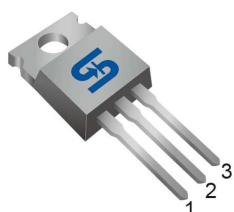


TO-220

ITO-220



**Pin Definition:**

1. Ground
2. Input (tab)
3. Output

### General Description

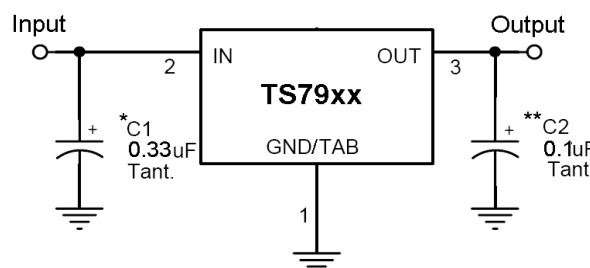
The TS7900 series of fixed output negative voltage regulators are intended as complements to the popular TS7800 series device. These negative regulators are available in the same seven-voltage options as the TS7900 devices. In addition, one extra voltage option commonly employed in MECL systems is also available in the negative TS7900A 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, ITO-220 & TO-263 package.

### Features

- Output Voltage: -5 & -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

### Standard Application Circuit



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.

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.

### Ordering Information

Part No.	Package	Packing
TS79xxCZ C0	TO-220	50pcs / Tube
TS79xxCZ C0G	TO-220	50pcs / Tube
TS79xxCI C0	ITO-220	50pcs / Tube
TS79xxCI C0G	ITO-220	50pcs / Tube

**Note:** Where **xx** denote voltage option  
 "G" denote for Green Product Halogen Free

### Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Input Voltage	$V_{IN}$	-35	V
Power Dissipation	$P_D$	Internal Limited	W
Junction Temperature	$T_J$	+150	°C
Storage Temperature Range	$T_{STG}$	-65~+150	°C
Thermal Resistance - Junction to Case	TO-220	$R_{\theta_{JC}}$	°C/W
	ITO-220		
Thermal Resistance - Junction to Ambient	TO-220	$R_{\theta_{JA}}$	°C/W
	ITO-220		

**Note:** \* Follow the derating curve

### TS7905 Electrical Characteristics

( $V_{in} = -10V$ ,  $I_{out} = 500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{in} = 0.33\mu F$ ,  $C_{out} = 0.1\mu F$ ; unless otherwise specified.)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Output voltage	Vout	$T_j = 25^{\circ}C$	-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	REGline	$T_j = 25^{\circ}C$	$-7.5V \leq V_{in} \leq -25V$	--	3	100	mV
			$-8V \leq V_{in} \leq -12V$	--	1	50	
Load Regulation	REGload	$T_j = 25^{\circ}C$	$10mA \leq I_{out} \leq 1A$	--	15	100	
			$250mA \leq I_{out} \leq 750mA$	--	5	50	
Quiescent Current	Iq	$I_{out} = 0$ , $T_j = 25^{\circ}C$	--	4	8	mA	
Quiescent Current Change	$\Delta Iq$	$-7.5V \leq V_{in} \leq -25V$	--	--	1.3		
		$10mA \leq I_{out} \leq 1A$	--	--	0.5		
Output Noise Voltage	Vn	$10Hz \leq f \leq 100KHz$ , $T_j = 25^{\circ}C$	--	40	--	$\mu V$	
Ripple Rejection Ratio	RR	$f = 120Hz$ , $-8V \leq V_{in} \leq -18V$	62	74	--	dB	
Voltage Drop	Vdrop	$I_{out} = 1A$ , $T_j = 25^{\circ}C$	--	2	--	V	
Output Short Circuit Current	Ios	$T_j = 25^{\circ}C$	--	750	--	mA	
Peak Output Current	I <sub>o peak</sub>	$T_j = 25^{\circ}C$	--	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/°C	

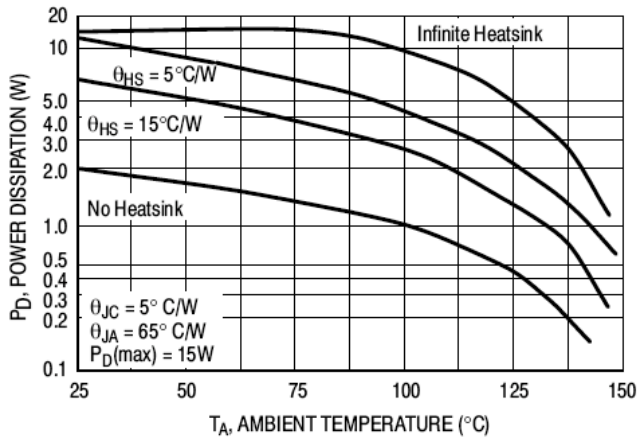
### TS7912 Electrical Characteristics

( $V_{in} = -19V$ ,  $I_{out} = 500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{in} = 0.33\mu F$ ,  $C_{out} = 0.1\mu F$ ; unless otherwise specified.)

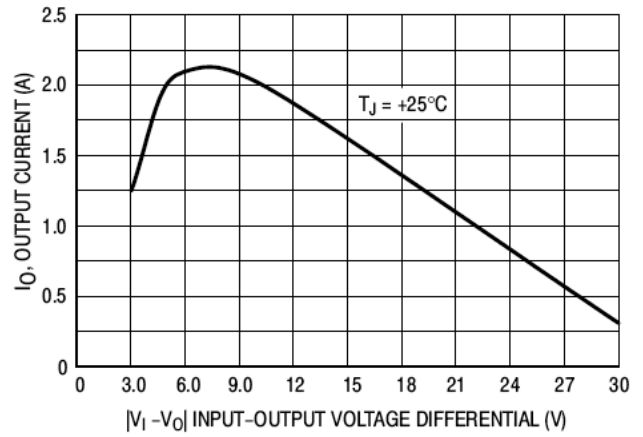
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	Vout	$T_j = 25^{\circ}C$	-11.53	-12	-12.48	V	
		$-14.5V \leq V_{in} \leq -27V$ , $10mA \leq I_{out} \leq 1A$ , $PD \leq 15W$	-11.42	-12	-12.60		
Line Regulation	REGline	$T_j = 25^{\circ}C$	$-14.5V \leq V_{in} \leq -30V$	--	10	240	mV
			$-15V \leq V_{in} \leq -19V$	--	3	120	
Load Regulation	REGload	$T_j = 25^{\circ}C$	$10mA \leq I_{out} \leq 1A$	--	12	240	
			$250mA \leq I_{out} \leq 750mA$	--	4	120	
Quiescent Current	Iq	$T_j = 25^{\circ}C$ , $I_{out} = 0$	--	4.3	8	mA	
Quiescent Current Change	$\Delta Iq$	$-14.5V \leq V_{in} \leq -30V$	--	--	1		
		$10mA \leq I_{out} \leq 1A$	--	--	0.5		
Output Noise Voltage	Vn	$10Hz \leq f \leq 100KHz$ , $T_j = 25^{\circ}C$	--	75	--	$\mu V$	
Ripple Rejection Ratio	RR	$f = 120Hz$ , $-15V \leq V_{in} \leq -25V$	55	70	--	dB	
Voltage Drop	Vdrop	$I_{out} = 1A$ , $T_j = 25^{\circ}C$	--	2	--	V	
Output Short Circuit Current	Ios	$T_j = 25^{\circ}C$	--	350	--	mA	
Peak Output Current	I <sub>o peak</sub>	$T_j = 25^{\circ}C$	--	2.1	--	A	
Temperature Coefficient of Output Voltage	$\Delta V_{out} / \Delta T_j$	$I_{out} = 10mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	--	-1	--	mV/°C	

- 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.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

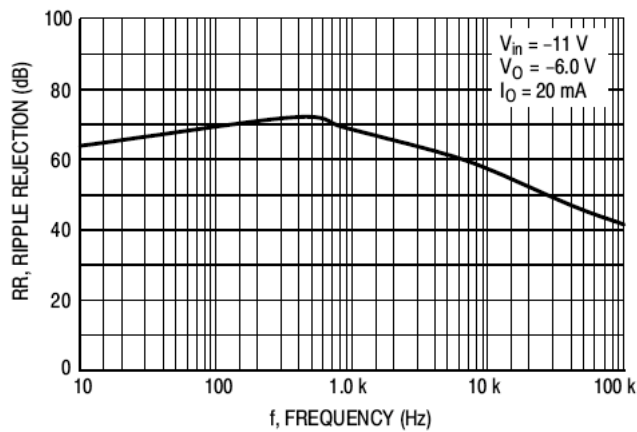
### Electrical Characteristics Curve



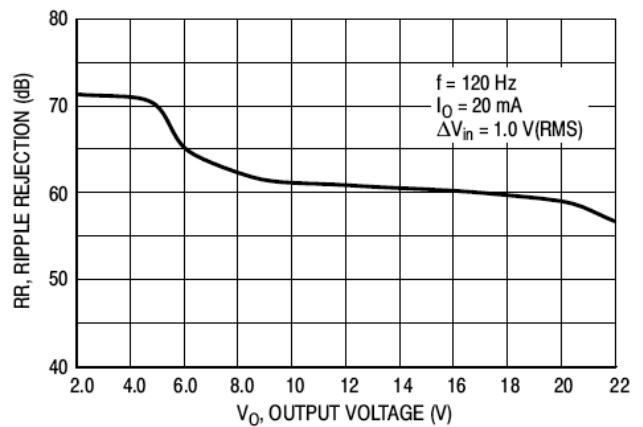
**Figure 1. Worst Case Power Dissipation as a Function of Ambient Temperature**



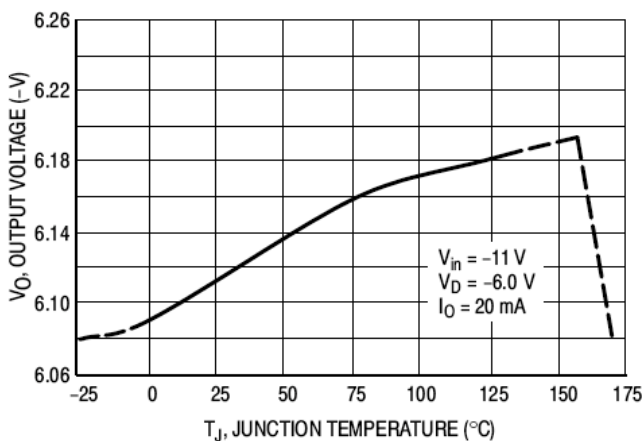
**Figure 2. Peak Output Current as a Function of Input-Output Differential Voltage**



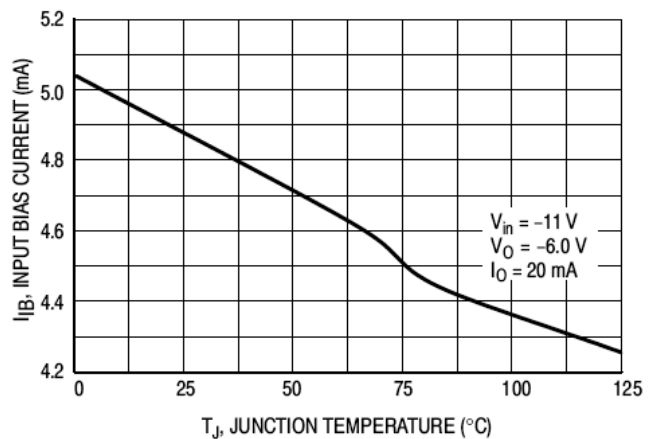
**Figure 3. Ripple Rejection as a Function of Frequency**



**Figure 4. Ripple Rejection as a Function of Output Voltage**

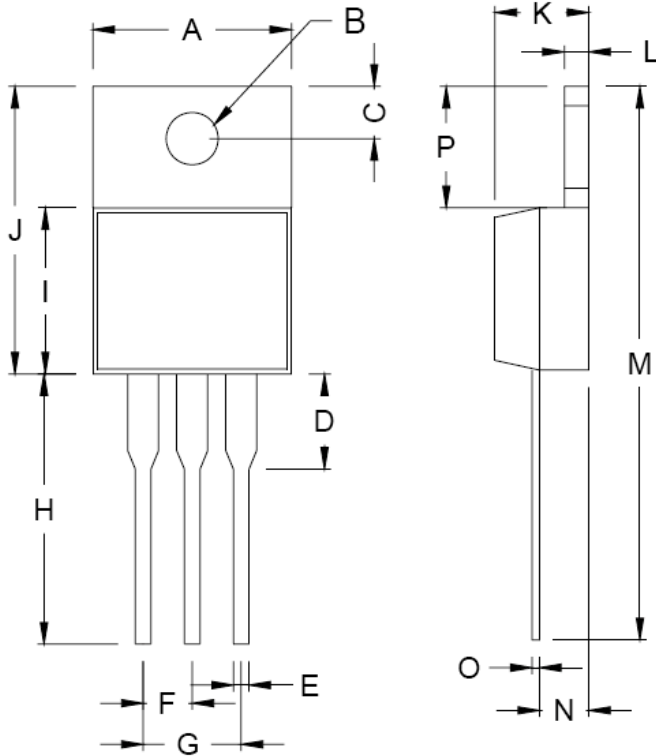


**Figure 5. Output Voltage as a Function of Junction Temperature**



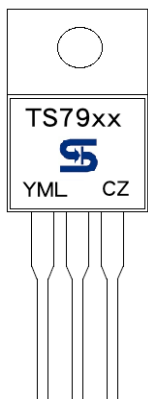
**Figure 5. Output Voltage as a Function of Junction Temperature**

### TO-220 Mechanical Drawing



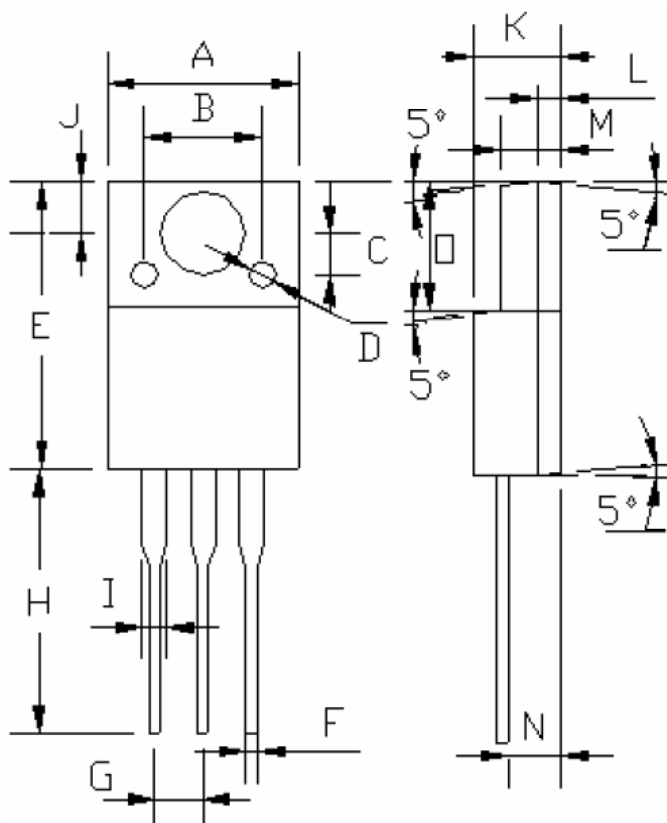
TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.31	10.50	0.367	0.413
B	3.74	3.91	0.147	0.154
C	2.36	3.24	0.093	0.128
D	2.22	3.22	0.087	0.127
E	0.78	0.98	0.031	0.039
F	--	2.65	--	0.104
G	--	5.30	--	0.209
H	12.32	13.88	0.485	0.546
I	8.74	9.26	0.344	0.365
J	15.07	16.47	0.593	0.648
K	4.35	4.65	0.171	0.183
L	1.16	1.40	0.046	0.055
M	28.37	30.35	1.117	1.195
N	1.78	2.67	0.070	0.105
O	0.255	0.610	0.010	0.024
P	5.75	7.65	0.226	0.301

### Marking Diagram



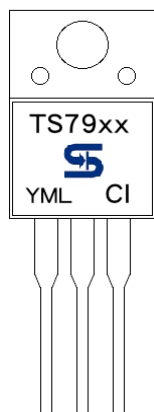
- XX** = Output Voltage  
(05=-5V, 12=-12V)
- Y** = Year Code
- M** = Month Code  
(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- = Month Code for Halogen Free Product  
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code
- CZ** = Package Code for TO-220

### ITO-220 Mechanical Drawing



ITO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.96	10.36	0.392	0.407
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	§ 1.40 (typ.)		§ 0.055 (typ.)	
E	15.07	16.07	0.593	0.632
F	0.80 (typ.)		0.031 (typ.)	
G	2.44	2.64	0.096	0.104
H	13.08	13.48	0.514	0.530
I	1.47 (max.)		0.057 (max.)	
J	3.20	3.40	0.125	0.133
K	4.60	4.80	0.181	0.188
L	1.15 (typ.)		0.045 (typ.)	
M	2.44	2.64	0.096	0.104
N	2.60	2.80	0.102	0.110
O	6.55	6.65	0.258	0.262

### Marking Diagram



- XX** = Output Voltage  
(05=-5V, 12=-12V)
- Y** = Year Code
- M** = Month Code  
(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- = Month Code for Halogen Free Product  
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code
- CI** = Package Code for ITO-220

# TS7900 Series

## 3-Terminal Fixed Negative Voltage Regulator

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