Voltage		25	7.7	8.0	8.3	V
	$I_O = 1mA$ to 40mA $V_I = 10.5V$ to 23V	0 to 125	7.6	8.0	8.4	
	$I_O = 1mA$ to 70mA		7.6	8.0	8.4	
Input Regulation	$V_I = 10.5V$ to 23V	25		42	175	mV
	$V_I = 11V$ to 23V			36	125	
Ripple Rejection	$V_I = 13V$ to 23V, $f = 120KHz$	25	37	46		dB
Output Regulation	$I_O = 1mA$ to 100mA	25		18	80	mV
	$I_O = 1mA$ to 40mA			10	40	
Output Noise Voltage	$F = 10Hz$ to 100KHz	25		54		μV
Dropout Voltage		25		1.7		V
Bias Current		25		4	6	mA
		125			5.5	
Bias Current Change	$V_I = 11V$ to 23V	0 to 125			1.5	mA
	$I_O = 1mA$ to 40mA				0.1	

GM78L09 Electrical Characteristics ($V_I = 16V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition		Min	Typ	Max	Unit
Output Voltage		25	8.6	9.0	9.4	V
	$I_O = 1mA$ to 40mA $V_I = 12V$ to 24V	0 to 125	8.55	9.0	9.45	
	$I_O = 1mA$ to 70mA		8.55	9.0	9.45	
Input Regulation	$V_I = 12V$ to 24V	25		45	175	mV
	$V_I = 13V$ to 24V			40	125	
Ripple Rejection	$V_I = 15V$ to 25V, $f = 120KHz$	25	38	44		dB
Output Regulation	$I_O = 1mA$ to 100mA	25		19	90	mV
	$I_O = 1mA$ to 40mA			11	40	
Output Noise Voltage	$F = 10Hz$ to 100KHz	25		58		μV
Dropout Voltage		25		1.7		V
Bias Current		25		4.1	6	mA
		125			5.5	
Bias Current Change	$V_I = 13V$ to 24V	0 to 125			1.5	mA
	$I_O = 1mA$ to 40mA				0.1	

GM78L10 Electrical Characteristics ($V_I = 17V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition		Min	Typ	Max	Unit
Output Voltage		25	9.6	10	10.4	V
	$I_O = 1mA$ to $40mA$ $V_I = 13V$ to $25V$	0 to 125	9.5	10	10.5	
	$I_O = 1mA$ to $70mA$		9.5	10	10.5	
Input Regulation	$V_I = 13V$ to $25V$	25		51	175	mV
	$V_I = 14V$ to $24V$			42	125	
Ripple Rejection	$V_I = 15V$ to $25V$, $f = 120KHz$	25	38	44		dB
Output Regulation	$I_O = 1mA$ to $100mA$	25		20	90	mV
	$I_O = 1mA$ to $40mA$			11	40	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		62		μV
Dropout Voltage		25		1.7		V
Bias Current		25		4.2	6	mA
		125			5.5	
Bias Current Change	$V_I = 14V$ to $25V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L12 Electrical Characteristics ($V_I = 19V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition		Min	Typ	Max	Unit
Output Voltage		25	11.5	12	12.5	V
	$I_O = 1mA$ to $40mA$ $V_I = 14V$ to $27V$	0 to 125	11.4	12	12.6	
	$I_O = 1mA$ to $70mA$		11.4	12	12.6	
Input Regulation	$V_I = 14.5V$ to $27V$	25		55	250	mV
	$V_I = 16V$ to $27V$			49	200	
Ripple Rejection	$V_I = 16V$ to $27V$, $f = 120KHz$	25	37	42		dB
Output Regulation	$I_O = 1mA$ to $100mA$	25		22	100	mV
	$I_O = 1mA$ to $40mA$			13	50	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		70		μV
Dropout Voltage		25		1.7		V
Bias Current		25		4.3	6.5	mA
		125			6	
Bias Current Change	$V_I = 16V$ to $27V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L15 Electrical Characteristics ($V_I = 23V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition	Min	Typ	Max	Unit	
Output Voltage		25	14.4	15	15.6	V
	$I_O = 1mA$ to $40mA$ $V_I = 17.5V$ to $30V$	0 to 125	14.25	15	15.75	
	$I_O = 1mA$ to $70mA$		14.25	15	15.75	
Input Regulation	$V_I = 17.5V$ to $30V$	25		65	300	mV
	$V_I = 19V$ to $30V$			58	250	
Ripple Rejection	$V_I = 18.5V$ to $28.5V$, $f = 120KHz$	25	34	39	dB	
Output Regulation	$I_O = 1mA$ to $100mA$	25		25	150	mV
	$I_O = 1mA$ to $40mA$			15	75	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		82	μV	
Dropout Voltage		25		1.7	V	
Bias Current		25		4.6	6.5	mA
		125			6	
Bias Current Change	$V_I = 19V$ to $30V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L18 Electrical Characteristics ($V_I = 26V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition	Min	Typ	Max	Unit	
Output Voltage		25	17.3	18	18.7	V
	$I_O = 1mA$ to $40mA$ $V_I = 20.5V$ to $33V$	0 to 125	17.1	18	18.9	
	$I_O = 1mA$ to $70mA$		17.1	18	18.9	
Input Regulation	$V_I = 20.5V$ to $33V$	25		70	360	mV
	$V_I = 22V$ to $33V$			64	300	
Ripple Rejection	$V_I = 21.5V$ to $31.5V$, $f = 120KHz$	25	32	36	dB	
Output Regulation	$I_O = 1mA$ to $100mA$	25		27	180	mV
	$I_O = 1mA$ to $40mA$			19	90	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		89	μV	
Dropout Voltage		25		1.7	V	
Bias Current		25		4.7	6.5	mA
		125			6	
Bias Current Change	$V_I = 22V$ to $33V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

GM78L24 Electrical Characteristics ($V_I = 32V$, $I_O = 40mA$ unless otherwise noted)

Parameter	Test Condition	Min	Typ	Max	Unit	
Output Voltage		25	23	24	25	V
	$I_O = 1mA$ to $40mA$ $V_I = 26.5V$ to $39V$	0 to 125	22.8	24	25.2	
	$I_O = 1mA$ to $70mA$		22.8	24	25.2	
Input Regulation	$V_I = 26.5V$ to $39V$	25		95	480	mV
	$V_I = 29V$ to $39V$			78	400	
Ripple Rejection	$V_I = 21.5V$ to $31.5V$, $f = 120KHz$	25	32	36		dB
Output Regulation	$I_O = 1mA$ to $100mA$	25		41	240	mV
	$I_O = 1mA$ to $40mA$			28	120	
Output Noise Voltage	$F = 10Hz$ to $100KHz$	25		97		μV
Dropout Voltage		25		1.7		V
Bias Current		25		4.8	6.5	mA
		125			6	
Bias Current Change	$V_I = 26V$ to $39V$	0 to 125			1.5	mA
	$I_O = 1mA$ to $40mA$				0.1	

Typical Performance Characteristics

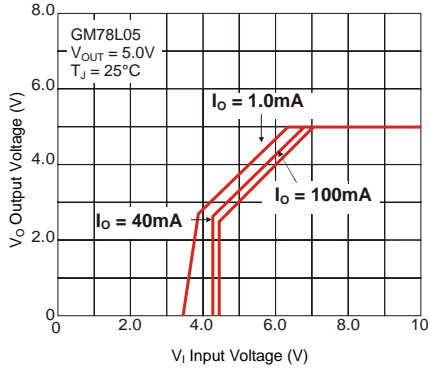


Figure 1. Dropout Characteristics

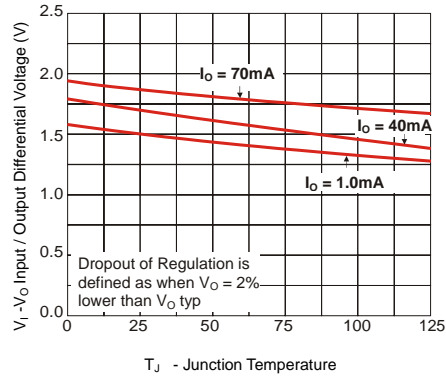


Figure 2. Dropout Voltage vs. Junction Temperature

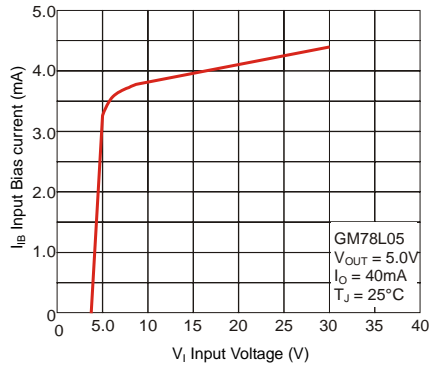


Figure 3. Input Bias Current vs. Input Voltage

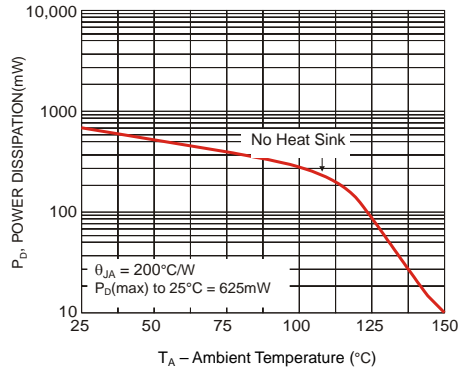
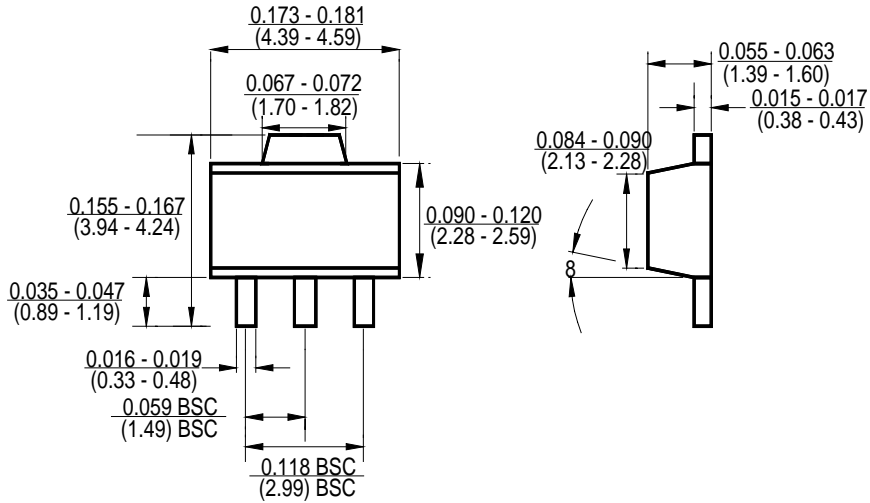
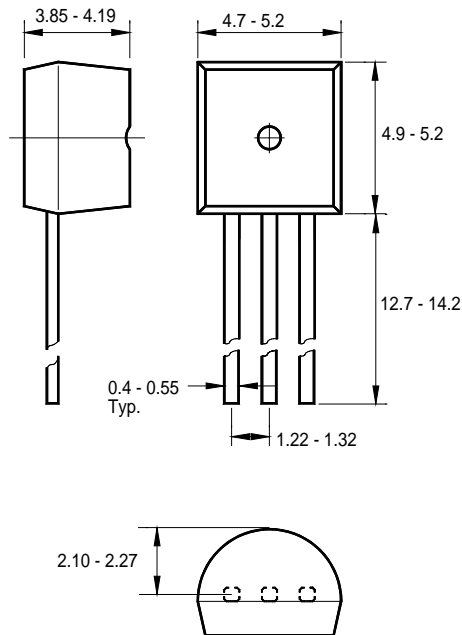


Figure 4. Maximum Average Power Dissipation vs. Ambient Temperature TO-92 Package

Package Outline Dimensions – SOT 89

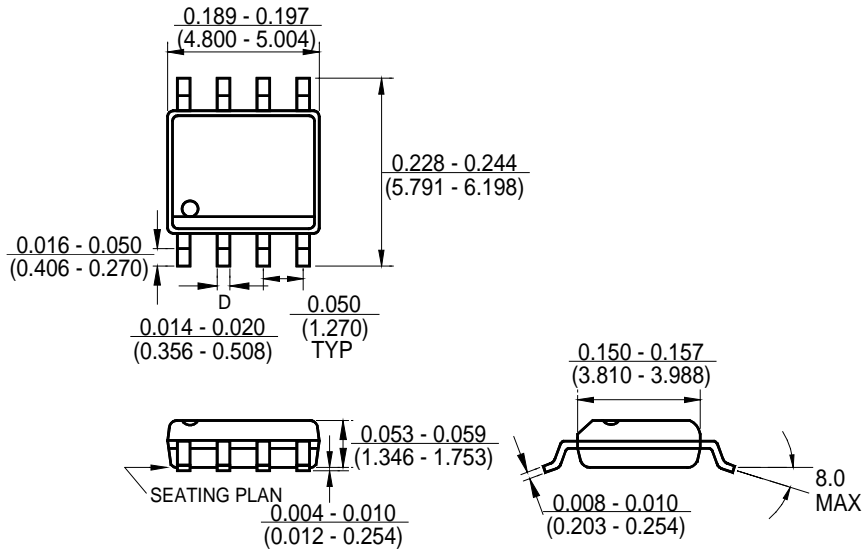


Package Outline Dimensions – TO 92



Dimensions are in millimeters

Package Outline Dimensions – SO 8



Ordering Number

<u>GM</u>	<u>78L</u>	<u>05</u>	<u>T92</u>	<u>B</u>
APM Gamma Micro	Circuit Type	Output Voltages	Package Type	Shipping Type
		05: 5.0V 06: 6.0V 08: 8.0V 09: 9.0V 10: 10V 12: 12V 15: 15V 18: 18V 24: 24V	T92: TO-92 ST89: SOT-89 S8: SO-8	B: Bag RL: Ammo Pack (Tape) T: Tube R: Tape & Reel