

The PJ79L00 Series negative voltage regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require up to 100 mA. Like their higher powered PJ7900 Series negative regulators, this series features thermal shutdown and current limiting, making them remarkably rugged. In

most applications, no external components are required for operation.

The PJ79L00 devices are useful for on-card regulation or any other application where a regulated negative voltage at a modest current level is needed. These regulators offer substantial advantage over the common resistor/zener diode approach.

FEATURES

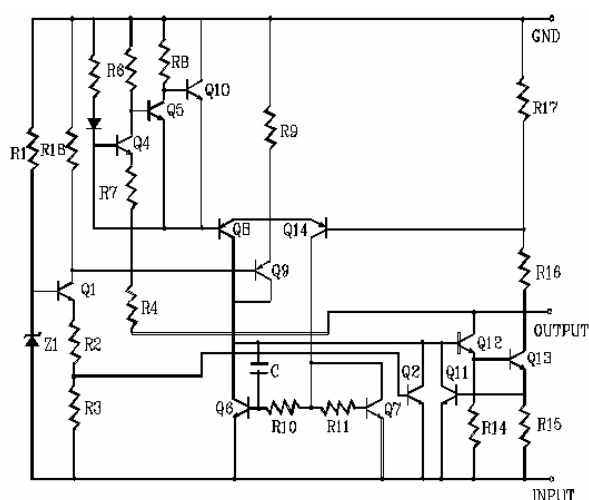
- No External Components Required
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- Complementary Positive Regulators Offered (PJ78L00 Series)
- Wide Range of Available, Fixed Output Voltages
- Available in $\pm 4\%$ Voltage Tolerance.

ORDERING INFORMATION

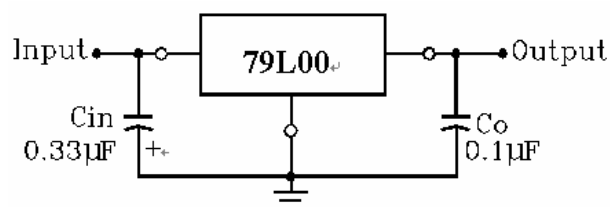
Device	Operating Temperature (Ambient)	Package
PJ79LxxCT	-20°C to +85°C	TO-92
PJ79LxxCS		SOP-8
PJ79LxxCY		SOT-89

CIRCUIT SCHEMATIC

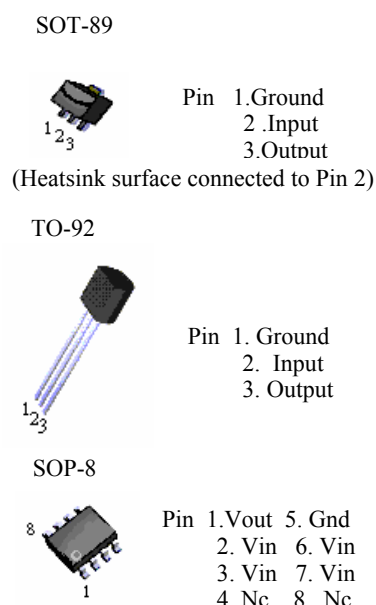
REPRESENTATIVE CIRCUIT SCHEMATIC



TYPICAL CONNECTING CIRCUIT



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 appropriately mounted on a printed circuit board. SOP-8 conforms to all external dimensions of the standard SO-8 Package.



3-Terminal Negative Output Voltage Regulators
ABSOLUTE MAXIMUM RATINGS ($T_A = +25^{\circ}\text{C}$)

RATING	SYMBOL	PJ79L00 Series	Unit
Input Voltage	$V_{in} *1$	- 35	V
Input Voltage	$V_{in} *2$	- 40	V
Storage Temperature	T_{stg}	- 65 to 150	$^{\circ}\text{C}$
Junction Temperature Range	T_J	0 to 150	$^{\circ}\text{C}$

Note: *1. PJ79L05

*2. PJ79L12, PJ79L15, PJ79L18

*3. PJ79L24

• PJ79L05 ELECTRICAL CHARACTERISTICS

($V_I = -10\text{V}$, $I_O = 40\text{ mA}$, $C_1 = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage ($T_J = +25^{\circ}\text{C}$)	V_O	- 4.8	- 5.0	- 5.2	Vdc
Line Regulation ($T_J = +25^{\circ}\text{C}$)	REGline	--	--	150	mV
-7.0 Vdc $\geq V_I \geq$ -20 Vdc					
-8.0 Vdc $\geq V_I \geq$ -20 Vdc					
Load Regulation	REGload	--	--	60	mV
$T_J = +25^{\circ}\text{C}$, $1.0\text{ mA} \leq I_O \leq 100\text{ mA}$					
$1.0\text{ mA} \leq I_O \leq 40\text{ mA}$					
Output Voltage	V_O	- 4.75	--	- 5.25	Vdc
- 7.0 Vdc $\geq V_I \geq$ -20 Vdc, $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$					
$V_I = -10\text{ Vdc}$, $1.0\text{ mA} \leq I_O \leq 70\text{ mA}$					
Input Bias Current	I_{IB}	--	--	6.0	mA
($T_J = +25^{\circ}\text{C}$)					
($T_J = +125^{\circ}\text{C}$)					
Input Bias Current Change	ΔI_{IB}	--	--	1.5	mA
- 8.0 Vdc $\geq V_I \geq$ -20 Vdc					
$1.0\text{ mA} \leq I_O \leq 40\text{ mA}$					
Output Noise Voltage	V_n	--	40	--	μV
($T_A = +25^{\circ}\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ KHz}$)					
Ripple Rejection	RR	41	49	--	dB
(- 8.0 $\geq V_I \geq$ -18 Vdc, $f = 120\text{ Hz}$, $T_J = 25^{\circ}\text{C}$)					
Dropout Voltage ($I_O = 40\text{ mA}$, $T_J = +25^{\circ}\text{C}$)	$ V_I - V_O $	--	1.7	--	Vdc

• PJ79L09 ELECTRICAL CHARACTERISTICS
VI=-15V, IO=40mA, CI=0.33μF, Co=0.1Mf, -40°C < TJ < +125°C (for PJ78lxx), 0°C < tj < 125°C (PJ78lxx)), unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	-8.6	-9.0	-9.4	Vdc
Line Regulation (Tj=+25°C, Io=40mA) -11.5V ≤ V _I ≤ -24V, -12V ≤ V _I ≤ -24V,	REGline	-- --	-- --	175 125	mV
Load Regulation Tj = +25°C, 1.0mA ≤ Io ≤ 100mA Tj = +25°C, 1.0mA ≤ Io ≤ 40mA	REGload	-- --	-- --	90 40	mV
Output Voltage -11.5V ≤ V _I ≤ -24V, 1.0mA ≤ Io ≤ 40mA Vi=15V, 1.0mA ≤ Io ≤ 70mA	Vo	-8.5 -8.5	-- --	-9.5 -9.5	Vdc
Input Bias Current (Tj = +25°C) (Tj = +125°C)	I _{IB}	-- --	-- --	6.0 5.5	mA
Input Bias Current Change -11V ≤ V _I ≤ -23V 1.0mA ≤ Io ≤ 40mA	ΔI _{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25°C, 10Hz ≤ f ≤ 100KHz)	Vn	--	60	--	μV
Ripple Rejection (Io=40mA, f=120Hz, -12V ≤ V _I ≤ -23V, Tj = +25°C)	RR	37	57	--	dB
Dropout Voltage (Tj = +25°C)	Vi-Vo	--	1.7	--	Vdc

• PJ79L12 ELECTRICAL CHARACTERISTICS
(V_I = -19V , I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF, 0°C < T_J < 125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj = +25°C)	V _O	- 11.5	- 12	- 12.5	Vdc
Line Regulation (Tj = +25°C) -14.5 Vdc ≥ V _I ≥ -27 Vdc -16 Vdc ≥ V _I ≥ -27 Vdc	REGline	-- --	-- --	250 200	mV
Load Regulation Tj = +25°C, 1.0 mA ≤ I _O ≤ 100 mA 1.0 mA ≤ I _O ≤ 40 mA	REGload	-- --	-- --	100 50	mV
Output Voltage -14.5 Vdc ≥ V _I ≥ -27 Vdc, 1.0mA ≤ I _O ≤ 40 mA V _I = -19 Vdc, 1.0mA ≤ I _O ≤ 70 mA	V _O	- 11.4 - 11.4	-- --	- 12.6 - 12.6	Vdc
Input Bias Current (Tj = + 25°C) (Tj = + 125°C)	I _{IB}	-- --	-- --	6.5 6.0	mA
Input Bias Current Change - 16 Vdc ≥ V _I ≥ -27 Vdc 1.0 mA ≤ I _O ≤ 40 mA	ΔI _{IB}	-- --	-- --	1.5 0.2	mA
Output Noise Voltage (T _A = + 25°C, 10 Hz ≤ f ≤ 100 KHz)	Vn	--	80	--	μV
Ripple Rejection (- 15 ≥ V _I ≥ -25 Vdc, f = 120 Hz, Tj = 25°C)	RR	37	42	--	dB
Dropout Voltage (I _O = 40 mA, Tj = + 25°C)	V _I -V _O	--	1.7	--	Vdc

• PJ79L15 ELECTRICAL CHARACTERISTICS

($V_I = -23V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $0^\circ\text{C} < T_J < 125^\circ\text{C}$ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage ($T_J = +25^\circ\text{C}$)	V_O	-14.4	-15	-15.6	Vdc
Line Regulation ($T_J = +25^\circ\text{C}$) -17.5 Vdc $\geq V_I \geq$ -30 Vdc -20 Vdc $\geq V_I \geq$ -30 Vdc	REGline	-- --	-- --	300 250	mV
Load Regulation $T_J = +25^\circ\text{C}$, $1.0\text{ mA} \leq I_O \leq 100\text{ mA}$ $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	REGload	-- --	-- --	150 75	mV
Output Voltage -17.5 Vdc $\geq V_I \geq$ -30 Vdc, $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$ $V_I = -23\text{ Vdc}$, $1.0\text{ mA} \leq I_O \leq 70\text{ mA}$	V_O	-14.25 -14.25	-- --	-15.75 -15.75	Vdc
Input Bias Current ($T_J = +25^\circ\text{C}$) ($T_J = +125^\circ\text{C}$)	I_{IB}	-- --	-- --	6.5 6.0	mA
Input Bias Current Change -20 Vdc $\geq V_I \geq$ -30 Vdc $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage ($T_A = +25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ KHz}$)	V_n	--	90	--	μV
Ripple Rejection (-18.5 Vdc $\geq V_I \geq$ -28.5 Vdc, $f = 120\text{ Hz}$)	RR	34	39	--	dB
Dropout Voltage ($I_O = 40\text{ mA}$, $T_J = +25^\circ\text{C}$)	$ V_I - V_O $	--	1.7	--	Vdc

• PJ79L18 ELECTRICAL CHARACTERISTICS

($V_I = -27V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $0^\circ\text{C} < T_J < 125^\circ\text{C}$ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage ($T_J = +25^\circ\text{C}$)	V_O	-17.3	-18	-18.7	Vdc
Line Regulation ($T_J = +25^\circ\text{C}$) -20.7 Vdc $\geq V_I \geq$ -33 Vdc -21 Vdc $\geq V_I \geq$ -33 Vdc	REGline	-- --	-- --	325 275	mV
Load Regulation $T_J = +25^\circ\text{C}$, $1.0\text{ mA} \leq I_O \leq 100\text{ mA}$ $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	REGload	-- --	-- --	170 85	mV
Output Voltage -20.7 Vdc $\geq V_I \geq$ -33 Vdc, $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$ $V_I = -27\text{ Vdc}$, $1.0\text{ mA} \leq I_O \leq 70\text{ mA}$	V_O	-17.1 -17.1	-- --	-18.9 -18.9	Vdc
Input Bias Current ($T_J = +25^\circ\text{C}$) ($T_J = +125^\circ\text{C}$)	I_{IB}	-- --	-- --	6.5 6.0	mA
Input Bias Current Change -21 Vdc $\geq V_I \geq$ -33 Vdc $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage ($T_A = +25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ KHz}$)	V_n	--	150	--	μV
Ripple Rejection (-23 $\geq V_I \geq$ -33 Vdc, $f = 120\text{ Hz}$, $T_J = 25^\circ\text{C}$)	RR	33	48	--	dB
Dropout Voltage ($I_O = 40\text{ mA}$, $T_J = +25^\circ\text{C}$)	$ V_I - V_O $	--	1.7	--	Vdc

PJ79L24 ELECTRICAL CHARACTERISTICS

($V_I = -33V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $0^\circ\text{C} < T_J < 125^\circ\text{C}$ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage ($T_J = +25^\circ\text{C}$)	V_O	- 23	- 24	- 25	Vdc
Line Regulation ($T_J = +25^\circ\text{C}$) - 27 Vdc $\geq V_I \geq$ -38 Vdc - 28 Vdc $\geq V_I \geq$ -38 Vdc	REGline	--	--	350 300	mV
Load Regulation $T_J = +25^\circ\text{C}$, $1.0\text{ mA} \leq I_O \leq 100\text{ mA}$ $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	REGload	--	--	200 100	mV
Output Voltage -27 Vdc $\geq V_I \geq$ -38 Vdc, $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$ $V_I = -33\text{ Vdc}$, $1.0\text{ mA} \leq I_O \leq 70\text{ mA}$	V_O	- 22.8 - 22.8	-- --	-25.2 -25.2	Vdc
Input Bias Current ($T_J = +25^\circ\text{C}$) ($T_J = +125^\circ\text{C}$)	I_{IB}	-- --	-- --	6.5 6.0	mA
Input Bias Current Change -28 Vdc $\geq V_I \geq$ -38 Vdc $1.0\text{ mA} \leq I_O \leq 40\text{ mA}$	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage ($T_A = +25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ KHz}$)	V_n	--	200	--	μV
Ripple Rejection (- 29 $\geq V_I \geq$ - 35 Vdc, $f = 120\text{ Hz}$, $T_J = 25^\circ\text{C}$)	RR	31	47	--	dB
Dropout Voltage ($I_O = 40\text{ mA}$, $T_J = +25^\circ\text{C}$)	$ V_I - V_O $	--	1.7	--	Vdc

APPLICATIONS INFORMATION

Design Considerations

The PJ79L00 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 $0.33\text{ }\mu\text{F}$ 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.

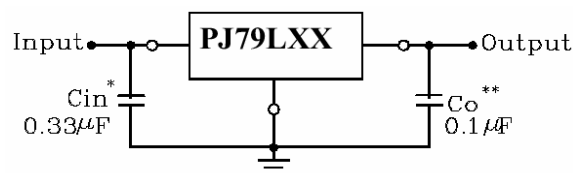


FIGURE 2-STANDARD APPLICATION

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V 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.

FIGURE 1 - POSITIVE AND NEGATIVE REGULATOR

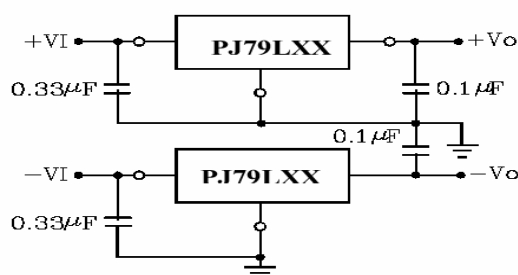


FIGURE 3-DROPOUT CHARACTERISTICS

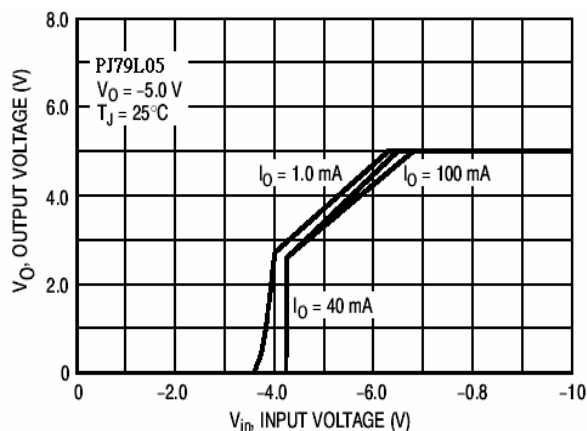


FIGURE 4-DROPOUT VOLTAGE versus JUNCTION TEMPERATURE

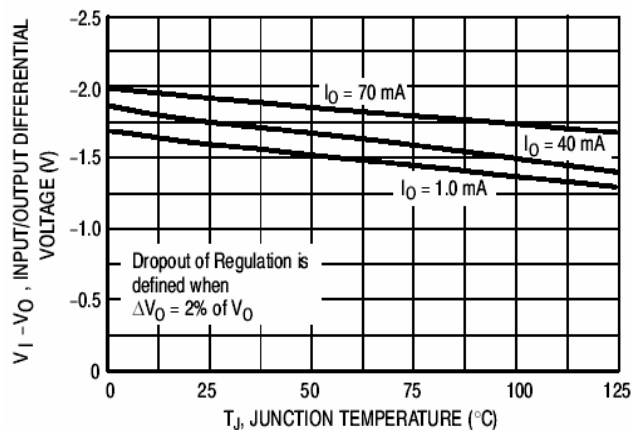


FIGURE 5-INPUT BIAS CURRENT versus AMBIENT TEMPERATURE

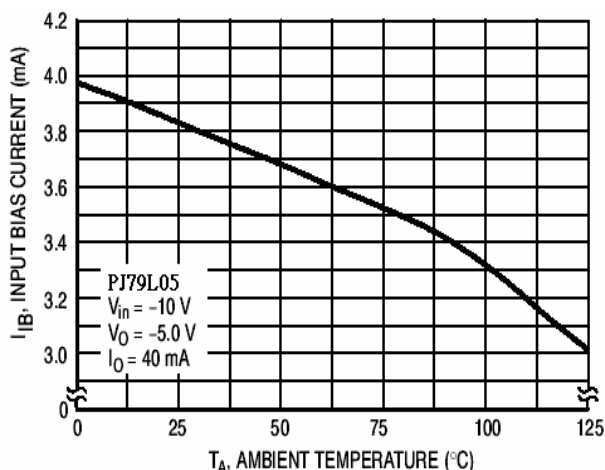


FIGURE 6-INPUT BIAS CURRENT versus INPUT VOLTAGE

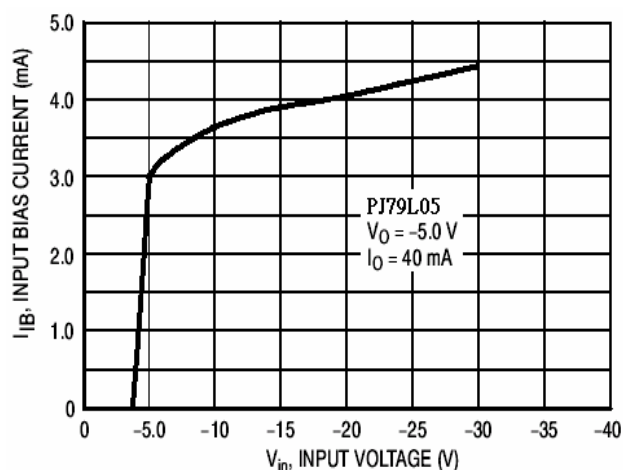
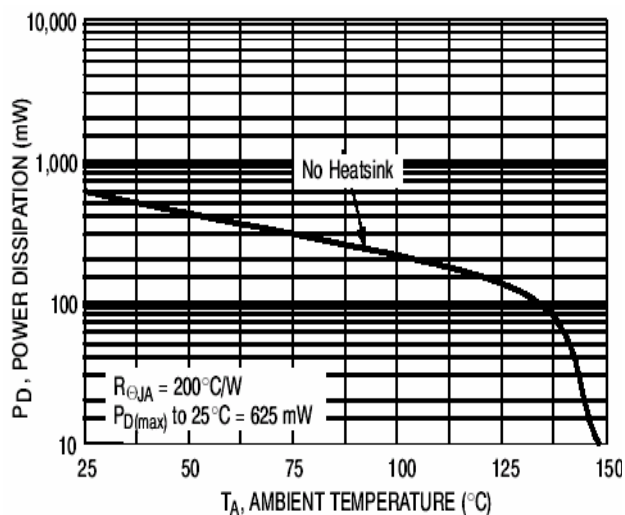
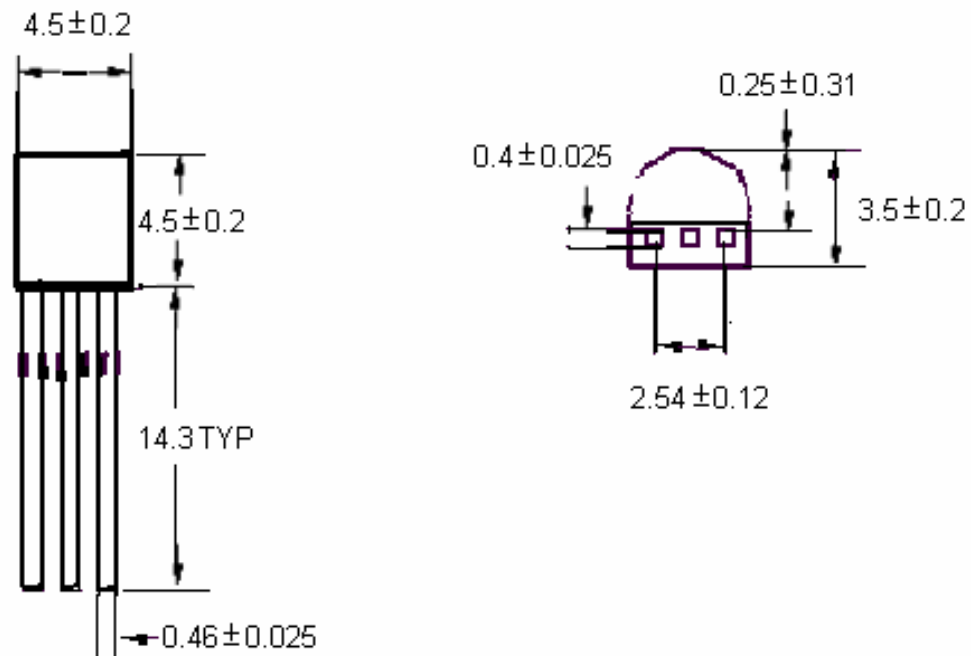


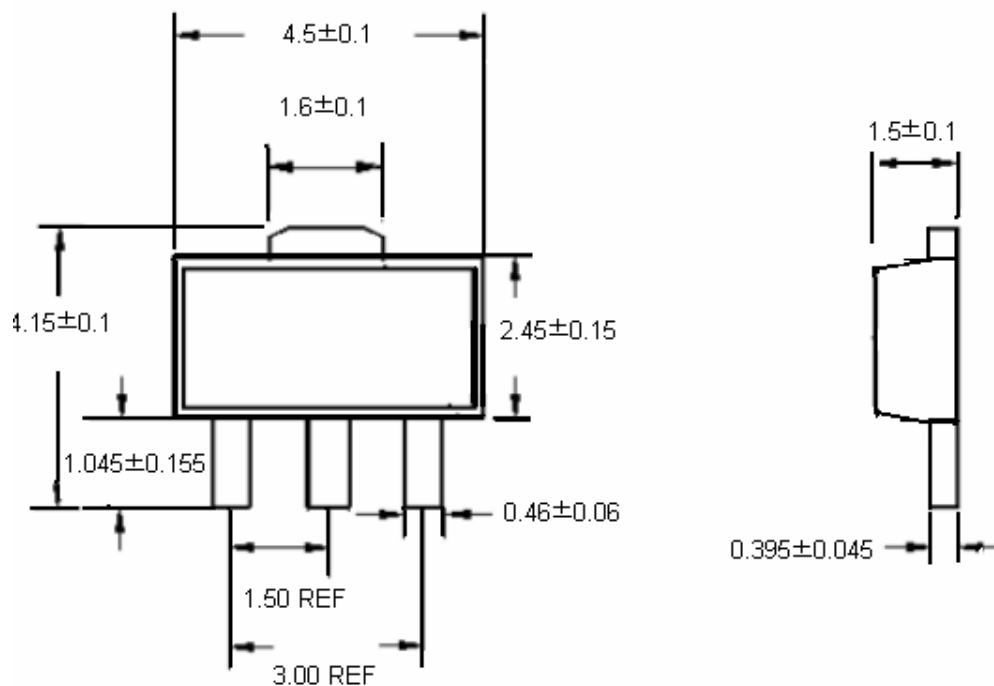
FIGURE 7-MAXIMUM AVERAGE POWER DISSIPATION versus AMBIENT TEMPERATURE - TO-92 Type Package



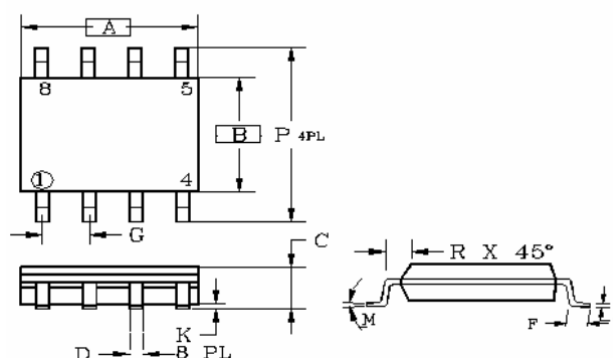
TO-92 Unit:mm



SOT-89 Unit:mm



SOP-8



DIM	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