

## 3-Terminal Fixed Negative Voltage Regulator

### ❖ GENERAL DESCRIPTION

The AX7905/12 series of fixed output negative voltage regulators are intended as complements to the popular TS7800 series device. These negative regulators are available in the same seven-voltage options as the AX7905/12 devices. In addition, one extra voltage option commonly employed in MECL systems is also available in the negative AX7905/12 Series. Available in fixed output voltage options from -5.0 to -24 volts, these regulators employ current limiting, thermal shutdown, and safe-area compensation--making them remarkably rugged under most operating conditions. With adequate heat sinking they can deliver output currents in excess of 1 ampere.

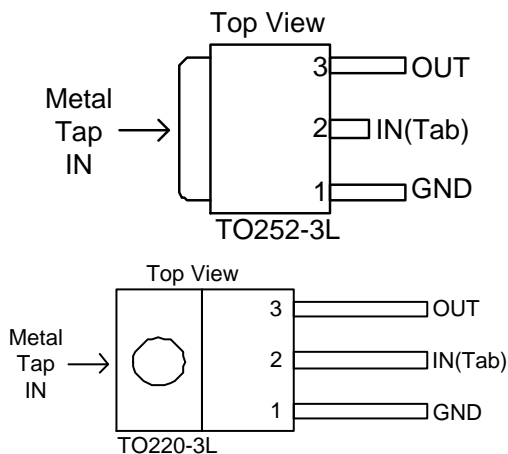
This series is offered in 3-pin TO-220 and TO252 package.

### ❖ FEATURES

- Output Voltage: -5 and -12V
- Output current up to 1A
- No external components required
- Internal thermal overload protection
- Internal short-circuit current limiting
- Output transistor safe-area compensation
- Output voltage offered in 4% tolerance

### ❖ PIN ASSIGNMENT

The packages of AX7905/12 are TO220-3L and TO252-3L; the pin assignment is given by:



Name	Description
<b>GND</b>	Grand
<b>IN (Tab)</b>	Voltage Input
<b>OUT</b>	Voltage Output

❖ **ORDER/MARKING INFORMATION**

Order Information	Top Marking
<p style="text-align: center;"><b>AX79XX X X</b></p> <pre>       graph TD       A[AX79XX X X] --- B[Product]       A --- C[Package]       A --- D[Packing]       B --- B1[05: AX7905]       B --- B2[12: AX7912]       C --- C1[D : TO252-3L]       C --- C2[T : TO220-3L]       D --- D1[Blank : Tube]       D --- D2[A : Taping]           </pre> <p><b>Product</b> 05: AX7905 12: AX7912</p> <p><b>Package</b> D : TO252-3L T : TO220-3L</p> <p><b>Packing</b> Blank : Tube A : Taping</p>	<p>Logo ← <b>AX</b> 7 9 X X → Part number 05: AX7905 12: AX7912</p> <p>Y Y W W X → ID code: internal → WW: 01~52 → Year : 10 = 2010 11 = 2011</p>

❖ **ABSOLUTE MAXIMUM RATINGS**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristics	Symbol	Rating	Unit
Input Voltage	$V_{IN}$	-35	V
Power Dissipation	$P_D$	Internal Limited	W
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-65~+150	$^\circ\text{C}$
Thermal Resistance - Junction to Case	TO220-3L	5	$^\circ\text{C/W}$
	TO252-3L	10	
Thermal Resistance - Junction to Ambient	TO220-3L	45	$^\circ\text{C/W}$
	TO252-3L	55	

**Note:** Follow the derating curve

**❖ ELECTRICAL CHARACTERISTICS**

<b>AX7905 Electrical Characteristics</b> ( $V_{IN}=10V$ , $I_{OUT}=500mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$ , $C_{IN}=0.33\mu F$ , $C_{OUT}=0.1\mu F$ ; unless otherwise specified.)							
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Output voltage	$V_{OUT}$	$T_j=25^{\circ}C$	-4.80	-5	-5.20	V	
		$-7.5V \leq V_{IN} \leq -20V$ , $10mA \leq I_{OUT} \leq 1A$ , $PD \leq 15W$	-4.75	-5	-5.25		
Line Regulation	$RE_{Gline}$	$T_j=25^{\circ}C$	$-7.5V \leq V_{IN} \leq -25V$	-	3	100	mV
			$-8V \leq V_{IN} \leq -12V$	-	1	50	
Load Regulation	$RE_{Gload}$	$T_j=25^{\circ}C$	$10mA \leq I_{OUT} \leq 1A$	-	15	100	
			$250mA \leq I_{OUT} \leq 750mA$	-	5	50	
Quiescent Current	$I_q$	$I_{OUT}=0$ , $T_j=25^{\circ}C$	-	4	8	mA	
Quiescent Current Change	$\Delta I_q$	$-7.5V \leq V_{IN} \leq -25V$	-	--	1.3		
		$10mA \leq I_{OUT} \leq 1A$	-	--	0.5		
Output Noise Voltage	$V_n$	$10Hz \leq f \leq 100KHz$ , $T_j=25^{\circ}C$	-	40	-	$\mu V$	
Ripple Rejection Ratio	RR	$f=120Hz$ , $-8V \leq V_{IN} \leq -18V$	62	74	-	dB	
Voltage Drop	$V_{drop}$	$I_{OUT}=1A$ , $T_j=25^{\circ}C$	--	2	-	V	
Output Short Circuit Current	$I_{OS}$	$T_j=2^{\circ}C$	-	750	-	mA	
Peak Output Current	$I_{o peak}$	$T_j=25^{\circ}C$	-	2.1	-	A	
Temperature Coefficient of Output Voltage	$\Delta V_{OUT} / \Delta T_j$	$I_{OUT}=10mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-0.1	-	$mV / ^{\circ}C$	

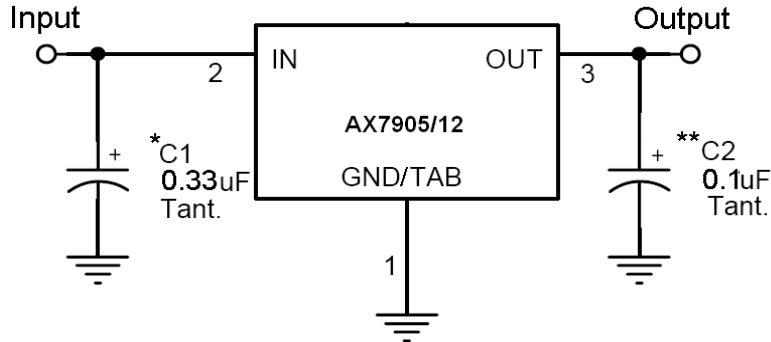
### ❖ ELECTRICAL CHARACTERISTICS (CONTINUE)

AX7912 Electrical Characteristics							
(V <sub>IN</sub> =-19V, I <sub>OUT</sub> =500mA, 0°C ≤T <sub>j</sub> ≤125°C, C <sub>IN</sub> =0.33uF, C <sub>OUT</sub> =0.1uF; unless otherwise specified.)							
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	V <sub>OUT</sub>	T <sub>j</sub> =25°C	-11.53	-12	-12.48	V	
		-14.5V ≤ V <sub>IN</sub> ≤ -27V, 10mA ≤ I <sub>OUT</sub> ≤ 1A, PD ≤ 15W	-11.42	-12	-12.60		
Line Regulation	RE <sub>Gline</sub>	T <sub>j</sub> =25°C	-14.5V ≤ V <sub>IN</sub> ≤ -30V	-	10	240	mV
			-15V ≤ V <sub>IN</sub> ≤ -19V	-	3	120	
Load Regulation	RE <sub>Gload</sub>	T <sub>j</sub> =25°C	10mA ≤ I <sub>OUT</sub> ≤ 1A	-	12	240	
			250mA ≤ I <sub>OUT</sub> ≤ 750mA	-	4	120	
Quiescent Current	I <sub>q</sub>	T <sub>j</sub> =25°C, I <sub>OUT</sub> =0	-	4.3	8	mA	
Quiescent Current Change	ΔI <sub>q</sub>	-14.5V ≤ V <sub>IN</sub> ≤ -30V	-	-	1		
		10mA ≤ I <sub>OUT</sub> ≤ 1A	-	-	0.5		
Output Noise Voltage	V <sub>n</sub>	10Hz ≤ f ≤ 100KHz, T <sub>j</sub> =25°C	-	75	-	uV	
Ripple Rejection Ratio	RR	f=120Hz, -15V ≤ V <sub>IN</sub> ≤ -25V	55	70	-	dB	
Voltage Drop	V <sub>drop</sub>	I <sub>OUT</sub> =1A, T <sub>j</sub> =25°C	-	2	-	V	
Output Short Circuit Current	I <sub>os</sub>	T <sub>j</sub> =25°C	-	350	-	mA	
Peak Output Current	I <sub>o peak</sub>	T <sub>j</sub> =25°C	-	2.1	-	A	
Temperature Coefficient of Output Voltage	ΔV <sub>OUT</sub> / ΔT <sub>j</sub>	I <sub>OUT</sub> =10mA, 0°C ≤ T <sub>j</sub> ≤ 125°C	-	-1	-	mV/°C	

**Note1:** Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.

**Note2:** This specification applies only for DC power dissipation permitted by absolute maximum ratings.

❖ APPLICATION CIRCUIT



**Note1:** A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the Input ripple voltage.

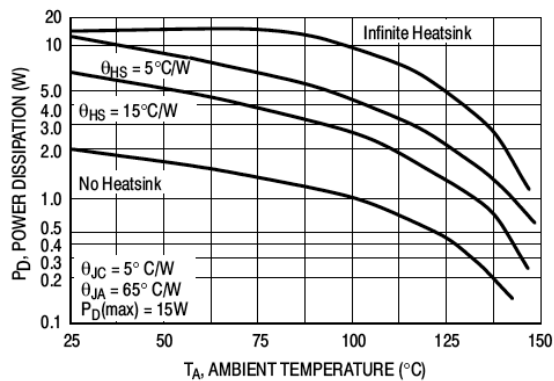
**Note2:** XX = these two digits of the type number indicate voltage.

\* = Cin is required if regulator is located an appreciable distance from power supply filter.

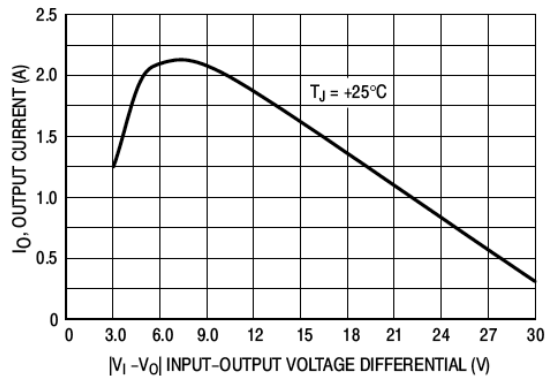
\*\* = Co is not needed for stability; however, it does improve transient response.

❖ TYPICAL CHARACTERISTICS

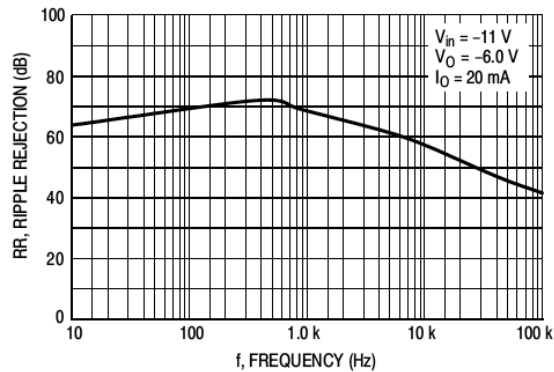
Worse Case Power Dissipation as a Function of Ambient Temperature



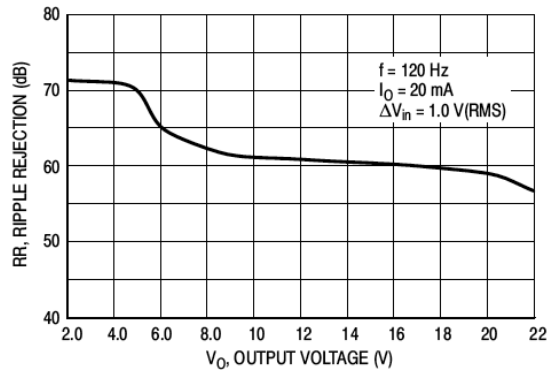
Peak Output Current as a Function of Input-Output Differential Voltage



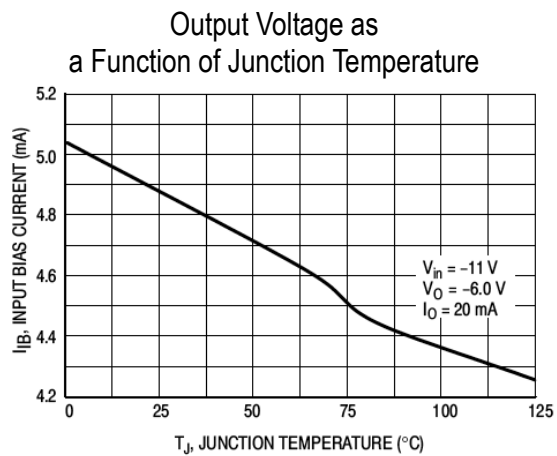
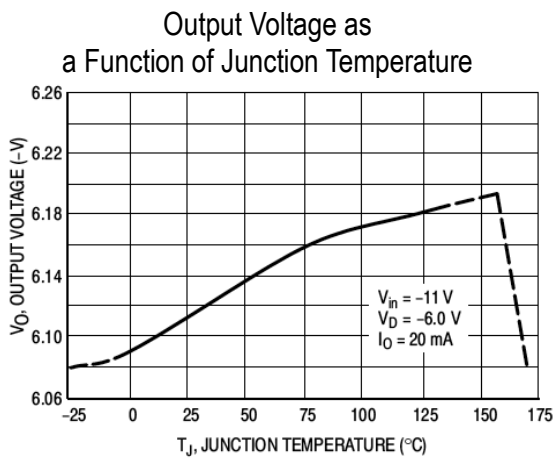
Ripple Rejection as a Function of Frequency



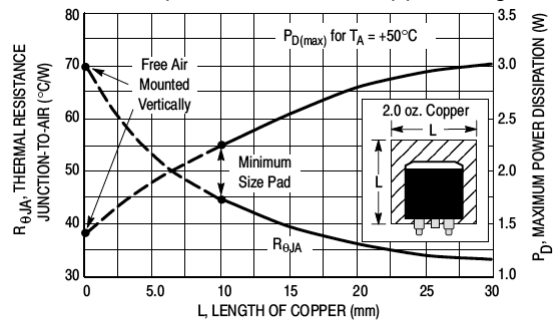
Ripple Rejection as a Function of Output Voltage



❖ TYPICAL CHARACTERISTICS

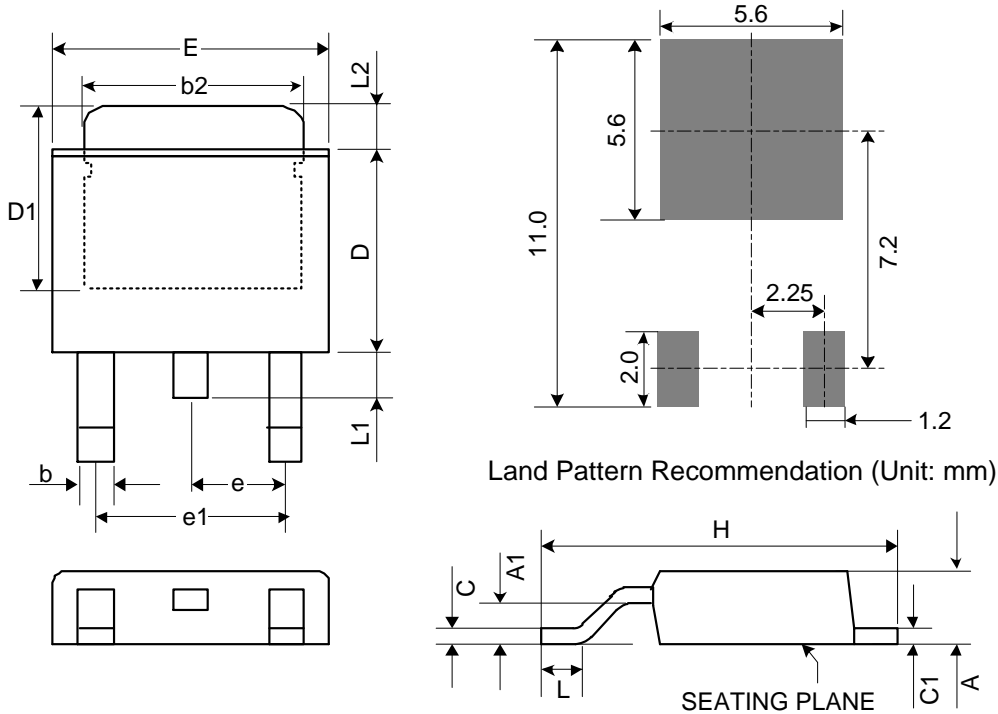


D<sup>2</sup>PAK Thermal Resistance and Maximum Power Dissipation vs. P.C.B Copper Length



❖ PACKAGE OUTLINES

(1) TO252-3L

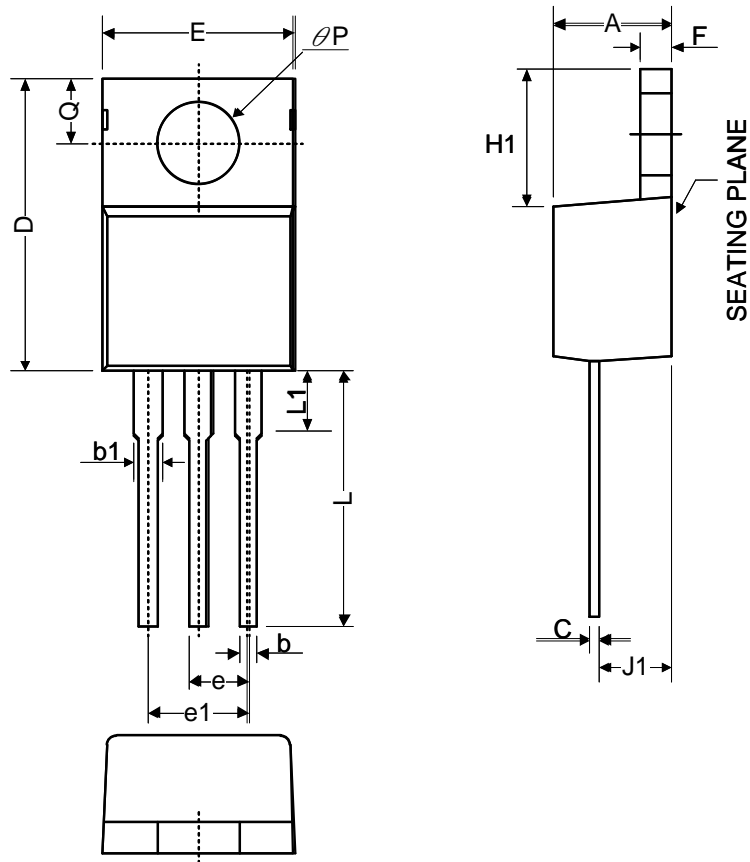


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.39	0.086	0.09	0.094
A1	-	-	0.13	-	-	0.005
b	0.51	0.71	0.89	0.02	0.028	0.035
b2	4.95	5.21	5.46	0.195	0.205	0.215
C	0.46	0.53	0.61	0.018	0.021	0.024
C1	0.46	0.53	0.58	0.018	0.021	0.023
D	5.33	5.46	6.22	0.21	0.215	0.245
D1	4.57	-	-	0.18	-	-
E	6.35	6.55	6.73	0.25	0.258	0.265
e	2.29 BSC			0.090 BSC.		
e1	4.58 BSC			0.180 BSC.		
H	9.4	9.7	10.4	0.37	0.382	0.41
L	1.4	1.6	1.78	0.055	0.063	0.07
L1	-	-	1.02	-	-	0.04
L2	1.52	1.78	2.03	0.06	0.07	0.08

Mold flash shall not exceed 0.005inch per side

JEDEC outline: TO-252

(2) TO220-3L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.55	4.19	4.83	0.14	0.165	0.19
b1	1.14	1.45	1.78	0.045	0.057	0.07
b	0.38	0.69	1.02	0.015	0.027	0.04
C	0.36	0.48	0.61	0.014	0.019	0.024
D	14.2	15.4	16.5	0.56	0.605	0.65
E	9.7	10.2	10.7	0.38	0.4	0.42
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
F	0.51	0.95	1.397	0.02	0.038	0.055
H1	5.84	6.35	6.86	0.23	0.25	0.27
J1	2.03	2.48	2.92	0.08	0.098	0.115
L	12.7	13.7	14.73	0.5	0.54	0.58
L1			6.35			0.25
$\theta P$	3.53	3.81	4.09	0.139	0.15	0.161
Q	2.54	2.98	3.43	0.1	0.118	0.135

Mold flash shall not exceed 0.005inch per side

JEDEC outline: TO-220 AB