

### Descriptions

This series of fixed-negative-voltage monolithic integrated-circuit voltage regulators is designed to complement series S7800 in a wide range of applications. These applications include on-card regulator for elimination of noise and distribution problems associated with single point regulations. Each of these regulators can deliver up to 1.0 amperes of output current. The internal current Limiting and thermal shutdown features of these regulators make them essentially immune to overload. In addition to use as fixed-voltage regulators, these device can be used with external components to obtain adjustable output voltages and also as the power pass element in precision regulators.

### Features

- Output Current UP to 1.0A
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- No External Components
- Output Transistor Safe-Area Compensations

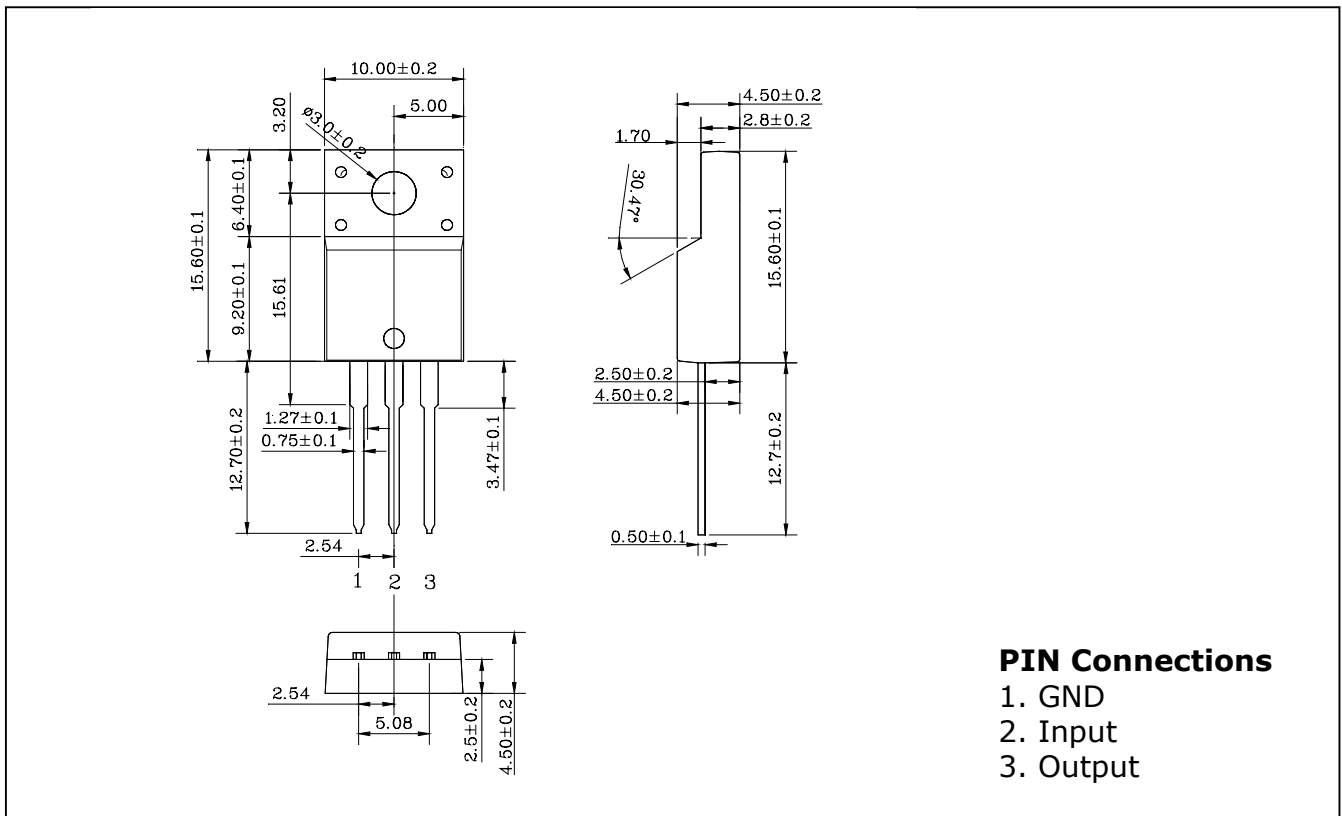
### Ordering Information

Type NO.	Marking	Package Code
S79xxPI	S79□□PI	TO-220F

□□: Voltage Code (05:-5V, 08:-8V, 09:-9V,12:-12V,15:-15V)

### Outline Dimensions

unit : mm



#### PIN Connections

1. GND
2. Input
3. Output

## Absolute Maximum Ratings

Ta=25°C

Characteristic	Symbol	Ratings	Unit
Operating Input voltage	$V_{IN}$	-35	V
Power Dissipation (Tc=25°C)	$P_D$	20.8	W
Power Dissipation (without Heatsink)	$P_D$	2.0	W
Operating Junction Temperature	$T_J$	-30 ~ 125	°C
Storage Temperature	$T_{STG}$	-55 ~ 150	°C

## Electrical Characteristics

(T<sub>j</sub> = 0 to 125°C, Vin = -10V, Iout=500mA, unless otherwise specified.)

Characteristic	Symbol	Test Condition	S7905PI			Unit	
			Min.	Typ.	Max.		
Output Voltage	$V_{OUT}$	$T_j = 25^\circ\text{C}$	-4.8	-5.0	-5.2	V	
		$I_{OUT}=5\text{mA} \sim 1\text{A}$ $V_{IN}=-7.0\text{V} \sim -20\text{V}, P_D \leq 15\text{W}$	-4.75	-5.0	-5.25		
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=-7.0\text{V} \sim -25\text{V}$	-	12.5	50	mV	
		$V_{IN}=-8.0\text{V} \sim -12\text{V}$	-	4	15		
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5\text{mA} \sim 1.0\text{A}$	-	15	100	mV	
		$I_{OUT}=250\text{mA} \sim 750\text{mA}$	-	5	50		
Quiescent Current	$I_B$	$T_j = 25^\circ\text{C}$	-	1.5	2.0	mA	
Quiescent Current Change	$\Delta I_B$	$V_{IN} = -7.0\text{V} \sim -25\text{V}$	-	0.15	0.5	mA	
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$	-	0.08	0.5		
Output Noise Voltage	$V_N$	$f=10\text{Hz} \sim 100\text{KHz}$	$T_j = 25^\circ\text{C}$	-	125	-	$\mu\text{V}_{rms}$
Ripple Rejection Ratio	RR	$f=120\text{Hz}, V_{IN}=-8.0\text{V} \sim -18\text{V}$		54	60	-	dB
Dropout Voltage	$V_D$	$I_{OUT}=1\text{A}$	$T_j = 25^\circ\text{C}$	-	2.0	-	V
Temperature coefficient of output Voltage Drift	$T_{CVO}$	$I_{OUT}=5\text{mA}$		-	-0.4	-	mV/°C
Peak Output Current	$I_{PK}$		$T_j = 25^\circ\text{C}$	-	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 separately.

## Electrical Characteristics

( $T_j = 0$  to  $125^\circ\text{C}$ ,  $V_{in} = -14\text{V}$ ,  $I_{out} = 500\text{mA}$ , unless otherwise specified.)

Characteristic	Symbol	Test Condition		S7908PI			Unit
				Min.	Typ.	Max.	
Output Voltage	$V_{OUT}$		$T_j = 25^\circ\text{C}$	-7.7	-8.0	-8.3	V
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$ $V_{IN} = -10.5\text{V} \sim -23\text{V}$ , $P_D \leq 15\text{W}$		-7.6	-8.0	-8.4	
Line Regulation	$\Delta V_{OUT}$	$V_{IN} = -10.5\text{V} \sim -25\text{V}$	$T_j = 25^\circ\text{C}$	-	12.5	160	mV
		$V_{IN} = -11.0\text{V} \sim -17\text{V}$		-	4	80	
Load Regulation	$\Delta V_{OUT}$	$I_{OUT} = 5\text{mA} \sim 1.0\text{A}$	$T_j = 25^\circ\text{C}$	-	15	160	mV
		$I_{OUT} = 250\text{mA} \sim 750\text{mA}$		-	5	80	
Quiescent Current	$I_B$		$T_j = 25^\circ\text{C}$	-	1.5	2.0	mA
Quiescent Current Change	$\Delta I_B$	$V_{IN} = -10.5\text{V} \sim -25\text{V}$		-	0.15	1.0	mA
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$		-	0.08	0.5	
Output Noise Voltage	$V_N$	$f = 10\text{Hz} \sim 100\text{KHz}$	$T_j = 25^\circ\text{C}$	-	200	-	$\mu\text{V}_{rms}$
Ripple Rejection Ratio	RR	$f = 120\text{Hz}$ , $V_{IN} = -11.5\text{V} \sim -21.5\text{V}$		54	60	-	dB
Dropout Voltage	$V_D$	$I_{OUT} = 1\text{A}$	$T_j = 25^\circ\text{C}$	-	2.0	-	V
Temperature coefficient of output Voltage Drift	$T_{CVO}$	$I_{OUT} = 5\text{mA}$	$T_j = 25^\circ\text{C}$	-	-0.6	-	$\text{mV}/^\circ\text{C}$
Peak Output Current	$I_{PK}$		$T_j = 25^\circ\text{C}$	-	2.1	-	A

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## Electrical Characteristics

( $T_j = 0$  to  $125^\circ\text{C}$ ,  $V_{in} = -15\text{V}$ ,  $I_{out} = 500\text{mA}$ , unless otherwise specified.)

Characteristic	Symbol	Test Condition		S7909PI			Unit
				Min.	Typ.	Max.	
Output Voltage	$V_{OUT}$		$T_j = 25^\circ\text{C}$	-8.70	-9.0	-9.30	V
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$ $V_{IN} = -11.5\text{V} \sim -23\text{V}$ , $P_D \leq 15\text{W}$		-8.60	-9.0	-9.40	
Line Regulation	$\Delta V_{OUT}$	$V_{IN} = -10.5\text{V} \sim -25\text{V}$	$T_j = 25^\circ\text{C}$	-	10	180	mV
		$V_{IN} = -110\text{V} \sim -17\text{V}$		-	5	90	
Load Regulation	$\Delta V_{OUT}$	$I_{OUT} = 5\text{mA} \sim 1\text{A}$	$T_j = 25^\circ\text{C}$	-	12	180	mV
		$I_{OUT} = 250\text{mA} \sim 750\text{mA}$		-	4	90	
Quiescent Current	$I_B$		$T_j = 25^\circ\text{C}$	-	3	6	mA
Quiescent Current Change	$\Delta I_B$	$V_{IN} = -11.5\text{V} \sim -25\text{V}$		-	0.1	1.0	mA
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$		-	0.08	0.5	
Output Noise Voltage	$V_N$	$f = 10\text{Hz} \sim 100\text{KHz}$	$T_j = 25^\circ\text{C}$	-	175	-	$\mu\text{V}_{rms}$
Ripple Rejection Ratio	RR	$f = 120\text{Hz}$ , $V_{IN} = -9.0\text{V} \sim -19\text{V}$		54	60	-	dB
Dropout Voltage	$V_D$	$I_{OUT} = 1\text{A}$	$T_j = 25^\circ\text{C}$	-	2.0	-	V
Temperature coefficient of output Voltage Drift	$T_{CVO}$	$I_{OUT} = 5\text{mA}$	$T_j = 25^\circ\text{C}$	-	-0.4	-	$\text{mV}/^\circ\text{C}$
Peak Output Current	$I_{PK}$		$T_j = 25^\circ\text{C}$	-	2.1	-	A

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## Electrical Characteristics

( $T_j = 0$  to  $125^\circ\text{C}$ ,  $V_{in} = -19\text{V}$ ,  $I_{out} = 500\text{mA}$ , unless otherwise specified.)

Characteristic	Symbol	Test Condition		S7912PI			Unit
				Min.	Typ.	Max.	
Output Voltage	$V_{OUT}$		$T_j = 25^\circ\text{C}$	-11.5	-12.0	-12.5	V
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$ $V_{IN} = -14.5\text{V} \sim -27\text{V}$ , $P_D \leq 15\text{W}$		-11.4	-12.0	-12.6	
Line Regulation	$\Delta V_{OUT}$	$V_{IN} = -14.5\text{V} \sim -30\text{V}$	$T_j = 25^\circ\text{C}$	-	5	80	mV
		$V_{IN} = -16.0\text{V} \sim -22\text{V}$		-	3	30	
Load Regulation	$\Delta V_{OUT}$	$I_{OUT} = 5\text{mA} \sim 1.0\text{A}$	$T_j = 25^\circ\text{C}$	-	15	200	mV
		$I_{OUT} = 250\text{mA} \sim 750\text{mA}$		-	5	75	
Quiescent Current	$I_B$		$T_j = 25^\circ\text{C}$	-	2.0	3.0	mA
Quiescent Current Change	$\Delta I_B$	$V_{IN} = -14.5\text{V} \sim -30\text{V}$		-	0.04	0.5	mA
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$		-	0.08	0.5	
Output Noise Voltage	$V_N$	$f = 10\text{Hz} \sim 100\text{KHz}$ ,	$T_j = 25^\circ\text{C}$	-	300	-	$\mu\text{V}_{rms}$
Ripple Rejection Ratio	RR	$f = 120\text{Hz}$ , $V_{IN} = -15\text{V} \sim -25\text{V}$		54	60	-	dB
Dropout Voltage	$V_D$	$I_{OUT} = 1\text{A}$	$T_j = 25^\circ\text{C}$	-	2.0	-	V
Temperature coefficient of output Voltage Drift	$T_{CVO}$	$I_{OUT} = 5\text{mA}$	$T_j = 25^\circ\text{C}$	-	-0.8	-	$\text{mV}/^\circ\text{C}$
Peak Output Current	$I_{PK}$		$T_j = 25^\circ\text{C}$	-	2.1	-	A

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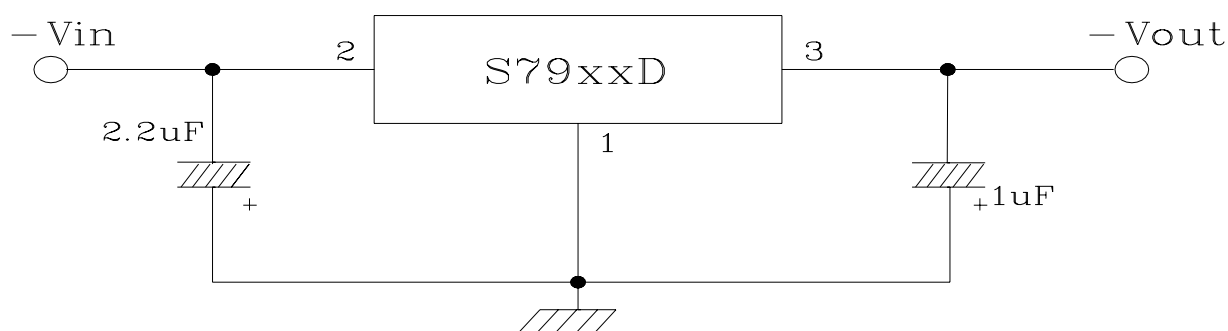
## Electrical Characteristics

( $T_j = 0$  to  $125^\circ\text{C}$ ,  $V_{in} = -23\text{V}$ ,  $I_{out} = 500\text{mA}$ , unless otherwise specified.)

Characteristic	Symbol	Test Condition	S7915PI			Unit
			Min.	Typ.	Max.	
Output Voltage	$V_{OUT}$	$T_j = 25^\circ\text{C}$	-14.4	-15.0	-15.6	V
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$ $V_{IN} = -17.5\text{V} \sim -30\text{V}$ , $P_D \leq 15\text{W}$	-14.25	-15.0	-15.75	
Line Regulation	$\Delta V_{OUT}$	$V_{IN} = -17.5\text{V} \sim -30\text{V}$	-	5	100	mV
		$V_{IN} = -20\text{V} \sim -26\text{V}$	-	3	50	
Load Regulation	$\Delta V_{OUT}$	$I_{OUT} = 5\text{mA} \sim 1.0\text{A}$	-	15	200	mV
		$I_{OUT} = 250\text{mA} \sim 750\text{mA}$	-	5	75	
Quiescent Current	$I_B$	$T_j = 25^\circ\text{C}$	-	2.0	3.0	mA
Quiescent Current Change	$\Delta I_B$	$V_{IN} = -17.5\text{V} \sim -30\text{V}$	-	0.04	0.5	mA
		$I_{OUT} = 5\text{mA} \sim 1\text{A}$	-	0.08	0.5	
Output Noise Voltage	$V_N$	$f = 10\text{Hz} \sim 100\text{KHz}$ , $T_j = 25^\circ\text{C}$	-	375	-	$\mu\text{V}_{\text{rms}}$
Ripple Rejection Ratio	RR	$f = 120\text{Hz}$ , $V_{IN} = -18.5\text{V} \sim -28.5\text{V}$	54	60	-	dB
Dropout Voltage	$V_D$	$I_{OUT} = 1\text{A}$ , $T_j = 25^\circ\text{C}$	-	2.0	-	V
Temperature coefficient of output Voltage Drift	$T_{CVO}$	$I_{OUT} = 5\text{mA}$ , $T_j = 25^\circ\text{C}$	-	-1.0	-	$\text{mV}/^\circ\text{C}$
Peak Output Current	$I_{PK}$	$T_j = 25^\circ\text{C}$	-	2.1	-	A

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### Test circuit



## Electrical Characteristic Curves

Fig. 1  $V_{OUT} - V_{IN}$

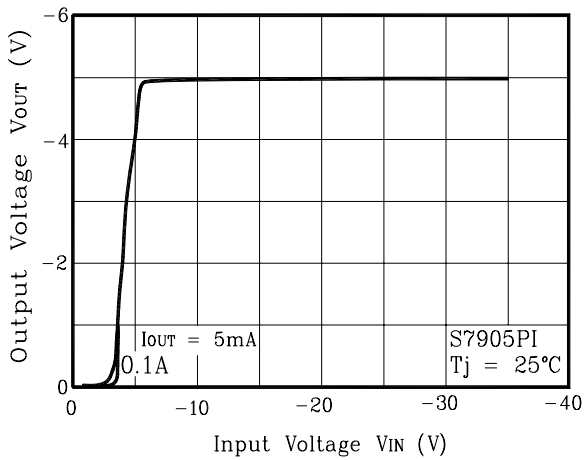


Fig. 2 Dropout - Voltage

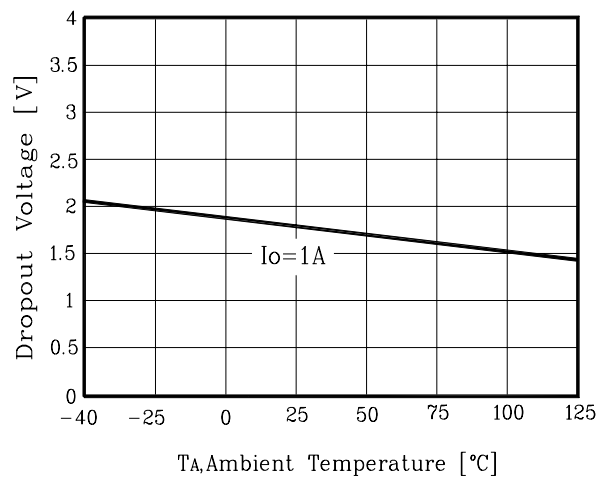


Fig. 3  $I_B - T_j$

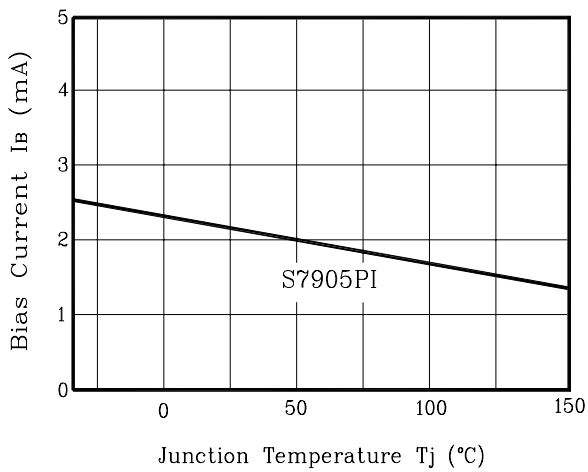


Fig. 4  $V_{OUT} - T_j$

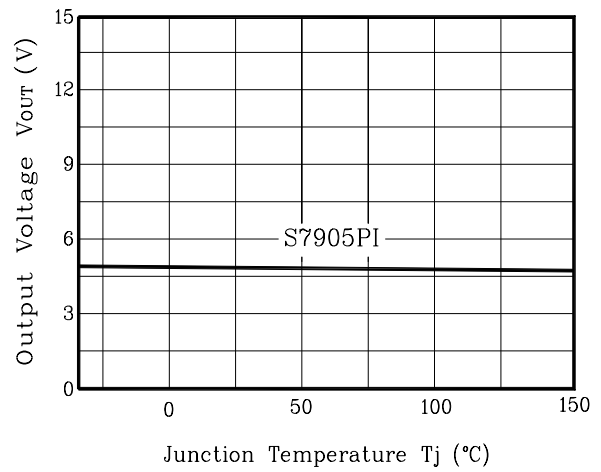
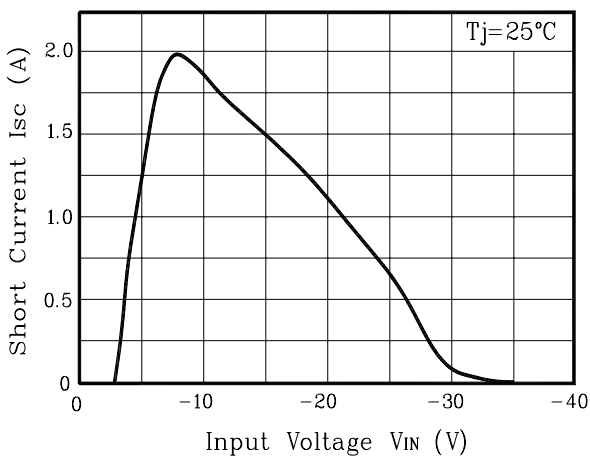


Fig. 5  $I_{SC} - V_{IN}$



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