GM7900 Series

1.5A NEGATIVE VOLTAGE REGULATOR

Description

The GM7900 series of fixed-negative voltage monolithic integrated circuit voltage regulators is designed to complement Series GM7800 in a wide range of applications.

These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5A of output current.

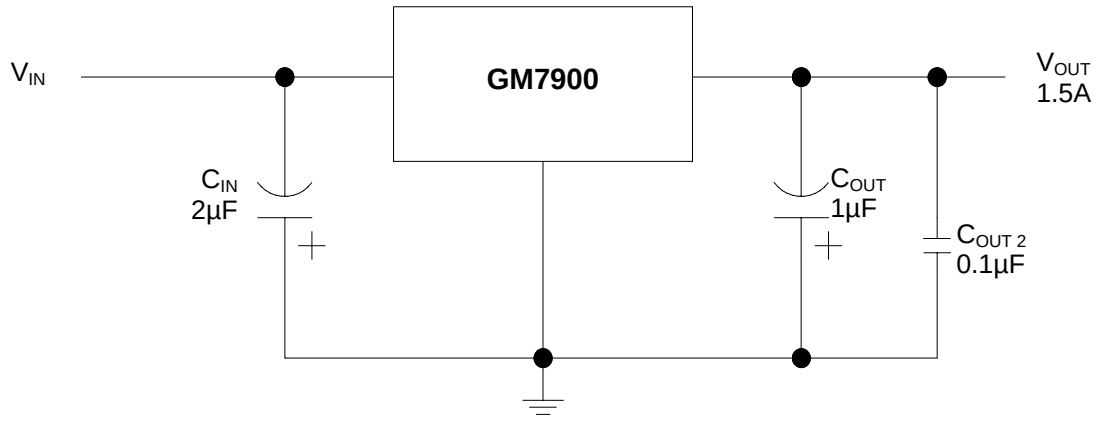
The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and current and also as the power pass element in precision regulators.

The GM7900 series are available in TO-220, TO-252, TO-263 packages.

Features

- **Output current up to 1.5A**
- **Available Output Voltage Options from -5V to -24V**
- **3- Terminal Regulators**
- **Internal Thermal Overload Protection**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Protection**
- **TO-220, TO-252 and TO-263 Packages**
- **High Power Dissipation Capability**

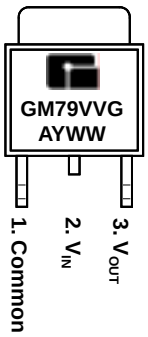
Typical Application Circuit



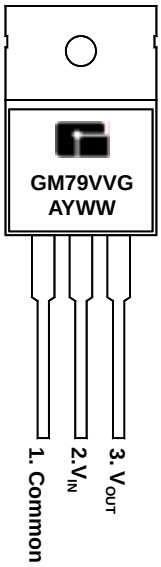
When using a negative regulator, bypass capacitors are a must on both input and output. Recommended values are 2μF on the input and 1μF on the output. It is considered good practice to include a 0.1μF capacitor on the output to improve the transient response. These capacitors may mylar, ceramic, or tantalum, provided that they have good high frequency characteristics

Marking Information and Pin Configurations (Top View) – Green Products

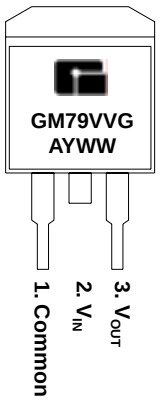
TO 252
(D-PAK)



TO 220



TO 263
(D^2-PAK)



G: Green Product
VV: Output Voltage Codes (05: -5.0V, …-12:12V)
A: Assembly/Test Site Code
Y: Year
WW: Week

Ordering Information – Green Products

Ordering Number	V_{OUT}	Package	Shipping
GM7900TA3TG	**00** = -5.0V -6.0V -8.0V -9.0V -10.0V -12.0V -15.0V -18.0V -24.0V	TO-263	50 Units/Tube
GM7900TA3RG		TO-263	800 Units / Reel
GM7900TB3TG		TO-220	50 Units/Tube
GM7900TC3TG		TO-252	80 Units/Tube
GM7900TC3RG		TO-252	2,500 Units / Reel

Absolute Maximum Ratings

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage	GM7905 to GM7920	V_I	-35	V
	GM7924		-40	
Continuous total dissipation at 25°C free air temperature			2	W
Continuous total dissipation at (or below) 25°C case temperature			15	W
Operating Ambient Temperature		T_A	0 to 150	°C
Storage Temperature		T_{stg}	- 60 to 150	°C
Lead Temperature 1.6mm (1/6 inch) from case for 10 seconds			260	°C

Recommended Operating Conditions

PARAMETER		SYMBOL	MIN	MAX	UNITS
Input Voltage	GM7905	V_I	-7	-25	V
	GM7906		-8	-25	
	GM7908		-10.5	-25	
	GM7909		-11.5	-25	
	GM7912		-14.5	-30	
	GM7915		-17.5	-30	
	GM7918		-21	-33	
	GM7920		-23	-34	
	GM7924		-27	-38	
Output Current		I_O		1.5	A
Operating virtual junction temperature		T_J	0	125	°C

GM7905 Electrical Characteristics (V_I = -10V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-4.8	-5.0	-5.2	V
	I_O =5mA to 1A V_I = -7V to -20V, P≦15W	0°C to 125°C	-4.75	-5.0	-5.25	
Input Regulation	V_I = -7V to -25V	25°C		12.5	50	mV
	V_I = -8V to -12V			4	15	
Ripple Rejection	V_I = -8V to -18V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		15	100	mV
	I_O = 250mA to 750mA			5	50	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-0.4		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		125		μV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		1.5	2.0	mA
Bias Current Change	V_I = -7V to -25V	0°C to 125°C		0.15	0.5	mA
	I_O = 5mA to 1A			0.08	0.5	
Peak Output Current		25°C		2.1		A

GM7906 Electrical Characteristics (V_I = -11V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-5.75	-6.0	-6.25	V
	I_O =5mA to 1A V_I = -8V to -21V, P≦15W	0°C to 125°C	-5.70	-6.0	-6.30	
Input Regulation	V_I = -8V to -25V	25°C		12.5	120	mV
	V_I = -9V to -13V			4	60	
Ripple Rejection	V_I = -9V to -19V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5mA	25°C		15	120	mV
	I_O = 250mA to 750mA			5	60	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-0.4		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		150		μV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		1.5	2	mA
Bias Current Change	V_I = -8V to -25V	0°C to 125°C		0.15	1.3	mA
	I_O = 5mA to 1A			0.08	0.5	
Short Circuit Output Current		25°C		550		mA
Peak Output Current		25°C		2.1		A

Note *: This specification applies only for dc power dissipation permitted by absolute maximum ratings.
Note 1: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

GM7908 Electrical Characteristics (V_I = -14V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-7.7	-8.0	-8.3	V
	I_O =5mA to 1A V_I = -10.5V to -23V, P≦15W	0°C to 125°C	-7.6	-8.0	-8.4	
Input Regulation	V_I = -10.5V to -25V	25°C		12.5	160	mV
	V_I = -11V to -17V			4	80	
Ripple Rejection	V_I = -11.5V to -21.5V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		15	160	mV
	I_O = 250mA to 750mA			5	80	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-0.8		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		200		µV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		1.5	2	mA
Bias Current Change	V_I = -10.5V to -25V	0°C to 125°C		0.15	1	mA
	I_O = 5mA to 1A			0.08	0.5	
Peak Output Current		25°C		2.1		A

GM7909 Electrical Characteristics (V_I = -15V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	8.64	9.0	9.36	V
	I_O =5mA to 1A V_I = -11.5V to -25V, P≦15W	0°C to 125°C	8.55	9.0	9.45	
Input Regulation	V_I = -11.5V to -25V	25°C		12.5	180	mV
	V_I = -14.5V to -22V			4	90	
Ripple Rejection	V_I = -12.5V to -24V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		15	180	mV
	I_O = 250mA to 750mA			5	90	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-1.0		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		225		µV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		1.5	2	mA
Bias Current Change	V_I = -11.5V to -25V	0°C to 125°C		0.15	1	mA
	I_O = 5mA to 1A			0.08	0.5	
Peak Output Current		25°C		2.2		A

Note *: This specification applies only for dc power dissipation permitted by absolute maximum ratings.
Note 1: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

GM7912 Electrical Characteristics (V_I = -19V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-11.5	-12	-12.5	V
	I_O =5mA to 1A V_I = -14.5V to -27V, P≦15W	0°C to 125°C	-11.4	-12	-12.6	
Input Regulation	V_I = -14.5V to -30V	25°C		5	80	mV
	V_I = -16V to -22V			3	30	
Ripple Rejection	V_I = -15V to -25V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		15	200	mV
	I_O = 250mA to 750mA			5	75	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-0.8		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		300		µV
Dropout Voltage	I_O = 1A	25°C		1.5		V
Bias Current		25°C		2	3	mA
Bias Current Change	V_I = -14.5V to -30V	0°C to 125°C		0.04	0.5	mA
	I_O = 5mA to 1A			0.06	0.5	
Peak Output Current		25°C		2.1		A

GM7915 Electrical Characteristics (V_I = -23V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-14.4	-15	-15.6	V
	I_O =5mA to 1A V_I = -17.5V to -30V, P≦15W	0°C to 125°C	-14.25	-15	-15.75	
Input Regulation	V_I = -17.5V to -30V	25°C		5	100	mV
	V_I = -20V to -26V			3	50	
Ripple Rejection	V_I = 15V to 25V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		15	200	mV
	I_O = 250mA to 750mA			5	75	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-1.0		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		375		µV
Dropout Voltage	I_O = 1A	25°C		1.5		V
Bias Current		25°C		2	3	mA
Bias Current Change	V_I = -17.5V to -30V	0°C to 125°C		0.04	0.5	mA
	I_O = 5mA to 1A			0.06	0.5	
Peak Output Current		25°C		2.1		A

Note *: This specification applies only for dc power dissipation permitted by absolute maximum ratings.
Note 1: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

GM7918 Electrical Characteristics (V_I = -27V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-17.3	18	-18.7	V
	I_O =5mA to 1A V_I = -21V to -33V, P≦15W	0°C to 125°C	17.1	-18	-18.9	
Input Regulation	V_I = -21V to -33V	25°C		5	360	mV
	V_I = -24V to =30V			3	180	
Ripple Rejection	V_I = -22V to -32V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		30	360	mV
	I_O = 250mA to 750mA			10	180	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-1.0		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		450		µV
Dropout Voltage	I_O = 1A	25°C		1.5		V
Bias Current		25°C		2	3	mA
Bias Current Change	V_I = -21V to -33V	0°C to 125°C		0.04	1	mA
	I_O = 5mA to 1A			0.06	0.5	
Peak Output Current		25°C		2.1		A

GM7920 Electrical Characteristics (V_I = -31V, I_O = 500mA unless otherwise noted)

Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-19.2	20	-20.8	V
	I_O =5mA to 1A V_I = -23V to -34V, P≦15W	0°C to 125°C	-19	-20	-21	
Input Regulation	V_I = -23V to -34V	25°C		5	400	mV
	V_I = -26V to -31V			3	200	
Ripple Rejection	V_I = -24V to -33V, f = 120KHz	0°C to 125°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		50	400	mV
	I_O = 250mA to 750mA			15	120	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-1.0		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		500		µV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		2	3	mA
Bias Current Change	V_I = -23V to -34V	0°C to 125°C		0.04	1	mA
	I_O = 5mA to 1A			0.06	0.5	
Peak Output Current		25°C		2.1		A

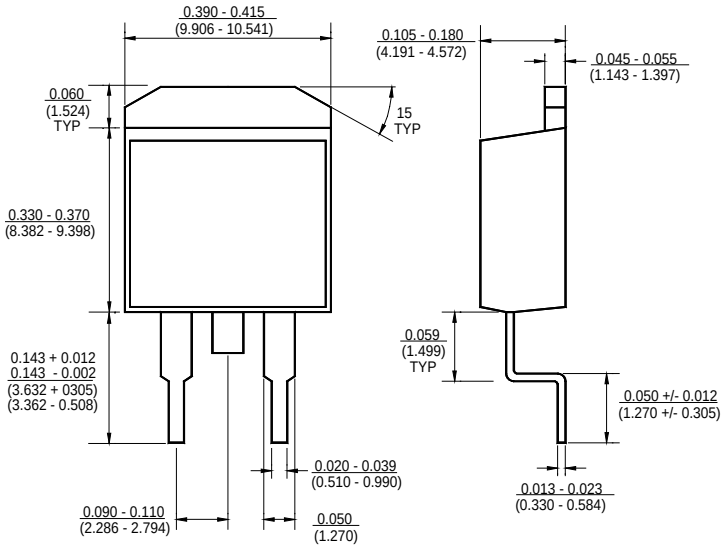
Note *: This specification applies only for dc power dissipation permitted by absolute maximum ratings.
Note 1: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

GM7924 Electrical Characteristics (V_I = -33V, I_O = 500mA unless otherwise noted)

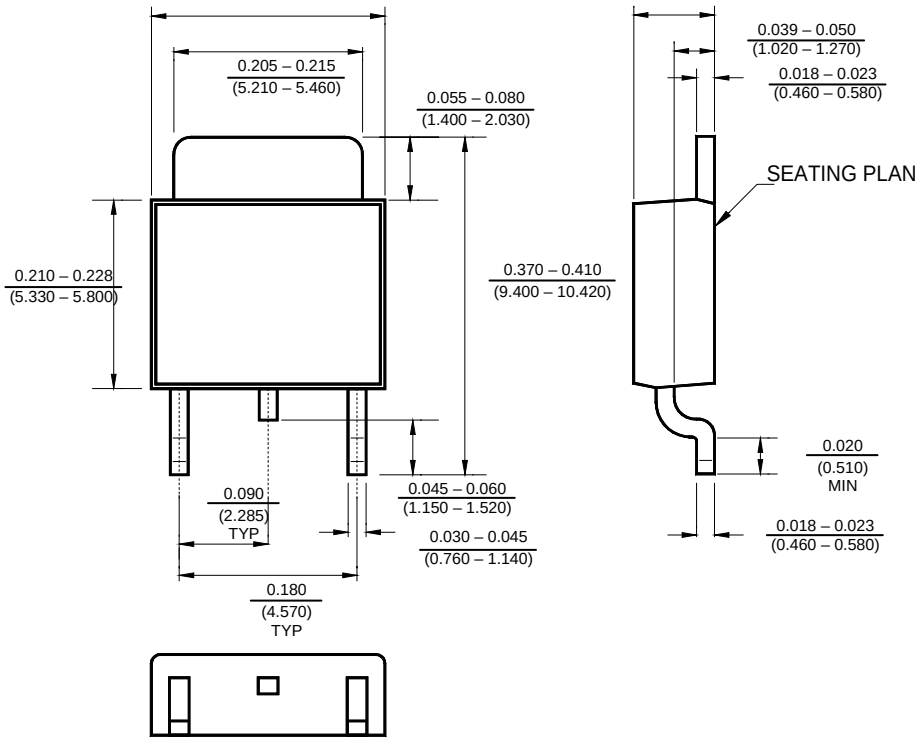
Parameter	Test Condition (Note 1)		Min	Typ	Max	Unit
Output Voltage (note *)		25°C	-23	-24	-25	V
	I_O =5mA to 1A V_I = -27V to -38V, P≦15W	0°C to 125°C	-22.8	-24	-25.2	
Input Regulation	V_I = -27V to -38V	25°C		5	480	mV
	V_I = -30V to -36V			3	240	
Ripple Rejection	V_I = -28V to -38V, f = 120KHz	25°C	54	60		dB
Output Regulation	I_O = 5mA to 1.5A	25°C		85	480	mV
	I_O = 250mA to 750mA			25	240	
Temperature Coefficient of Output Voltage	I_O = 5mA	0°C to 125°C		-1		mV/°C
Output Noise Voltage	f = 10Hz to 100KHz	25°C		600		µV
Dropout Voltage	I_O = 1A	25°C		1.6		V
Bias Current		25°C		2	3	mA
Bias Current Change	V_I = -27V to -38V	0°C to 125°C		0.04	1	mA
	I_O = 5mA to 1A			0.06	0.5	
Peak Output Current		25°C		2.1		A

Note *: This specification applies only for dc power dissipation permitted by absolute maximum ratings.
Note 1: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

Package Outline Dimensions – TO263



Package Outline Dimensions – TO252



Ordering Number

GM	78	05	TA3	T	G
APM Gamma Micro	Circuit Type	Output Voltage	Package Type	Shipping Type	Blank:Pb-free G:Green
		05: 5.0V 06: 6.0V 08: 8.0V 09: 9.0V 10: 10V 12: 12V 15: 15V 18: 18V 24: 24V	TA3: TO263 TB3: TO220 TC3: TO252	R: Taping & Reel T: Tube	

Note:

Pb-free products:

- RoHS compliant and compatible with the current require-ments of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes with 100% matte tin (Sn) plating.

Green products:

- Lead-free (RoHS compliant)
- Halogen free(Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)