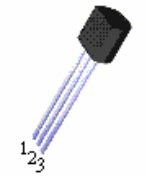
3-Terminal Low Current Positive Voltage Regulators

The PJ78L00 Series of positive voltage Regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require a regulated supply of up to 100 mA. Like their higher powered PJ7800 Series cousins, these regulators feature internal current limiting and thermal shutdown making them remarkably rugged. No external components are required with the PJ78L00 devices in many applications.

These devices offer a substantial performance advantage over the traditional zener diode-resistor combination, as output impedance and quiescent current are substantially reduced.

TO-92



Pin 1. Output
2. Ground
3. Input

SOT-89

PJ78L00

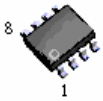
Pin 1. Input
2. Ground
3. Output

PJ78L00A

1. Output
2. Ground
3. Input

(Heatsink surface connected to Pin 2)

SOP-8



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

FEATURES

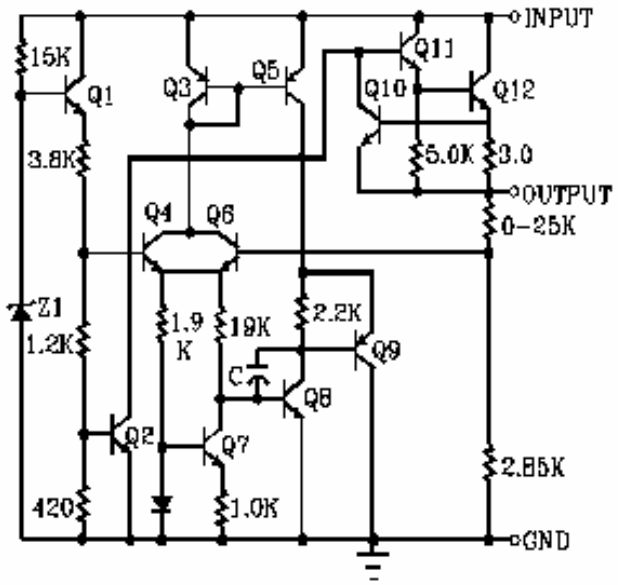
- Wide Range of Available, Fixed Output Voltages
- Low Cost
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required
- Complementary Negative Regulators Offered (PJ79L00 Series)
- Available in ±4% Voltage Tolerance.

ORDERING INFORMATION

Device	Operating Temperature	Package
PJ78LxxCT	-20℃ to +85℃	TO-92
PJ78LxxCS		SOP-8
PJ78LxxCY		SOT-89
PJ78LxxACY		

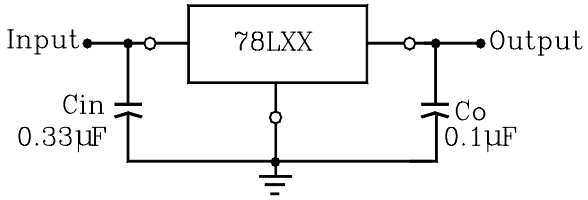
CIRCUIT SCHEMATIC

REPRESENTATIVE CIRCUIT SCHEMATIC



TYPICAL CONNECTING CIRCUIT

STANDARD APPLICATION



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

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

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

MAXIMUM RATINGS (Ta=+25℃ unless otherwise noted.)

RATING	SYMBOL	PJ78L00 SERIES	UNIT
Input Voltage	Vi *1	35	V
Input Voltage	Vi *2	40	V
Storage Junction Temperature Range	Tstg	-65 to +150	℃
Operating Junction Temperature Range	Tj	0 to +150	℃

Note : *1. PJ78L05 to PJ78L18

*2. PJ78L24

- This specification applies only for DC power dissipation permitted by absolute maximum ratings.
- Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

• *PJ78L05 ELECTRICAL CHARACTERISTICS*

(V_I =10V, Io=40mA, C_I=0.33μF, C_o=0.1μF, 0℃ < T_J <+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (T_J =+25℃)	Vo	4.8	5.0	5.2	Vdc
Line Regulation (T_J =+25℃, Io=40mA) 7.0V≤ V_I ≤20V 8.0V≤ V_I ≤20V	REGline	 -- --	 55 45	 150 100	mV
Load Regulation T_J =+25℃, 1.0mA≤Io≤100mA T_J =+25℃, 1.0mA≤Io≤40mA	REGload	 -- --	 11 5.0	 60 30	mV
Output Voltage 7.0V≤ V_I ≤20V, 1.0mA≤Io≤40mA V_I = 10V, 1.0mA≤Io≤70mA	Vo	 4.75 4.75	 -- --	 5.25 5.25	Vdc
Input Bias Current (T_J =+25℃) (T_J =+125℃)	I_{IB}	 -- --	 3.8 --	 6.0 5.5	mA
Input Bias Current Change 8.0V≤ V_I ≤20V 1.0mA≤Io≤40mA	ΔI_{IB}	 -- --	 -- --	 1.5 0.1	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn	--	40	--	μV
Ripple Rejection (lo=40mA, f=120Hz, 8.0V≤ V_I ≤18V, T_J =+25℃)	RR	41	49	--	dB
Dropout Voltage	Vi-Vo		1.7		Vdc

• *PJ78L08 ELECTRICAL CHARACTERISTICS*

(V_I =14V, Io=40mA, C_I =0.33μF, Co=0.1μF,0℃ < T_J <+125℃ , unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (TJ =+25℃)	Vo	7.7	8.0	8.3	Vdc
Line Regulation(TJ =+25℃, lo=40mA) 10.5V≤ VI ≤23V , 11V≤ VI ≤23V,	REGline	-- --	20 12	175 125	mV
Load Regulation TJ =+25℃, 1.0mA≤Io≤100mA TJ =+25℃, 1.0mA≤Io≤40mA	REGload	-- --	15 8.0	80 40	mV
Output Voltage 10.5V≤ VI ≤23V, 1.0mA≤Io≤40mA VI =14V, 1.0mA≤Io≤70mA	Vo	7.6 7.6	-- --	8.4 8.4	Vdc
Input Bias Current (TJ =+25℃) (TJ =+125℃)	I_{IB}	-- --	3.0 --	6.0 5.5	mA
Input Bias Current Change 11V≤ VI ≤23V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn	--	60	--	μV
Ripple Rejection (lo=40mA, f=120Hz, 12V≤ VI ≤23V, TJ =+25℃	RR	37	57	--	dB
Dropout Voltage (TJ =+25℃)	Vi-Vo	--	1.7	--	Vdc

• *PJ78L09 ELECTRICAL CHARACTERISTICS*

. (V_I=15V,Io=40mA,C_I=0.33 μF, Co=0.1 μF, -40℃<T_J<+125℃(for PJ78LXX), 0℃< T_J <125℃(PJ78LXX),unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (TJ =+25℃)	Vo	8.6	9.0	9.4	Vdc
Line Regulation(TJ =+25℃, lo=40mA) 11.5V≤ VI ≤24V , 12V≤ VI ≤24V,	REGline	-- --	20 12	175 125	mV
Load Regulation TJ =+25℃, 1.0mA≤Io≤100mA TJ =+25℃, 1.0mA≤Io≤40mA	REGload	-- --	15 8.0	90 40	mV
Output Voltage 11.5V≤ VI ≤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℃) (TJ =+125℃)	I_{IB}	-- --	3.0 --	6.0 5.5	mA
Input Bias Current Change 11V≤ VI ≤23V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn	--	60	--	μV
Ripple Rejection (lo=40mA, f=120Hz, 12V≤ VI ≤23V, TJ =+25℃	RR	37	57	--	dB
Dropout Voltage (TJ =+25℃)	Vi-Vo	--	1.7	--	Vdc

• *PJ78L12 ELECTRICAL CHARACTERISTICS*

(V_I =19V, Io=40mA, C_I =0.33μF, Co=0.1μF, 0℃ < T_J <+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (T_J =+25℃)	Vo	11.5	12	12.5	Vdc
Line Regulation(T_J =+25℃, Io=40mA) 14.5V≤ V_I ≤27V 16V≤ T_J ≤27V	REGline	-- --	120 100	250 200	mV
Load Regulation T_J =+25℃, 1.0mA≤Io≤100mA T_J =+25℃, 1.0mA≤Io≤40mA	REGload		20 10	100 50	mV
Output Voltage 14.5V≤ V_I ≤27V, 1.0mA≤Io≤40mA V_I =19V, 1.0mA≤Io≤70mA	Vo	11.4 11.4	-- --	12.6 12.6	Vdc
Input Bias Current (T_J =+25℃) (T_J =+125℃)	I_{IB}	-- --	42 --	6.5 6.0	mA
Input Bias Current Change 16V≤ V_I ≤27V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn	--	80	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 15V≤ V_I ≤25V, T_J =+25℃)	RR	36	42	--	dB
Dropout Voltage(T_J =+25℃)	Vi-Vo	--	1.7	--	Vdc

• *PJ78L15 ELECTRICAL CHARACTERISTICS*

(V_I =23V, Io=40mA, C_I =0.33μF, Co=0.1μF, 0℃ < T_J <+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (T_J =+25℃)	Vo	14.4	15	15.6	Vdc
Line Regulation(T_J =+25℃, Io=40mA) 17.5V≤ V_I ≤30V 20V≤ V_I ≤30V	REGline	-- --	130 110	300 250	mV
Load Regulation T_J =+25°C, 1.0mA≤Io≤100mA T_J =+25°C, 1.0mA≤Io≤40mA	REGload	-- --	25 12	150 75	mV
Output Voltage 17.5V< V_I <30V, 1.0mA≤Io≤40mA V_I =23V, 1.0mA≤Io≤70mA	Vo	14.25 14.25	-- --	15.75 15.75	Vdc
Input Bias Current (T_J =+25℃) (T_J =+125℃)	I_{IB}	-- --	4.4 --	6.5 6.0	mA
Input Bias Current Change 20V≤ V_I ≤30V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	90	--	μV
Ripple Rejection (Io=40mA, f=120Hz,18.5V≤ V_I ≤28.5V, T_J =+25°C)	RR	34	39	--	dB
Dropout Voltage (T_J =+25°C)	Vi-Vo	--	1.7	--	Vdc

• *PJ78L18 ELECTRICAL CHARACTERISTICS*

(V_I =27V, Io=40mA, C_I =0.33μF, Co=0.1μF, 0°C < T_J <+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (T_J =+25°C)	Vo	17.3	18	18.7	Vdc
Line Regulation(T_J =+25°C, Io=40mA) 20.7V≤ V_I ≤33V 21V≤ V_I ≤33V	REGline	-- --	45 35	325 275	mV
Load Regulation T_J =+25°C, 1.0mA≤Io≤100mA T_J =+25°C, 1.0mA≤Io≤40mA	REGload	-- --	30 15	170 85	mV
Output Voltage 21.5V≤ V_I ≤33V, 1.0mA≤Io≤40mA Vi=27V, 1.0mA≤Io≤70mA	Vo	17.1 17.1	-- --	18.9 18.9	Vdc
Input Bias Current (T_J =+25°C) (T_J =+125°C)	I_{IB}	-- --	3.1 --	6.5 6.0	mA
Input Bias Current Change 22V≤ V_I ≤33V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	150	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 23V≤ V_I ≤33V, T_J =+25°C)	RR	31	45	--	dB
Dropout Voltage (T_J =+25°C)	Vi-Vo	--	1.7	--	Vdc

• *PJ78L24 ELECTRICAL CHARACTERISTICS*

(V_I =33V, Io=40mA, C_I =0.33μF, Co=0.1μF, 0°C < T_J <+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (T_J =+25°C)	Vo	23	24	24	Vdc
Line Regulation(T_J =+25°C, Io=40mA) 27.5V≤ V_I ≤38V 28V≤ V_I ≤80V	REGline	-- --	50 60	350 300	mV
Load Regulation T_J =+25°C, 1.0mA≤Io≤100mA T_J =+25°C, 1.0mA≤Io≤40mA	REGload	-- --	40 20	200 100	mV
Output Voltage 28V≤ V_I ≤38V, 1.0mA≤Io≤40mA 28V≤ V_I ≤33V, 1.0mA≤Io≤70mA	Vo	22.8 22.8	-- --	25.2 25.2	Vdc
Input Bias Current (T_J =+25°C) (T_J =+125°C)	I_{IB}	-- --	3.1 --	6.5 6.0	mA
Input Bias Current Change 28V≤ V_I ≤38V 1.0mA≤Io≤40mA	ΔI_{IB}	-- --	-- --	1.5 0.1	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	200	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 29V≤ V_I ≤35V, T_J =+25°C)	RR	31	45	--	dB
Dropout Voltage (T_J =+25°C)	Vi-Vo	--	1.7	--	Vdc

FIGURE 1-DROPOUT CHANRACTERISTICS

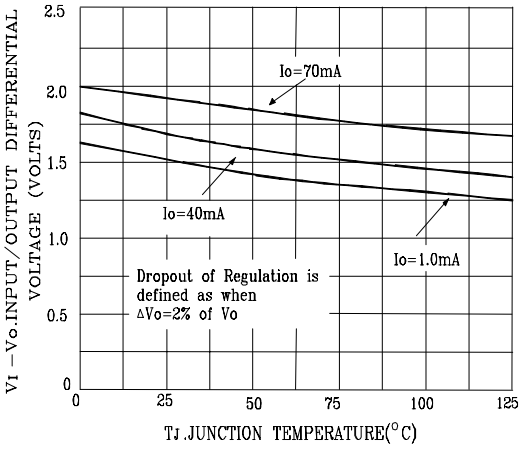


FIGURE 2 - DROPOUT VOLTAGE versus JUNCTION TEMPERATURE

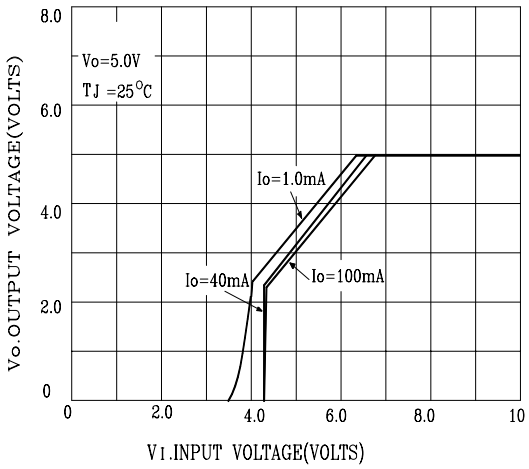


FIGURE 3 - INPUT BIAS CURRENT versus AMBIENT TEMPERATUR

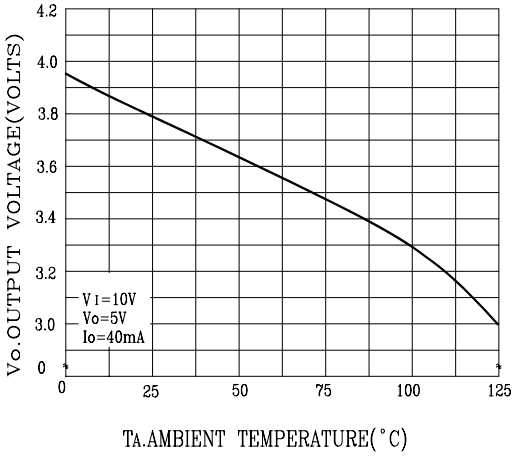


FIGURE 4 - INPUT BIAS CURRENT versus INPUT VOLTAGE

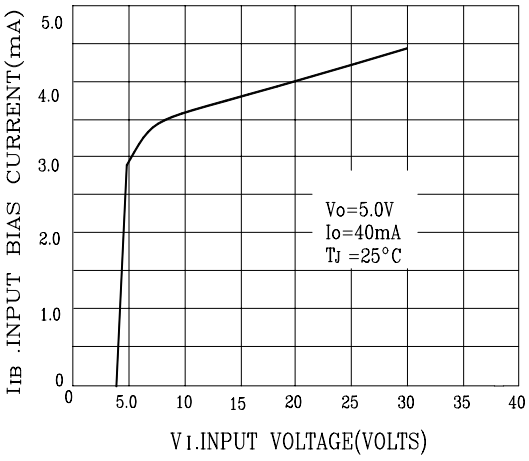
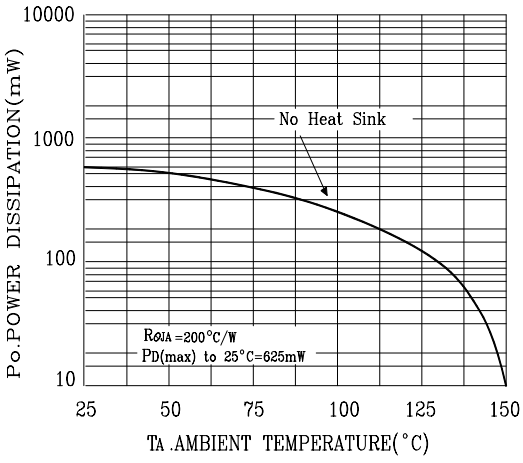
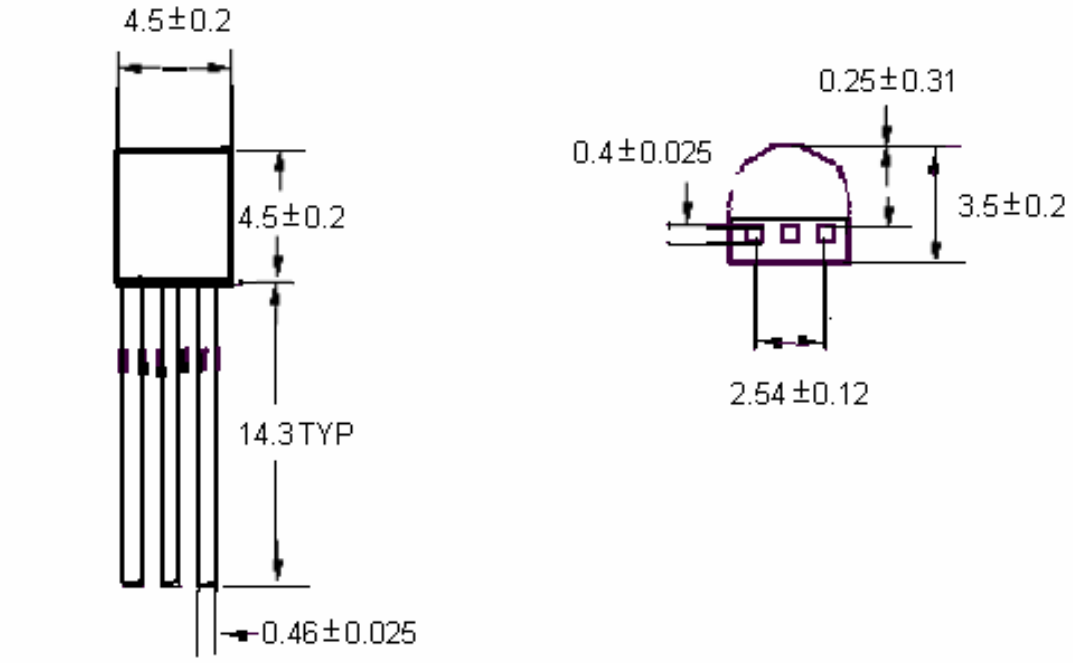


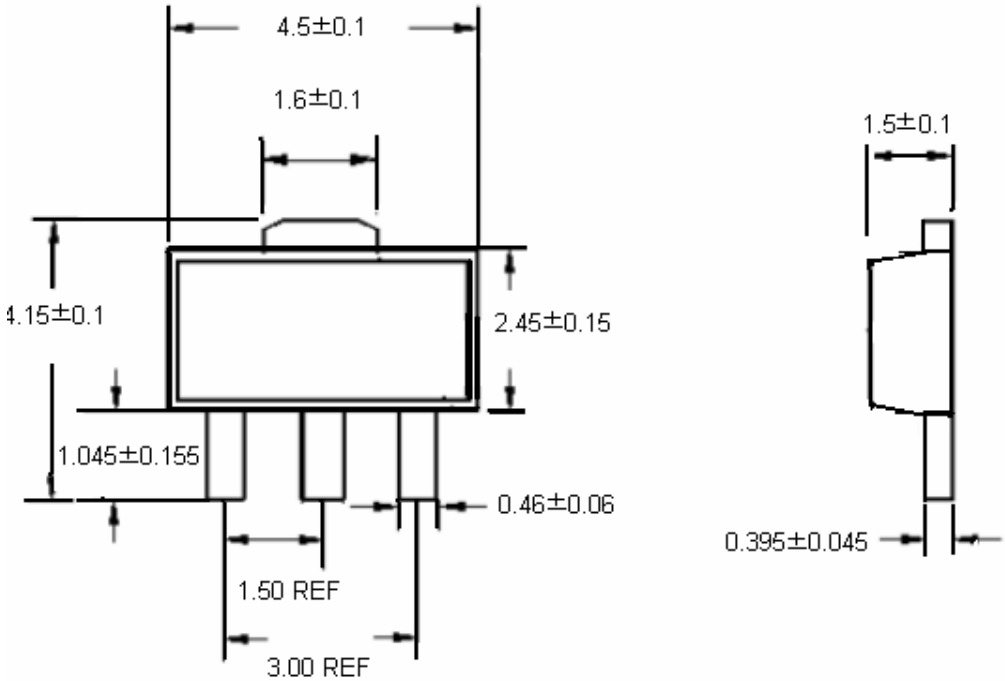
FIGURE 5 - MAXIMUM AVERAGE POWER DISSIPATION versus AMBIENT TEMPERATURE



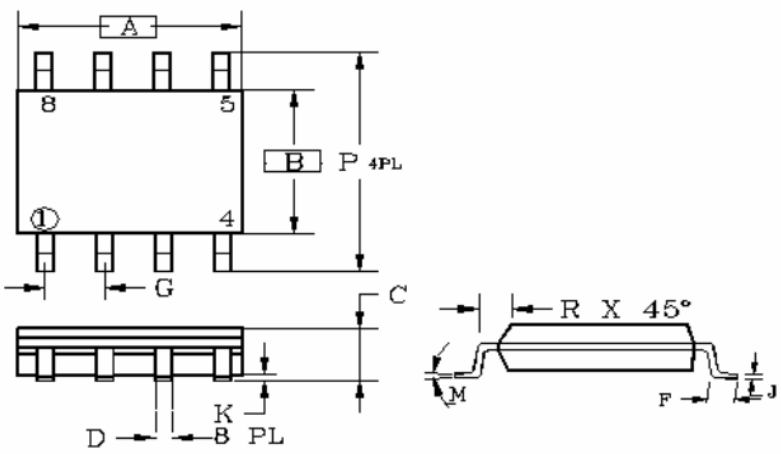
TO-92 Unit:mm



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