

NEGATIVE VOLTAGE REGULATORS

- Output current up to 1.5A
- 3-Terminal Regulators
- Internal Thermal Overload Protection
- Output Voltages -5V, -6V, -8V, -12V, -15V, -18V and -24V
- Offer in TO-220, TO-252 and TO-263
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Direct replacements for LM79xx

The GM7900 series are classic regulators useful in a wide range of applications. For example, you can use them for local on-card regulation to eliminate the distribution problems associated with single point regulation.

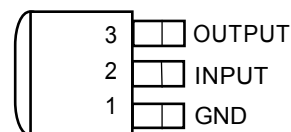
The wide range of output voltages (-5V to -24V) make them useful in an endless list of applications. Although designed as fixed voltage regulators, you can add a few external components to make adjustable voltages and currents.

Current limiting prevents the peak output current to a safe value. Safe-area protection for the output transistor limits internal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit activates to prevent the regulator from overheating. These versatile workhorses are easy to use.

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

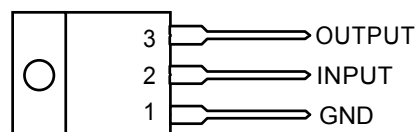
Connection Diagrams

(Top View)



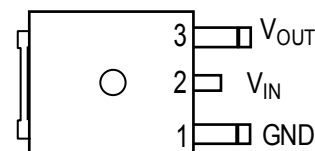
TO-263 (D2PAK)

(Top View)



TO-220 3-LEAD

(Top View)



TO-252 (D-PAK)

Applications:

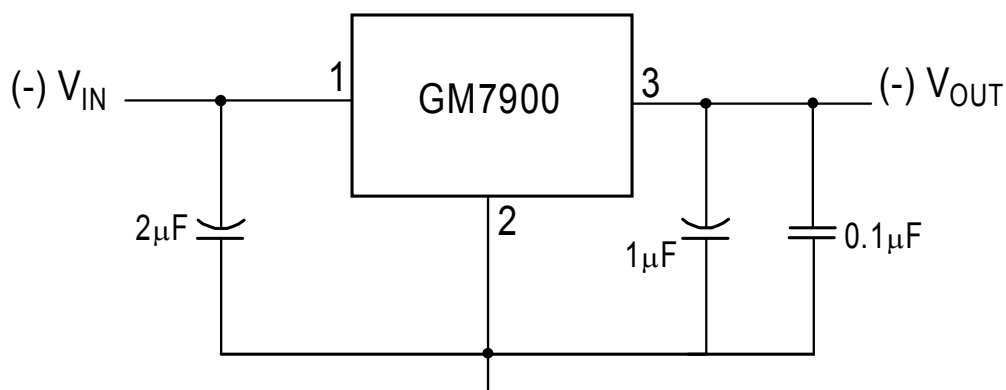
- Post-Regulator Switching DC/DC Converters
- Bias Supply for Analog Circuits
- Instrumentation and Audio Systems
- Logic Systems
- Others too numerous to mention

Absolute Maximum Ratings:

Rating		Value	Unit
Input Voltage	GM7924	-40	V
	All others	-35	
Continuous Total Dissipation at 25°C free-air temperature		2	W
Continuous Total Dissipation at (or below) 25°C case temperature		15	
Operating free-air, case, or virtual junctions Temperature Range		0 to +150	°C
Storage Temperature Range		-65 to +150	
Lead Temperature 1.6mm (1/16 inch) from case for 10 seconds		260	

NEGATIVE VOLTAGE REGULATORS
■ Recommended Operating Conditions

PARAMETER		SYMBOL	MIN	MAX	UNIT
Input Voltage	GM7905	V_I	-7.0	-25.0	V
	GM7906		-8.0	-25.0	
	GM7908		-10.5	-25.0	
	GM7912		-14.5	-30.0	
	GM7915		-17.5	-30.0	
	GM7918		-21.0	-33.0	
	GM7924		-27.0	-38.0	
Output Current		I_o	-	1.5	A
Operating Virtual Junction Temperature		T_J	0	125	°C

TYPICAL APPLICATION


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

NEGATIVE VOLTAGE REGULATORS
■ GM7905 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -10V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Output Voltage**	25°C	-4.8	-5	-5.2	V
	$I_O = 5mA$ to 1A, $V_I = -7V$ to -20V, $P \leq 15W$ 0°C to 125°C	-4.75	-5	-5.25	
Input Regulation	$V_I = -7V$ to -25V		12.5	50	mV
	$V_I = -8V$ to -12V		4	15	
Ripple Rejection	$V_I = -8V$ to -12V, $f = 120Hz$	54	60		dB
Output Regulation	$I_O = 5mA$ to 1.5A		15	100	mV
	$I_O = 250mA$ to 750mA		5	50	
Temperature Coefficient of Output Voltage	$I_O = 5mA$		-0.4		mV/°C
Output Noise Voltage	$f = 10Hz$ to 100kHz		125		μV
Dropout Voltage	$I_O = 1A$		1.1		V
Bias Current			1.5	2	mA
Bias Current change	$V_I = -7V$ to -25V		0.15	0.5	mA
	$I_O = 5mA$ to 1A		0.08	0.5	
Peak Output Current			2.1		A

■ GM7906 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -11V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Output Voltage**	25°C	-5.75	-6	-6.25	V
	$I_O = 5mA$ to 1A, $V_I = -8V$ to -21V, $P \leq 15W$ 0°C to 125°C	-5.7	-6	-6.3	
Input Regulation	$V_I = -8V$ to -25V		12.5	120	mV
	$V_I = -9V$ to -13V		4	60	
Ripple Rejection	$V_I = -9V$ to -19V, $f = 120Hz$	54	60		dB
Output Regulation	$I_O = 5mA$ to 1.5A		15	120	mV
	$I_O = 250mA$ to 750mA		5	60	
Temperature Coefficient of Output Voltage	$I_O = 5mA$		-0.4		mV/°C
Output Noise Voltage	$f = 10Hz$ to 100kHz		150		μV
Dropout Voltage	$I_O = 1A$		1.1		V
Bias Current			1.5	2	mA
Bias Current change	$V_I = -8V$ to -25V		0.15	1.3	mA
	$I_O = 5mA$ to 1A		0.08	0.5	
Peak Output Current			2.1		A

*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.

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NEGATIVE VOLTAGE REGULATORS
■ GM7908 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -14V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		MIN	TYP	MAX	UNIT
Output Voltage**		25°C	-7.7	-8	-8.3	V
	I _O =5mA to 1A, V _I =-10.5V to -23V, P≤15W	0°C to 125°C	-7.6	-8	-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=120Hz	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 Ouput Voltage	I _O =5mA	0°C to 125°C		-0.6		mV/°C
Output Noise Voltage	f = 10Hz to 100kHz	25°C		200		μV
Dropout Voltage	I _O = 1A	25°C		1.1		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	1.0	mA
	I _O =5mA to 1A			0.08	0.5	
Peak Output Current		25°C		2.1		A

■ GM7912 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -19V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		MIN	TYP	MAX	UNIT
Output Voltage**		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=120Hz	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 Ouput 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		1.1		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

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NEGATIVE VOLTAGE REGULATORS
GM7915 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -23V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Output Voltage**	25°C	-14.4	-15	-15.6	V
	$I_O = 5mA$ to 1A, $V_I = -17.5V$ to -30V, $P \leq 15W$ 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	$V_I = -18.5V$ to -28.5V, $f = 120Hz$ 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		1.1		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

GM7918 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -27V$, $I_O = 500mA$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Output Voltage**	25°C	-17.3	-18	-18.7	V
	$I_O = 5mA$ to 1A, $V_I = -21V$ to -33V, $P \leq 15W$ 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, $f = 120Hz$ 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		1.1		V
Bias Current	25°C		2	3	mA
Bias Current change	$V_I = -21V$ to -33V	0°C to 125°C	0.04	1.0	mA
	$I_O = 5mA$ to 1A		0.06	0.5	
Peak Output Current	25°C		2.1		A

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NEGATIVE VOLTAGE REGULATORS
■ GM7924 ELECTRICAL CHARACTERISTICS at specified Junction Temperature
 $V_I = -33V$, $I_O = 500mA$ (unless otherwise noted)

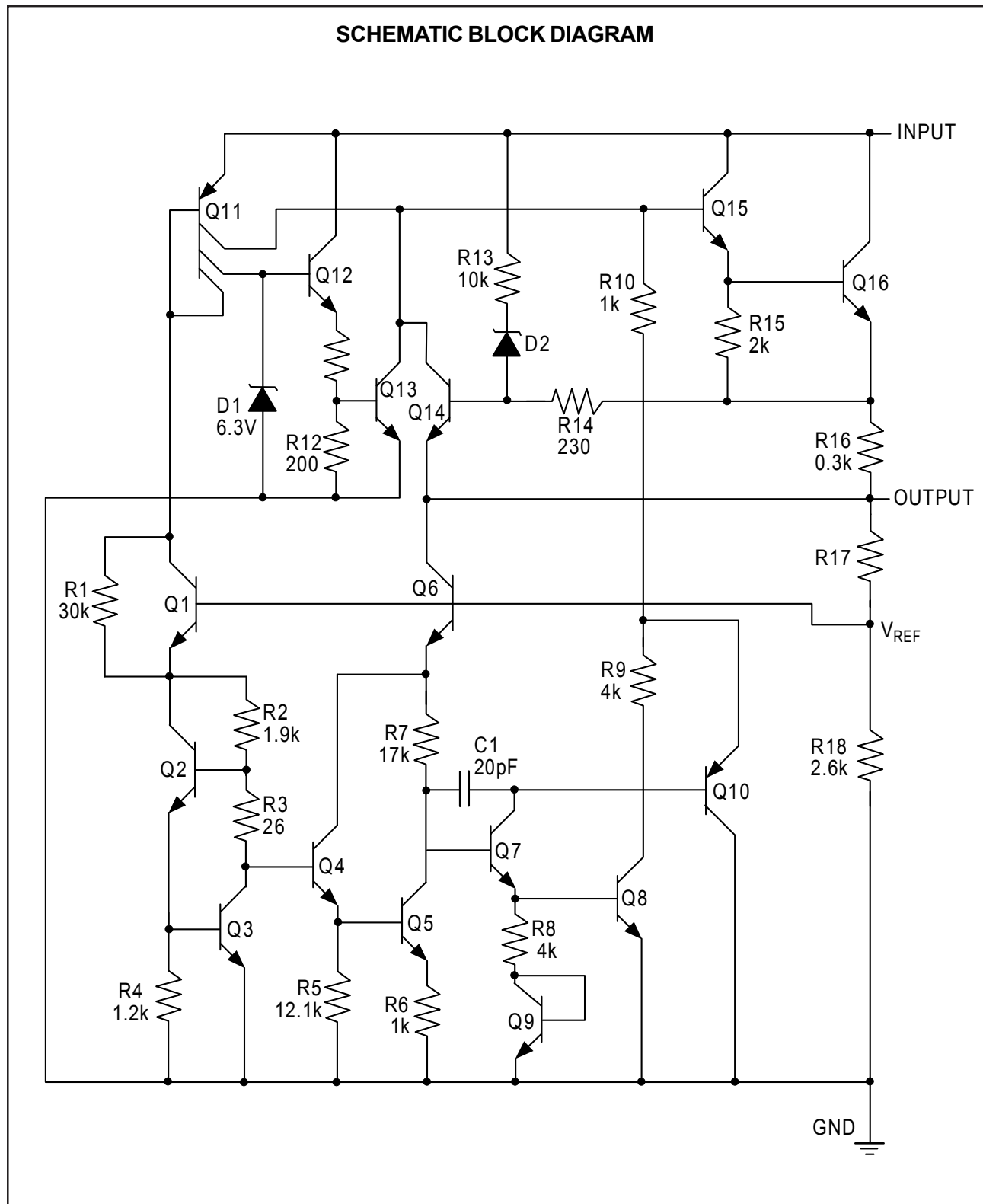
PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Output Voltage**	25°C	-23	-24	-25	V
	$I_O = 5mA$ to 1A, $V_I = -27V$ to -38V, $P \leq 15W$	0°C to 125°C	-22.8	-24	-25.2
Input Regulation	$V_I = -27V$ to -38V	25°C	5	480	mV
	$V_I = -30V$ to -36V		3	240	
Ripple Rejection	$V_I = -28V$ to -38V, $f = 120Hz$	0°C to 125°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	1.1		V
Bias Current		25°C	2	3	mA
Bias Current change	$V_I = -27V$ to -38V	0°C to 125°C	0.04	1.0	mA
	$I_O = 5mA$ to 1A		0.06	0.5	
Peak Output Current		25°C	2.1		A

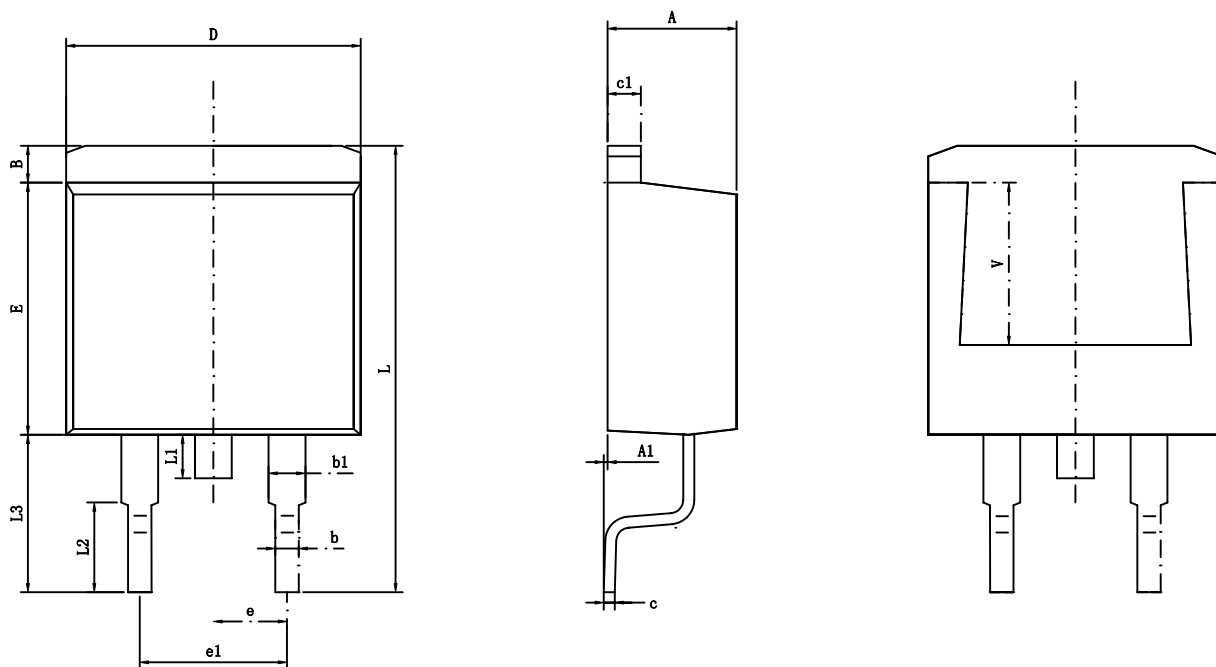
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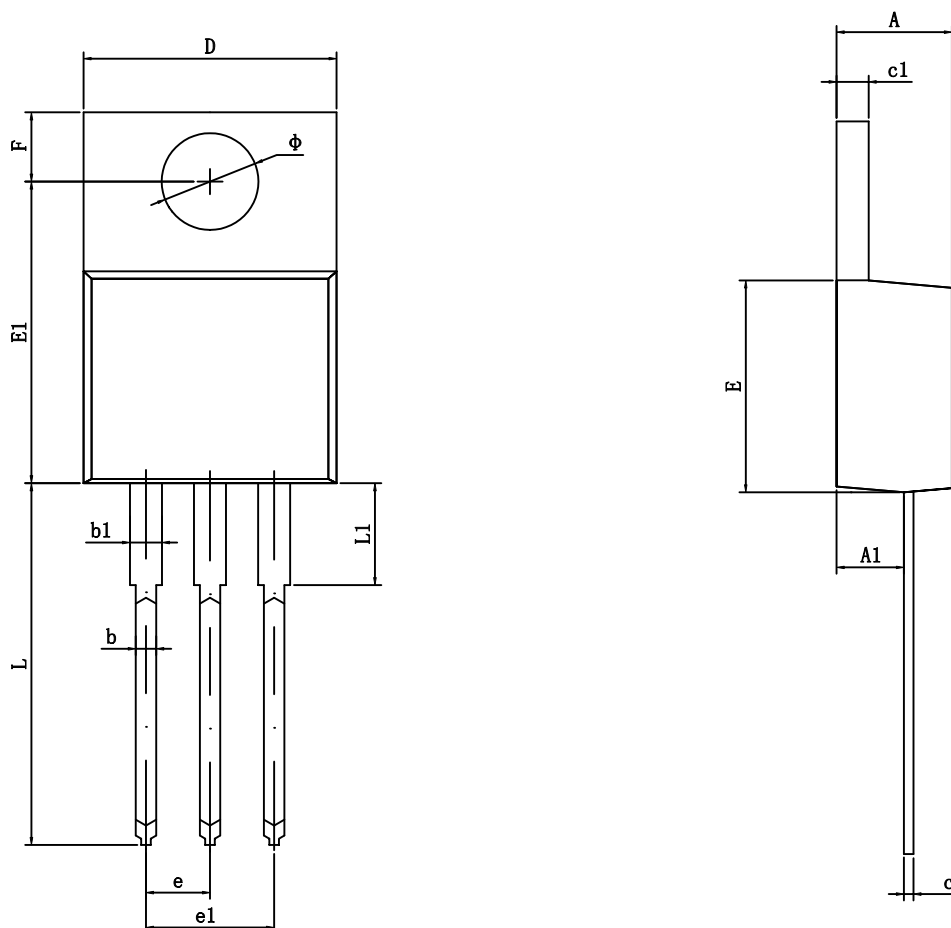
■ ORDERING INFORMATION

	OUTPUT VOLTAGE	PACKAGE		
		TO-263-3	TO-220-3	TO-252-3
GM7900	5V	GM7905-TA3	GM7905-TB3	GM7905-TC3
	6V	GM7906-TA3	GM7906-TB3	GM7906-TC3
	8V	GM7908-TA3	GM7908-TB3	GM7908-TC3
	12V	GM7912-TA3	GM7912-TB3	GM7912-TC3
	15V	GM7915-TA3	GM7915-TB3	GM7915-TC3
	18V	GM7918-TA3	GM7918-TB3	GM7918-TC3
	24V	GM7924-TA3	GM7924-TB3	GM7924-TC3

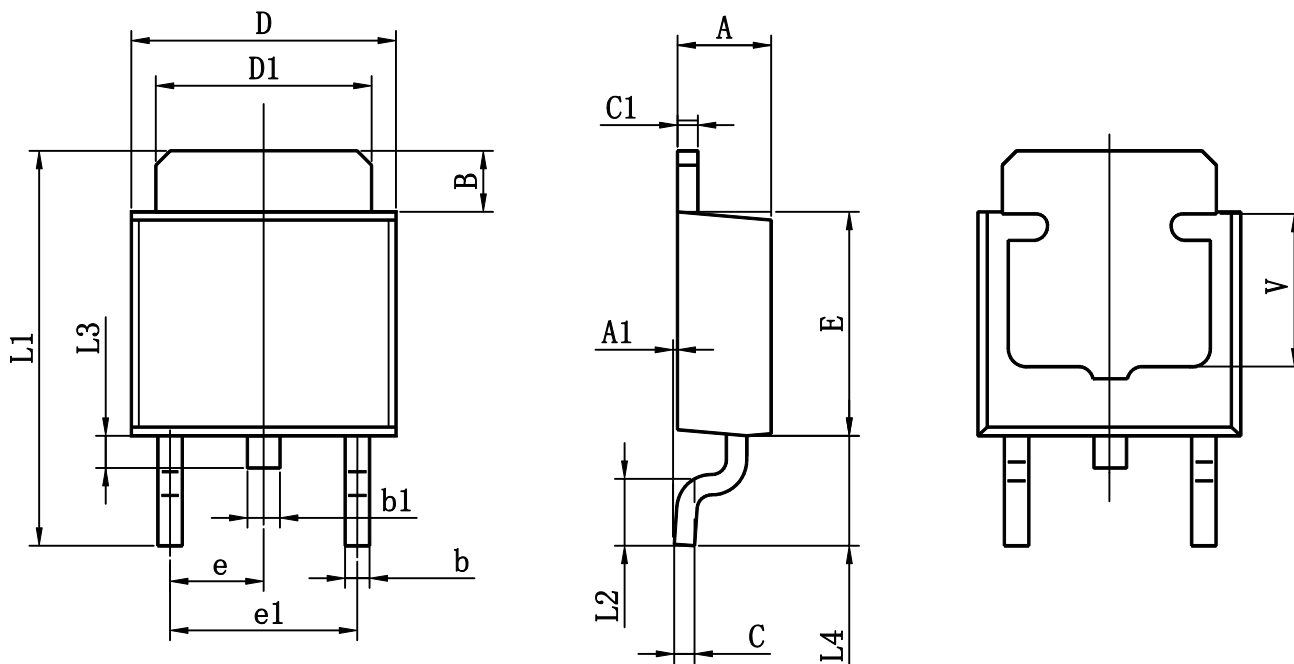
NEGATIVE VOLTAGE REGULATORS


NEGATIVE VOLTAGE REGULATORS
TO-263-2L PACKAGE OUTLINE DIMENSIONS


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.170	1.370	0.046	0.054
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540TYP		0.100TYP	
e1	4.980	5.180	0.196	0.204
L	15.050	15.450	0.593	0.608
L1	1.300	1.700	0.051	0.067
L2	2.340	2.740	0.092	0.108
L3	5.080	5.480	0.200	0.216
V	5.600REF		0.220REF	

NEGATIVE VOLTAGE REGULATORS
TO-220-3L PACKAGE OUTLINE DIMENSIONS


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540TYP		0.100TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
ϕ	3.790	3.890	0.149	0.153

NEGATIVE VOLTAGE REGULATORS
TO-252-2L PACKAGE OUTLINE DIMENSIONS


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300TYP		0.091TYP	
e1	4.500	4.700	0.177	0.185
L1	9.500	9.900	0.374	0.390
L2	1.400	1.780	0.055	0.070
L3	0.650	0.950	0.026	0.037
L4	2.550	2.900	0.100	0.114
V	3.80REF		0.150REF	