

### 3-Terminal Low Current Positive Voltage Regulators

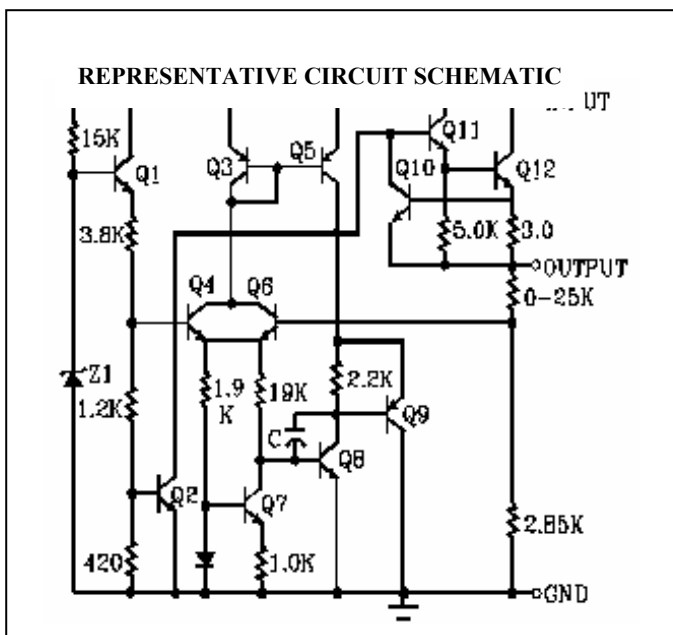
The PJ78L00 Series of positive voltage Regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require a regulated supply of up to 100 mA. Like their higher power PJ7800 Series cousins, these regulators feature internal current limiting and thermal shutdown making 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.

#### 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.

#### CIRCUIT SCHEMATIC



TO-92	SOT-89				
Pin 1. Output 2. Ground 3. Input	<table border="0"> <tr> <td style="text-align: center;">PJ78L00</td> <td style="text-align: center;">PJ78L00A</td> </tr> <tr> <td style="text-align: center;">Pin 1. Input 2. Ground 3. Output</td> <td style="text-align: center;">1. Output 2. Ground 3. Input</td> </tr> </table> <p>(Heatsink surface connected to Pin 2)</p>	PJ78L00	PJ78L00A	Pin 1. Input 2. Ground 3. Output	1. Output 2. Ground 3. Input
PJ78L00	PJ78L00A				
Pin 1. Input 2. Ground 3. Output	1. Output 2. Ground 3. Input				
SOP-8					
	<table border="0"> <tr> <td style="text-align: center;">Pin: 1.Vout 2.Gnd 3.Gnd 4.Nc</td> <td style="text-align: center;">5.Nc 6.Gnd 7.Gnd 8.Vin</td> </tr> </table>	Pin: 1.Vout 2.Gnd 3.Gnd 4.Nc	5.Nc 6.Gnd 7.Gnd 8.Vin		
Pin: 1.Vout 2.Gnd 3.Gnd 4.Nc	5.Nc 6.Gnd 7.Gnd 8.Vin				

#### ORDERING INFORMATION

Device	Operating Temperature (Ambient)	Package
PJ78LxxCT	-20°C to +85°C	TO-92
PJ78LxxCS		SOP-8
PJ78LxxCY		SOT-89
PJ78LxxACY		

#### 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.

\*= $C_{in}$  is required if regulator is located an appreciable distance from power supply filter.

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

### 3-Terminal Low Current Positive Voltage Regulators

**MAXIMUM RATINGS** (Ta=+25°C unless otherwise noted.)

RATING	SYMBOL	PJ78L00 SERIES	UNIT
Input Voltage	Vi *1	35	V
Input Voltage	Vi *2	40	V
Storage Temperature Range	Tstg	-25 to +150	°C
Operating Ambient Temperature	Topr	-20 to +85	°C
Operating Junction Temperature	Tj	0 to +125	°C
Temperature Coefficient	Tc	0.005	%/°C
Power Dissipation	PD		mW
TO-92		625	
SOP-8		500	
SOT-89		500	

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 0.33µF capacitor across the input and a 0.1µF capacitor across the output.

**PJ78L05 ELECTRICAL CHARACTERISTICS :**

(Vi=10V, Io=40mA, Ci=0.33µF, Co=0.1µF, 0°C <Tj<+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	4.8	5.0	5.2	Vdc
Line Regulation (Tj=+25°C, Io=40mA)	REGline	--	32	150	mV
7.0V≤Vi≤20V			26	100	
Load Regulation	REGload	--	15	60	mV
Tj=+25°C, 1.0mA≤Io≤100mA			8	30	
Output Voltage	Vo	4.8	--	5.2	Vdc
7.0V≤Vi≤20V, 1.0mA≤Io≤40mA		4.8	--	5.2	
Input Bias Current	IIB	--	3.8	6.0	mA
(Tj=+25°C)			--	5.5	
Input Bias Current Change	Δ IIB	--	--	1.5	mA
8.0V≤Vi≤20V			--	0.1	
Output Noise Voltage	Vn	--	40	--	µV
(Ta=+25°C, 10Hz≤f≤100KHz)					
Ripple Rejection	RR	40	49	--	dB
(Io=40mA, f=120Hz, 8.0V≤Vi≤18V, Tj=+25°C)					
Dropout Voltage	Vi-Vo	--	1.7	--	Vdc

### 3-Terminal Low Current Positive Voltage Regulators

**• PJ78L08 ELECTRICAL CHARACTERISTICS :**

(Vi=14V, Io=40mA, Ci=0.33μF, Co=0.1μF, 0°C <Tj<+125°C , unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	7.68	8.0	8.32	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 10.5V≤Vi≤23V , 11V≤Vi≤23V,	REGline	--	42 36	175 125	mV
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA Tj=+25°C, 1.0mA≤Io≤40mA	REGload	--	18 10	80 40	mV
Output Voltage 10.5V≤Vi≤23V, 1.0mA≤Io≤40mA Vi=14V, 1.0mA≤Io≤70mA	Vo	7.68 7.68	-- --	8.32 8.32	Vdc
Input Bias Current (Tj=+25°C) (Tj=+125°C)	I <sub>IB</sub>	--	3.0 --	6.0 5.5	mA
Input Bias Current Change 11V≤Vi≤23V 1.0mA≤Io≤40mA	ΔI <sub>IB</sub>	--	--	1.5 0.2	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	V <sub>n</sub>	--	54	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 12V≤Vi≤23V, Tj=+25°C)	RR	36	45	--	dB
Dropout Voltage (Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

**• PJ78L09 ELECTRICAL CHARACTERISTICS :**

(VI=16V, IO=40mA, CI=0.33 μ F, 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	8.64	9.0	9.36	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 11.5V≤Vi≤24V , 12V≤Vi≤24V,	REGline	--	45 40	175 125	mV
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA Tj=+25°C, 1.0mA≤Io≤40mA	REGload	--	19 11	90 40	mV
Output Voltage 11.5V≤Vi≤24V, 1.0mA≤Io≤40mA Vi=16V, 1.0mA≤Io≤70mA	Vo	8.64 8.64	-- --	9.36 9.36	Vdc
Input Bias Current (Tj=+25°C) (Tj=+125°C)	I <sub>IB</sub>	--	3.0 --	6.0 5.5	mA
Input Bias Current Change 11V≤Vi≤23V 1.0mA≤Io≤40mA	ΔI <sub>IB</sub>	--	--	1.5 0.1	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	V <sub>n</sub>	--	58	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 12V≤Vi≤23V, Tj=+25°C)	RR	37	45	--	dB
Dropout Voltage (Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

### 3-Terminal Low Current Positive Voltage Regulators

**• PJ78L12 ELECTRICAL CHARACTERISTICS :**

(Vi=19V, Io=40mA, Ci=0.33μF, Co=0.1μF, 0°C <Tj<+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	11.52	12	12.48	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 14.5V≤Vi≤27V 16V≤Vj≤27V	REGline	--	55 49	250 200	mV
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA Tj=+25°C, 1.0mA≤Io≤40mA	REGload	--	22 13	100 50	mV
Output Voltage 14.5V≤Vi≤27V, 1.0mA≤Io≤40Ma Vi=19V, 1.0mA≤Io≤70mA	Vo	11.52 11.52	-- --	12.48 12.48	Vdc
Input Bias Current (Tj=+25°C) (Tj=+125°C)	IIB	-- --	42 --	6.5 6.0	mA
Input Bias Current Change 16V≤Vi≤27V 1.0mA≤Io≤40mA	ΔIIB	-- --	-- --	1.5 0.2	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	70	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 15V≤Vi≤25V, Tj=+25°C)	RR	36	42	--	dB
Dropout Voltage(Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

**• PJ78L15 ELECTRICAL CHARACTERISTICS :**

(Vi=23V, Io=40mA, Ci=0.33μF, Co=0.1μF, 0°C <Tj<+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	14.4	15	15.6	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 17.5V≤Vi≤30V 20V≤Vi≤30V	REGline	-- --	65 58	300 250	mV
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA Tj=+25°C, 1.0mA≤Io≤40mA	REGload	-- --	25 12	150 75	mV
Output Voltage 17.5V<Vi<30V, 1.0mA≤Io≤40mA Vi=23V, 1.0mA≤Io≤70mA	Vo	14.40 14.40	-- --	15.60 15.60	Vdc
Input Bias Current (Tj=+25°C) (Tj=+125°C)	IIB	-- --	4.4 --	6.5 6.0	mA
Input Bias Current Change 20V≤Vi≤30V 1.0mA≤Io≤40mA	ΔIIB	-- --	-- --	1.5 0.2	mA
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	82	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 18.5V≤Vi≤28.5V, Tj=+25°C)	RR	33	39	--	dB
Dropout Voltage (Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

### 3-Terminal Low Current Positive Voltage Regulators

**• PJ78L18 ELECTRICAL CHARACTERISTICS :**

(Vi=27V, Io=40mA, Ci=0.33μF, Co=0.1μF, 0°C <Tj<+125°C unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	17.28	18	18.72	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 2154V≤Vi≤33V	REGline	--	70	325	mV
22V≤Vj≤33V		--	64	275	
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA	REGload	--	30	170	mV
Tj=+25°C, 1.0mA≤Io≤40mA		--	15	85	
Output Voltage 21.5V≤Vi≤33V, 1.0mA≤Io≤40mA	Vo	17.44	--	18.56	Vdc
Vi=27V, 1.0mA≤Io≤70mA		17.44	--	18.56	
Input Bias Current (Tj=+25°C)	IB	--	3.1	6.5	mA
(Tj=+125°C)		--	--	6.0	
Input Bias Current Change 22V≤Vi≤33V	ΔIB	--	--	1.5	mA
1.0mA≤Io≤40mA		--	--	0.2	
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	150	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 23V≤Vi≤33V, Tj=+25°C)	RR	32	46	--	dB
Dropout Voltage (Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

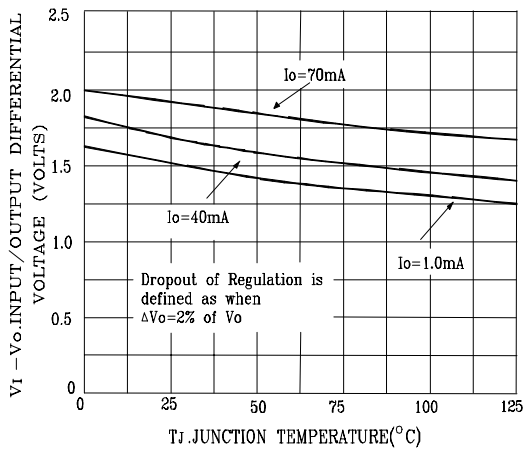
**• PJ78L24 ELECTRICAL CHARACTERISTICS :**

(Vi=33V, Io=40mA, Ci=0.33μF, Co=0.1μF, 0°C <Tj<+125°C unless otherwise noted.)

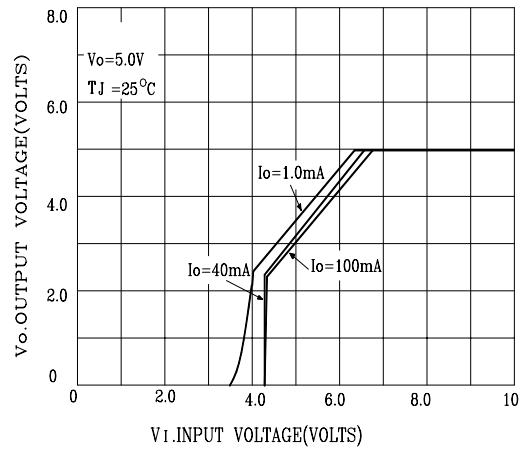
CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25°C)	Vo	23.04	24	24.96	Vdc
Line Regulation(Tj=+25°C, Io=40mA) 27.5V≤Vi≤38V	REGline	--	35	350	mV
28V≤Vi≤38V		--	30	300	
Load Regulation Tj=+25°C, 1.0mA≤Io≤100mA	REGload	--	40	200	mV
Tj=+25°C, 1.0mA≤Io≤40mA		--	20	100	
Output Voltage 28V≤Vi≤38V, 1.0mA≤Io≤40mA	Vo	23.32	--	24.68	Vdc
28V≤Vi≤33V, 1.0mA≤Io≤70mA		23.32	--	24.68	
Input Bias Current (Tj=+25°C)	IB	--	3.1	6.5	mA
(Tj=+125°C)		--	--	6.0	
Input Bias Current Change 28V≤Vi≤38V	ΔIB	--	--	1.5	mA
1.0mA≤Io≤40mA		--	--	0.2	
Output Noise Voltage (Ta=+25°C, 10Hz≤f≤100KHz)	Vn	--	200	--	μV
Ripple Rejection (Io=40mA, f=120Hz, 29V≤Vi≤35V, Tj=+25°C)	RR	30	43	--	dB
Dropout Voltage (Tj=+25°C)	Vi-Vo	--	1.7	--	Vdc

### 3-Terminal Low Current Positive Voltage Regulators

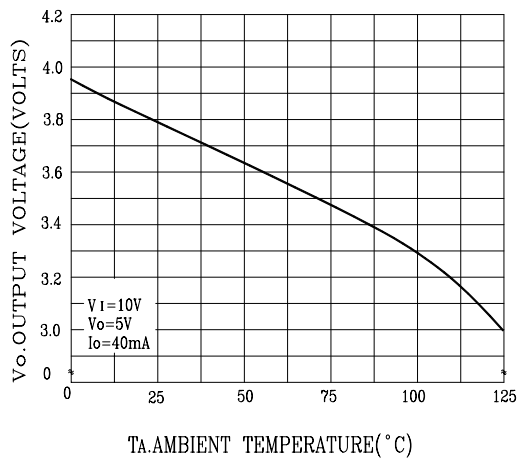
**FIGURE 1 - DROPOUT VOLTAGE versus JUNCTION TEMPERATURE**



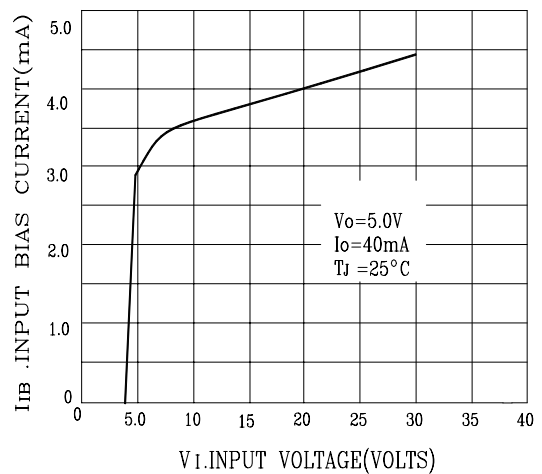
**FIGURE 2 – DROPOUT CHARACTERISTICS**



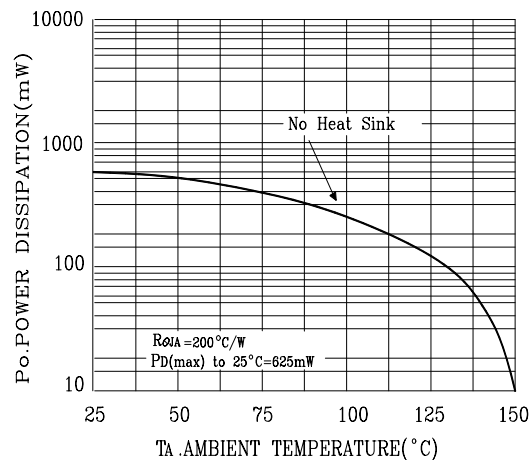
**FIGURE 3 - INPUT BIAS CURRENT versus AMBIENT TEMPERATURE**



**FIGURE 4 - INPUT BIAS CURRENT versus INPUT VOLTAGE CHARACTERISTICS**



**FIGURE 5 - MAXIMUM AVERAGE POWER DISSIPATION versus AMBIENT TEMPERATURE**

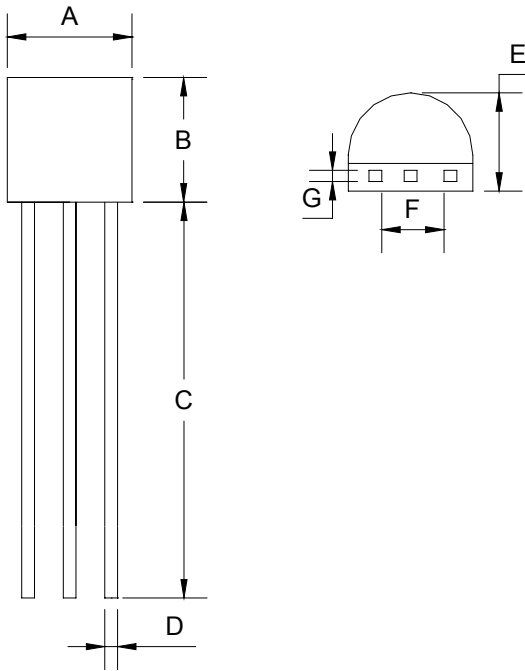


### 3-Terminal Low Current Positive Voltage Regulators

TO-92 Mechanical drawing

1.Top View

2.Side View

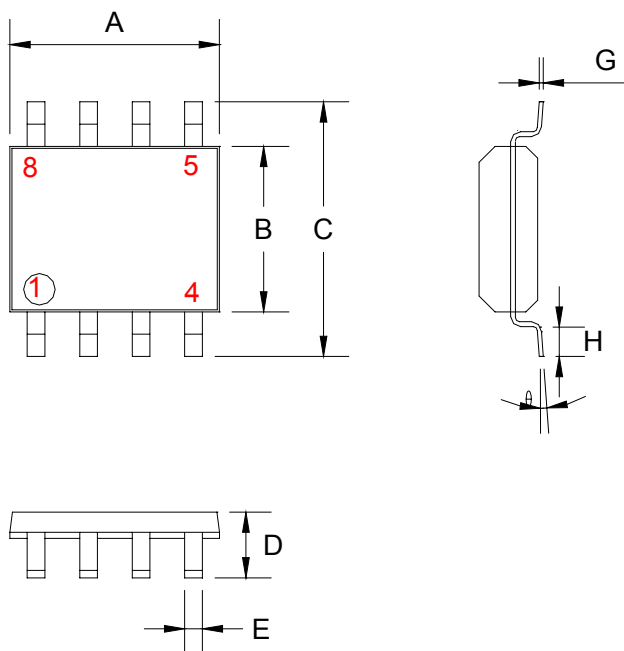


TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30	14.35	0.563	0.565
D	0.40	0.50	0.015	0.020
E	3.30	3.70	0.129	0.146
F	2.42	2.66	0.095	0.105
G	0.37	0.42	0.014	0.017

SOP-8 Mechanical drawing

1.Top View

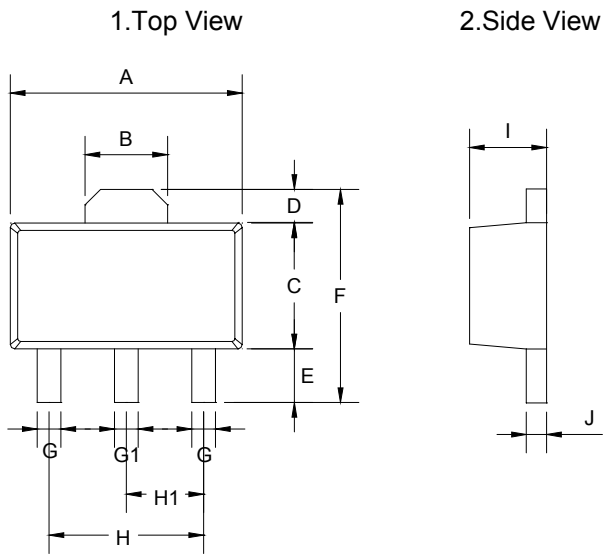
2.Side View



SOP-8 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	5.80	6.20	0.228	0.244
D	1.40	1.50	0.055	0.059
E	0.33	0.51	0.013	0.020
F	1.27BSC		0.05BSC	
G	0.19	0.25	0.007	0.010
H	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

3-Terminal Low Current Positive Voltage Regulators

SOT-89 Mechanical drawing

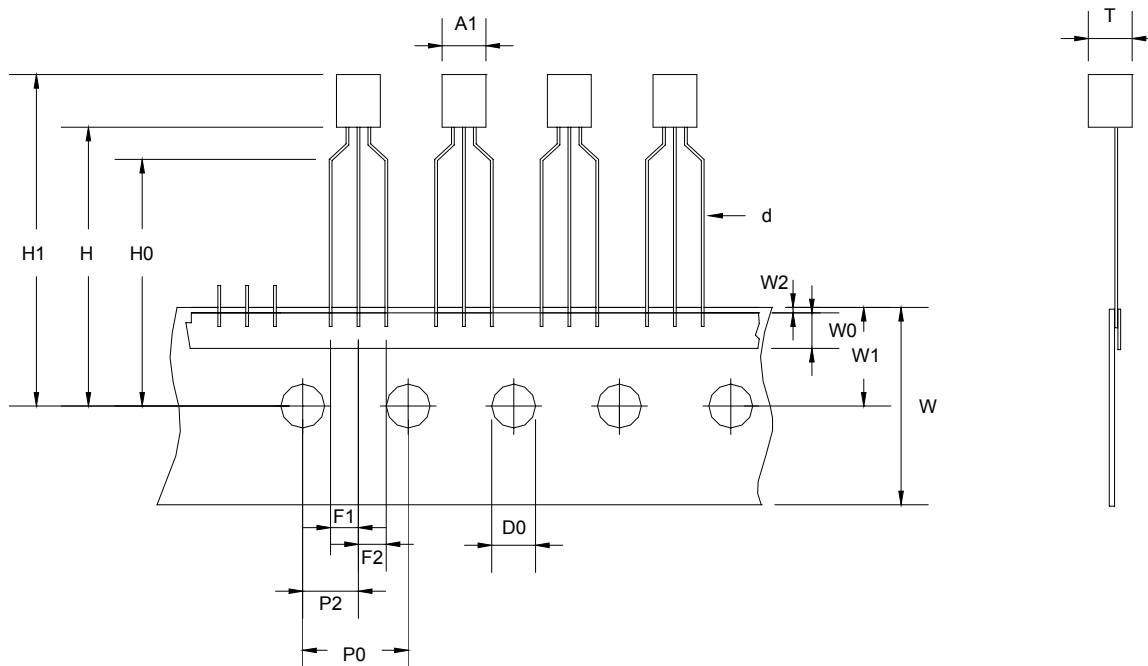


SOT-89 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
B	1.40	1.75	0.055	0.069
C	2.40	2.60	0.094	0.102
D	0.35	0.45	0.014	0.018
E	0.80	-	0.031	-
F	-	4.25	-	0.167
G	0.36	0.48	0.014	0.019
G1	0.41	0.53	0.016	0.020
H	2.90	3.10	0.114	0.122
H1	1.40	1.60	0.054	0.063
I	1.40	1.60	0.055	0.063
J	0.38	0.43	0.014	0.017



### 3-Terminal Low Current Positive Voltage Regulators

#### TO-92 PACKING INFORMATION



DIM	MILLIMETERS	INCHES
A1	4.50±0.20	0.177±0.008
T	3.50±0.20	0.138±0.008
d	0.45±0.50	0.018±0.02
P0	12.7±0.30	0.50±0.012
P2	6.35±0.70	0.25±0.028
F1,F2	2.54+0.40/-0.10	0.10+0.016/-0.004
W	18.00+1.00/-0.50	0.708+0.04/-0.02
W0	6.00±0.3	0.236±0.012
W1	9.00+0.25/-0.50	0.354+0.01/-0.02
W2	0.50±0.05	0.02±0.002
H	18.50±0.50	0.728±0.02
H0	16.00±0.50	0.630±0.02
H1	23.57±0.64	0.927±0.025
D0	4.00±0.20	0.157±0.008

#### PACKING SPECIFICATION

	SPEC.	Q'TY
INNER BOX	380mm*201mm*46mm	2,000PCS
CARTON	426mm*370mm*280mm	20KPCS