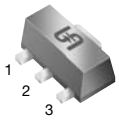
TS79L00

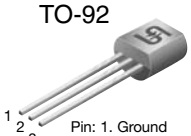
3-Terminal Negative Output Voltage Regulators

SOT-89



Pin: 1. Ground 2. Input 3. Output
(Heatsink surface connected to Pin 2.)

TO-92



Pin: 1. Ground
2. Input 3. Output

SOP-8

Pin: 1. Vout 2. Vin 3. Vin 4. Nc
5. Ground 6. Vin 7. Vin 8. Nc

Voltage Range
5 to 24 Volts
Current
0.1 Amperes

Features

- ✧ No External Components Required
- ✧ Internal Short-Circuit Current Limiting
- ✧ Internal Thermal Overload Protection
- ✧ Complementary Positive Regulators Offered (TS78L00 Series)
- ✧ Wide Range of Available, Fixed Output Voltages
- ✧ Available in ±4% Voltage Tolerance

Ordering Informations

Device	Operating Temperature (Ambient)	Package
TS79LxxCT	-20°C to +85°C	TO-92
TS79LxxCS		SOP-8
TS79LxxCY		SOT-89

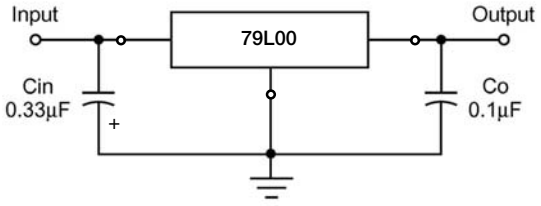
Absolute Maximum Ratings (T_A=+25°C)

Parameter	Symbol	Value	Unit
Input Voltage	Vin *1	-35	V
Input Voltage	Vin *2	-40	V
Storage Temperature	Tstg	-65 to 150	°C
Junction Temperature Range	T_J	0 to 150	°C

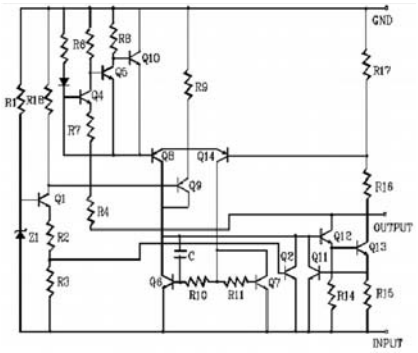
Note: *1: TS79L05
*2: TS79L12, TS79L15, TS79L18

Standard Application

SOP-8 is an internally modified SO-8 Package. Pins 2, 3, 6 and 7 are electrically common to the die attach flag. This internal lead frame modification decreases package thermal resistance and increases power dissipation capability when appropriagely mounted on a printed circuit board. SOP-8 conforms to all external dimensions of the standard SO-8 Package.



Representative Circuit Schematic



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TS79L05 Electrical Characteristics

(V_I= -10V, I_O=40mA, C_I= 0.33μF, C_O= 0.1μF, 0°C<T_J<125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-4.8	-5.0	-5.2	Vdc
Line Regulation (T_J=+25°C)	REGline				
-7.0Vdc≥V_I≥-20Vdc		--	--	150	mV
-8.0Vdc≥V_I≥-20Vdc		--	--	100	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	60	mV
1.0mA≤I_O≤40mA		--	--	30	mV
Output Voltage	V_O				
-7.0Vdc≥V_I≥-20Vdc, 1.0mA≤I_O≤40mA		-4.75	--	-5.25	Vdc
V_I=-10Vdc, 1.0mA≤I_O≤70mA		-4.75	--	-5.25	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.0	mA
(T_J=+125°C)		--	--	5.5	mA
Input Bias Current Change	ΔI_{IB}				
-8.0Vdc≥V_I≥-20Vdc		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.1	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	40	--	μV
Ripple Rejection (-8.0≥V_I≥-18Vdc, f=120Hz, T_J=25°C)	RR	41	49	--	dB
Dropout Voltage (I_O=40mA, T_J=+25°C)	$\|V_I-V_O\|$	--	1.7	--	Vdc

TS79L09 Electrical Characteristics (V_I= -15V, I_O=40mA, C_I= 0.33μF, C_O= 0.1Mf,

-40°C<T_J< +125°C (for TS78lxx), 0°C<tj< 125°C (TS78lxx), unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-8.6	-9.0	-9.4	Vdc
Line Regulation (T_J=+25°C, I_O=40mA)	REGline				
-11.5V≤V_I≤-24V		--	--	175	mV
-12V≤V_I≤-24V		--	--	125	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	90	mV
T_J=+25°C, 1.0mA≤I_O≤40mA		--	--	40	mV
Output Voltage	V_O				
-11.5V≤V_I≤-24V, 1.0mA≤I_O≤40mA		-8.5	--	-9.5	Vdc
Vi=15V, 1.0mA≤I_O≤70mA		-8.5	--	-9.5	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.0	mA
(T_J=+125°C)		--	--	5.5	mA
Input Bias Current Change	ΔI_{IB}				
-11V≤V_I≤-23V		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.1	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	60	--	μV
Ripple Rejection (I_O=40mA, f=120Hz, -12V≤V_I≤-23V, T_J=+125°C)	RR	37	57	--	dB
Dropout Voltage (T_J=+25°C)	Vi-Vo	--	1.7	--	Vdc

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TS79L12 Electrical Characteristics

(V_I= -19V, I_O=40mA, C_I= 0.33μF, C_O= 0.1μF, 0°C<T_J<125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-11.5	-12	-12.5	Vdc
Line Regulation (T_J=+25°C)	REGline				
-14.5Vdc≥V_I≥-27Vdc		--	--	250	mV
-16Vdc≥V_I≥-27Vdc		--	--	200	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	100	mV
1.0mA≤I_O≤40mA		--	--	50	mV
Output Voltage	V_O				
-14.5Vdc≥V_I≥-27Vdc, 1.0mA≤I_O≤40mA		-11.4	--	-12.6	Vdc
V_I=-19Vdc, 1.0mA≤I_O≤70mA		-11.4	--	-12.6	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.5	mA
(T_J=+125°C)		--	--	6.0	mA
Input Bias Current Change	ΔI_{IB}				
-16Vdc≥V_I≥-27Vdc		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.2	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	80	--	μV
Ripple Rejection (-15≥V_I≥-25Vdc, f=120Hz, T_J=25°C)	RR	37	42	--	dB
Dropout Voltage (I_O=40mA, T_J=+25°C)	$\|V_I-V_O\|$	--	1.7	--	Vdc

TS79L15 Electrical Characteristics

(V_I= -23V, I_O=40mA, C_I= 0.33μF, C_O= 0.1μF, 0°C<T_J<125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-14.4	-15	-15.6	Vdc
Line Regulation (T_J=+25°C)	REGline				
-17.5Vdc≥V_I≥-30Vdc		--	--	300	mV
-20Vdc≥V_I≥-30Vdc		--	--	250	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	150	mV
1.0mA≤I_O≤40mA		--	--	75	mV
Output Voltage	V_O				
-17.5Vdc≥V_I≥-30Vdc, 1.0mA≦I_O≦40mA		-14.25	--	-15.75	Vdc
V_I=-23Vdc, 1.0mA≤I_O≤70mA		-14.25	--	-15.75	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.5	mA
(T_J=+125°C)		--	--	6.0	mA
Input Bias Current Change	ΔI_{IB}				
-20Vdc≥V_I≥-30Vdc		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.1	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	90	--	μV
Ripple Rejection (-18.5Vdc≥V_I≥-28.5Vdc, f=120Hz)	RR	34	39	--	dB
Dropout Voltage (I_O=40mA, T_J=+25°C)	$\|V_I-V_O\|$	--	1.7	--	Vdc

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TS79L18 Electrical Characteristics

(V_I= -27V, I_O=40mA, C_I= 0.33μF, C_O= 0.1μF, 0°C<T_J<125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-17.3	-18	-18.7	Vdc
Line Regulation (T_J=+25°C)	REGline				
-20.7Vdc≥V_I≥-33Vdc		--	--	325	mV
-21Vdc≥V_I≥-33Vdc		--	--	275	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	170	mV
1.0mA≤I_O≤40mA		--	--	85	mV
Output Voltage	V_O				
-20.7Vdc≥V_I≥-33Vdc, 1.0mA≤I_O≤40mA		-17.1	--	-18.9	Vdc
V_I=-27Vdc, 1.0mA≤I_O≤70mA		-17.1	--	-18.9	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.5	mA
(T_J=+125°C)		--	--	6.0	mA
Input Bias Current Change	ΔI_{IB}				
-21Vdc≥V_I≥-33Vdc		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.1	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	150	--	μV
Ripple Rejection (-23≥V_I≥-33Vdc, f=120Hz, T_J=25°C)	RR	33	48	--	dB
Dropout Voltage (I_O=40mA, T_J=+25°C)	$\lvert V_I-V_O \rvert$	--	1.7	--	Vdc

TS79L24 Electrical Characteristics

(V_I= -33V, I_O=40mA, C_I= 0.33μF, C_O= 0.1μF, 0°C<T_J<125°C unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Output Voltage (T_J=+25°C)	V_O	-23	-24	-25	Vdc
Line Regulation (T_J=+25°C)	REGline				
-27Vdc≥V_I≥-38Vdc		--	--	350	mV
-28Vdc≥V_I≥-38Vdc		--	--	300	mV
Load Regulation	REGload				
T_J=+25°C, 1.0mA≤I_O≤100mA		--	--	200	mV
1.0mA≤I_O≤40mA		--	--	100	mV
Output Voltage	V_O				
-27Vdc≥V_I≥-38Vdc, 1.0mA≤I_O≤40mA		-22.8	--	-25.2	Vdc
V_I=-33Vdc, 1.0mA≤I_O≤70mA		-22.8	--	-25.2	Vdc
Input Bias Current	I_{IB}				
(T_J=+25°C)		--	--	6.5	mA
(T_J=+125°C)		--	--	6.0	mA
Input Bias Current Change	ΔI_{IB}				
-28Vdc≥V_I≥-38Vdc		--	--	1.5	mA
1.0mA≤I_O≤40mA		--	--	0.1	mA
Output Noise Voltage (T_A=+25°C, 10Hz≤f≤100kHz)	Vn	--	200	--	μV
Ripple Rejection (-29≥V_I≥-35Vdc, f=120Hz, T_J=25°C)	RR	31	47	--	dB
Dropout Voltage (I_O=40mA, T_J=+25°C)	$\lvert V_I-V_O \rvert$	--	1.7	--	Vdc

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FIG. 1 - DROPOUT CHARACTERISTICS

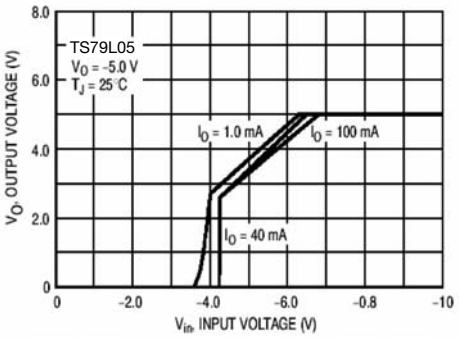


FIG. 2 - DROPOUT VOLTAGE versus JUNCTION TEMPERATURE

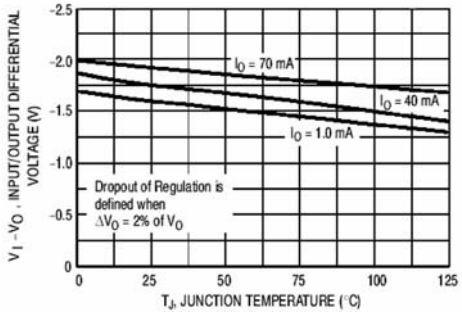


FIG. 3 - INPUT BIAS CURRENT versus AMBIENT TEMPERATURE

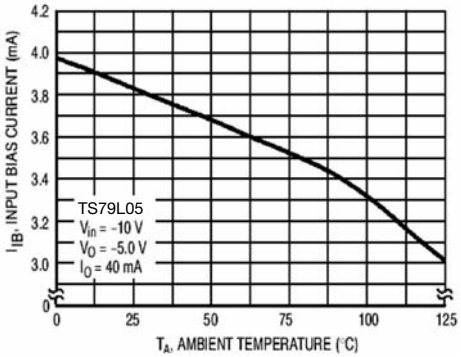


FIG. 4 - INPUT BIAS CURRENT versus INPUT VOLTAGE

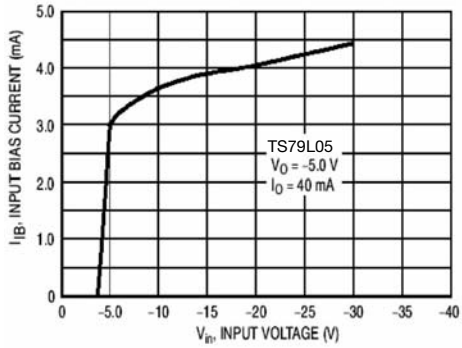
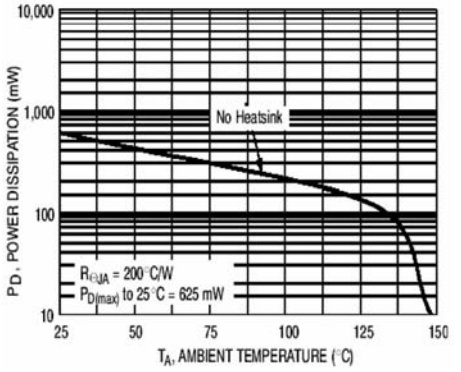


FIG. 5 - MAXIMUM AVERAGE POWER DISSIPATION versus AMBIENT TEMPERATURE - TO-92 Type Package



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Applications Information

Design Considerations

The TS79L00 Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short-Circuit Protection that limits the maximum current the circuit will pass.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33μF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.

FIG. 6 - POSITIVE AND NEGATIVE REGULATOR

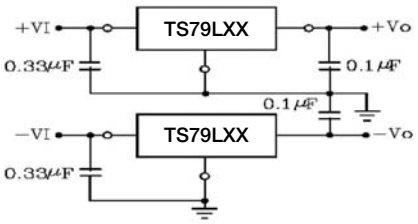
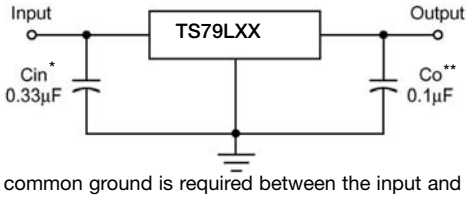


FIG. 7 - STANDARD APPLICATION



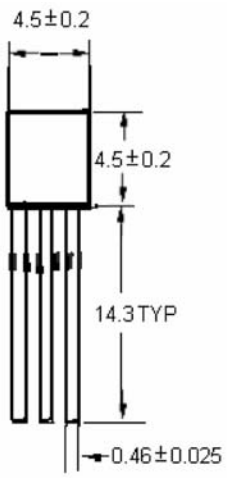
A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

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

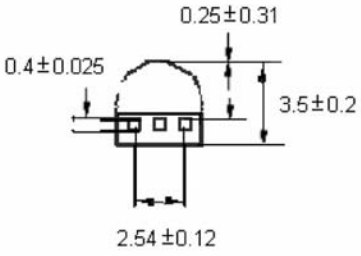
** = C_O improves stability and transient response.

TO-92 Mechanical drawing **Unit: mm**

1. Top View



2. Side View



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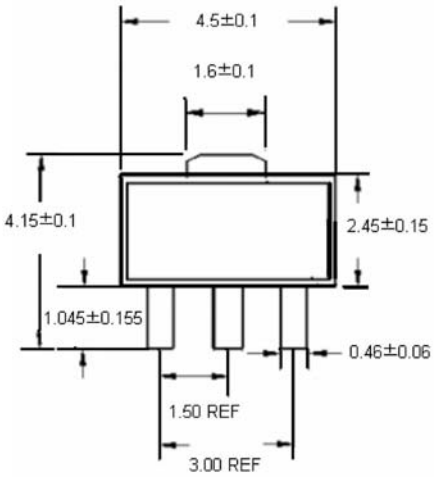
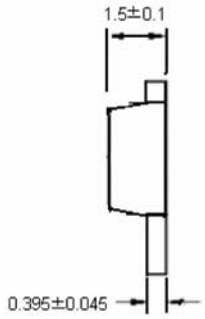
SOT-89 Mechanical drawing **Unit: mm**

1. Top View



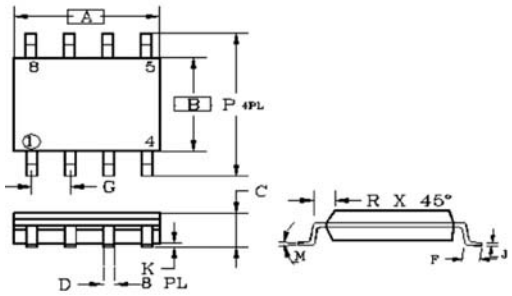
2. Side View



SOP-8 Mechanical drawing

1. Top View

2. Side View



DIM	SOP-8 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019