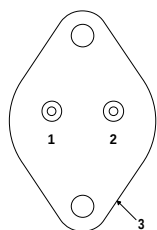
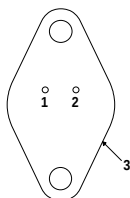


1.5 AMP NEGATIVE VOLTAGE REGULATOR



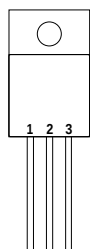
Pin 1 – Ground
Pin 2 – V_{OUT}
Case – V_{IN}

K Package – TO-3



Pin 1 – Ground
Pin 2 – V_{OUT}
Case – V_{IN}

R Package – TO-66

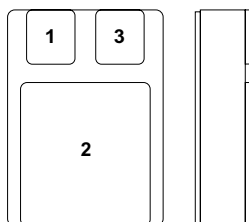


Pin 1 – Ground
Pin 2 – V_{IN}
Pin 3 – V_{OUT}
Case – V_{IN}^*

G Package – TO-257

IG Package– TO-257*

* isolated Case on IG package



Pin 1 – Ground
Pin 2 – V_{IN}
Pin 3 – V_{OUT}

SMD PACKAGE – SMD1

Ceramic Surface Mount

FEATURES

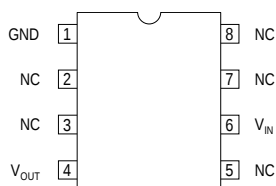
- OUTPUT VOLTAGES OF -12, -15V
- 0.01% / V LINE REGULATION
- 0.3% / A LOAD REGULATION
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SOA PROTECTION
- 1% VOLTAGE TOLERANCE
(–A VERSIONS)

DESCRIPTION

The IP120A / LM120 / IP7900A / IP7900 series of 3 terminal regulators is available with several fixed output voltage making them useful in a wide range of applications.

The A suffix devices 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.



J Package – 8 Pin Cerdip

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

V_I	DC Input Voltage (for $V_O = -12, -15V$)	35V
P_D	Power Dissipation	Internally limited
T_j	Operating Junction Temperature Range	-55 to $150^{\circ}C$
T_{stg}	Storage Temperature	-65 to $150^{\circ}C$

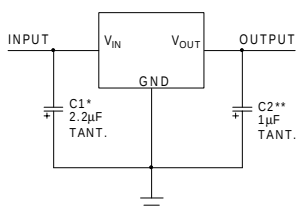
Parameter	Test Conditions	IP7912A IP120A-12			IP7912, IP120-12 LM120-12			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V _O Output Voltage	I _O = 500mA V _{IN} = -19V	-11.88	-12	-12.12	-11.76	-12	-12.24	V
	V _{IN} = -14.8V to -27V P _D ≤ P _{MAX} I _O = 5mA to I _{MAX} T _J = -55 to 150°C	-11.64		-12.36	11.52		-12.48	
V _O Low Supply	I _O = 5mA to I _{MAX} P _D ≤ P _{MAX} V _{IN} = -14.5V to -27V	-11.40		-12.36	-11.40		-12.60	V
ΔV _O Line Regulation	I _O = 0.5 I _{MAX}	V _{IN} = -14.5V to -30V		4	18	4	120	mV
		V _{IN} = -14.8V to -27V T _J = -55 to 150°C		4	18	4	200	
	I _O ≤ I _{MAX} V _{IN} = -16V to -22V	T _J = -55 to 150°C		1	4	1	25	
				2	9	2	60	
ΔV _O Load Regulation	V _{IN} = -19V	I _O = 5mA to 1.5A		12	32	12	80	mV
		I _O = 250mA to 750mA		4	19	4	60	
	V _{IN} = -19V	I _O = 5mA to I _{MAX} T _J = -55 to 150°C		8	60	8	120	
I _Q Quiescent Current	I _O ≤ 0.5 I _{MAX} V _{IN} = -19V	T _J = -55 to 150°C		0.2	0.4	0.2	0.4	mA
				1	2	1	2	
ΔI _Q Quiescent Current Change	I _O = 5mA to I _{MAX} V _{IN} = -19V	T _J = -55 to 150°C		0.2	0.4	0.2	0.4	mA
				0.2	0.5	0.2	0.5	
	I _O ≤ 0.5 I _{MAX}	V _{IN} = -14.5V to -30V		0.1	0.4	0.1	0.4	
		V _{IN} = -15V to -30V T _J = -55 to 150°C		0.1	0.5	0.1	1.0	
V _N Output Noise Voltage	f = 10Hz to 100kHz V _{IN} = -19V		75	960		75	960	μV
$\frac{\Delta V_{IN}}{\Delta V_O}$ Ripple Rejection	f = 120Hz V _{IN} = -15V to -25V	I _O ≤ I _{MAX}		58	72	56	72	dB
		I _O ≤ 0.5 I _{MAX} T _J = -55 to 150°C		58	72	56	72	
Dropout Voltage	I _O = I _{MAX}		1.1	2.3		1.1	2.3	V
R _O Output Resistance	f = 1 kHz		8			8		mΩ
I _{sc} Short Circuit Current	V _{IN} = -35V		0.6	1.2		0.6	1.2	A
I _{pk} Peak Output Current	V _{IN} = -19V		2.4	3.3		2.4	3.3	
Average Temperature Coefficient of V _O	I _O = 5mA		0.5	4.8		0.5	4.8	mV/°C
Input Voltage required to maintain line regulation	I _O ≤ I _{MAX}		-14.5			-14.5		V

- 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.
- Test Conditions unless otherwise stated: P_{MAX} = 10W for TO-220SM, P_{MAX} = 1W for Cerdip, P_{MAX} = 20W for all other package devices
I_{MAX} = 1.0A, T_J = 25°C

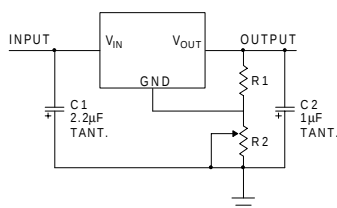
Parameter		Test Conditions		IP7915A IP120A–15			IP7915, IP120–15 LM120–15			Units		
				Min.	Typ.	Max.	Min.	Typ.	Max.			
V _O Output Voltage	I _O = 500mA V _{IN} = -23V		-14.85	-15	-15.15	-14.7	-15	-15.3	V			
	V _{IN} = -17.9V to -30V P _D ≤ P _{MAX} I _O = 5mA to I _{MAX} T _J = -55 to 150°C		-14.55		-15.45		-14.4 -15.6					
	V _O Low Supply		I _O = 5mA to I _{MAX} P _D ≤ P _{MAX} V _{IN} = -17.5V to -30V		-14.25		-15.45			-14.25 -15.75		V
ΔV _O Line Regulation	I _O = 0.5 I _{MAX}	V _{IN} = -17.5V to -30V		4		22		4		150		mV
		V _{IN} = -17.9V to -30V T _J = -55 to 150°C		4		22		4		250		
	I _O ≤ I _{MAX}		2		10		2		75			
	V _{IN} = -20V to -26V T _J = -55 to 150°C		5		30		5		150			
ΔV _O Load Regulation	V _{IN} = -23V	I _O = 5mA to 1.5A		12		35		12		80		mV
		I _O = 250mA to 750mA		4		21		4		75		
	V _{IN} = -23V I _O = 5mA to I _{MAX} T _J = -55 to 150°C		9		75		9		150			
I _Q Quiescent Current	I _O ≤ 0.5 I _{MAX}		1		1.9		1		1.9		mA	
	V _{IN} = -23V T _J = -55 to 150°C		1		2		1		2			
ΔI _Q Quiescent Current Change	I _O = 5mA to I _{MAX}		0.2		0.4		0.2		0.4		mA	
	V _{IN} = -23V	T _J = -55 to 150°C		0.2		0.5		0.2		0.5		
		V _{IN} = -17.5V to -30V		0.1		0.4		0.1		0.4		
	I _O ≤ 0.5 I _{MAX}		V _{IN} = -18.5V to -30V T _J = -55 to 150°C		0.1		0.5		0.1			1.0
V _N Output Noise Voltage	f = 10Hz to 100kHz V _{IN} = -23V		90		1200		90		1200		μV	
$\frac{\Delta V_{IN}}{\Delta V_O}$ Ripple Rejection	f = 120Hz	I _O ≤ I _{MAX}	56	70		54	70		dB			
	V _{IN} = -18.5V to -28.5V	I _O ≤ 0.5 I _{MAX} T _J = -55 to 150°C	56	70		54	70					
Dropout Voltage		I _O = I _{MAX}	1.1		2.3		1.1		2.3		V	
R _O Output Resistance	f = 1 kHz		9				9				mΩ	
I _{sc} Short Circuit Current	V _{IN} = -35V		0.6		1.2		0.6		1.2		A	
I _{pk} Peak Output Current	V _{IN} = -23V		2.4		3.3		2.4		3.3			
Average Temperature Coefficient of V _O		I _O = 5mA	0.6		6		0.6		6		mV/°C	
Input Voltage required to maintain line regulation		I _O ≤ I _{MAX}	-17.5				-17.5				V	

- 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.
- Test Conditions unless otherwise stated: P_{MAX} = 10W for TO-220SM, P_{MAX} = 1W for Cerdip, P_{MAX} = 20W for all other package devices
I_{MAX} = 1.0A, T_J = 25°C

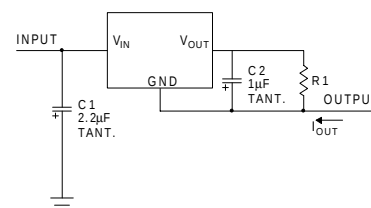
APPLICATIONS INFORMATION



Fixed Output Regulator



Adjustable Output Regulator



Current Regulator

* Required if the regulator is located far from the power supply.

** Required for stability. 25mF electrolytic may be substituted.

$$V_{OUT} \approx V_{REG} \frac{(R1+R2)}{R1}$$

$$I_{OUT} = \frac{V_{REG}}{R1} + I_Q$$

Order Information

Part Number	K-Pack (TO-3)	R-Pack (TO-66)	G/IG-Pack (TO-257)	SG-Pack SMD1	J-Pack 8 Pin Cerdip	Temp. Range	Note: To order, add the package identifier to the part number. eg. IP7912AK IP120SMD-15
IP7900A	4	4	4	4	4	-55 to +150°C	
IP7900	4	4	4	4	4	"	
IP120A	4	4	4	4	4	"	
IP120	4	4	4	4	4	"	
LM120	4	4	4	4	4	"	