GLOBALTECH SEMICONDUCTOR

GS78Lxx

Three-Terminal Positive Voltage Regulator

Product Description

The GS78Lxx 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 100mA. Like their higher-powered GS78xx Series cousins, these regulators feature internal current limiting and thermal shutdown making them remarkably rugged. No external components are required with the GS78Lxx 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.

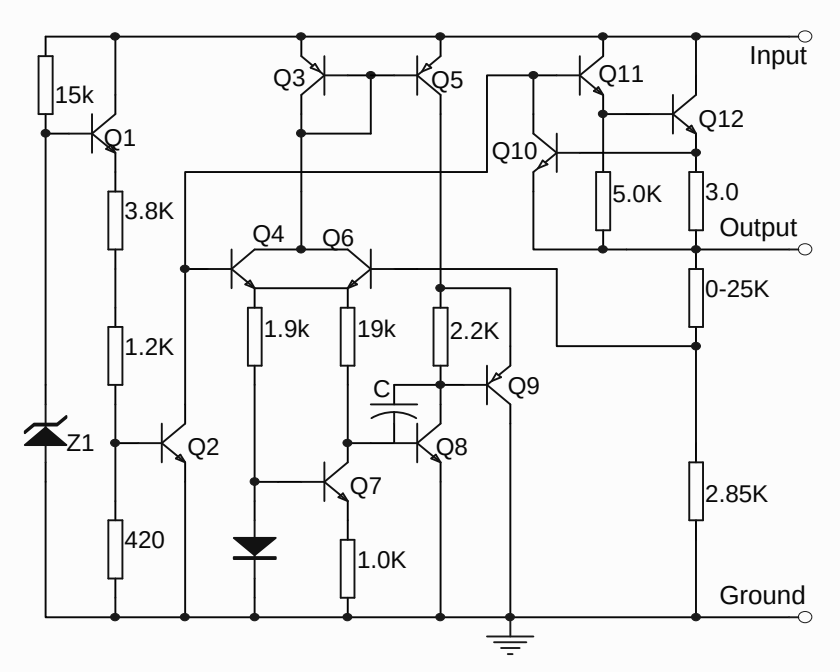
Features

- Wide Range of Available, Fixed Output Voltages
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required
- Complementary Negative Regulators Offered (GS79Lxx Series)
- Available in ±5% Accuracy

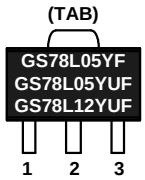
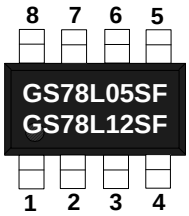
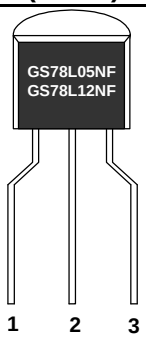
Applications

- Battery Powered Systems
- Portable Consumer Equipment
- Portable Computer
- Radio Control Systems
- Logic Systems
- Power Adapter

Representative Schematic Diagram

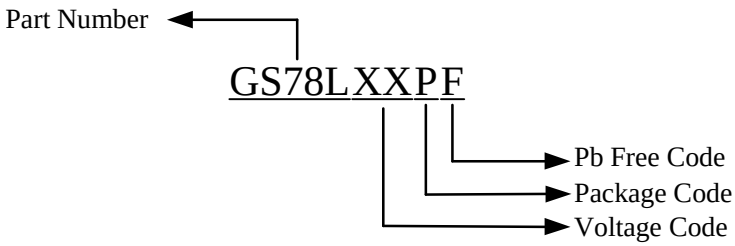


Packages & Pin Assignments

GS78LxxYF (SOT-89)	GS78LxxSF (SOP-8)	GS78LxxNF (TO-92)
		

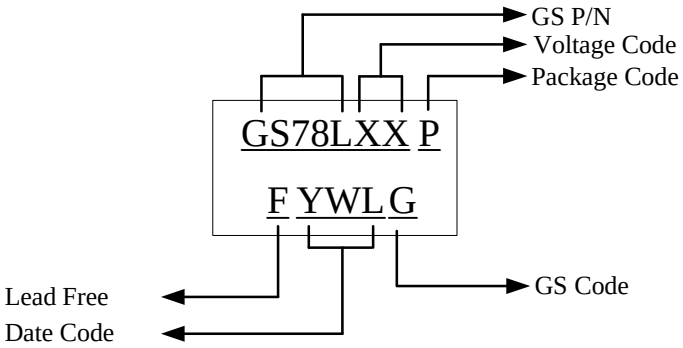
GS78L05YF		GS78L05YUF GS78L12YUF		GS78L05SF GS78L12SF		GS78L05NF GS78L12NF	
1	V_{IN}	1	V_{OUT}	1	V_{OUT}	1	V_{OUT}
2	GND	2	GND	8	V_{IN}	2	G_{ND}
3	V_{OUT}	3	V_{IN}	2,3,6,7	GND	3	V_{IN}
				4,5	NC		

Ordering Information



*Request for other voltages, please contact factory directly.

Marking Information



Absolute Maximum Ratings

(T_A=+125℃, unless otherwise noted.)

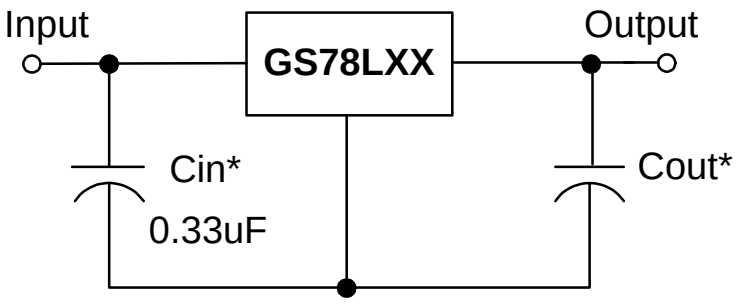
Parameter	Symbol	Maximum		Unit
Input voltage	V_{IN}	30		V
Power Dissipation (Note1)	P_D	SOT-89	0.5	W
		SOP-8	0.625	
		TO-92	0.5	
The junction-to-ambient thermal resistance	θ_{JA}	SOT-89	200	℃/w
		SOP-8	160	
		TO-92	200	
Operating junction temperature range	T_J	0 to +150		℃
Storage temperature range	T_{STG}	-65 to +150		℃

Electrical Characteristics

(V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33μ F, C_{OUT}=0.1μ F, 0℃<T_J<+125℃, unless otherwise noted.)

Parameter	Symbol	Characteristics	Min.	Typ.	Max.	Unit
Output voltage	V_{OUT}	T_J=+25℃	4.8	5.0	5.2	V
Line regulation	Reg_{LINE}	T_J=+25℃, I_{OUT} =40mA 7.0V ≤ V_{IN} ≤20V 8.0V ≤ V_{IN} ≤20V	-- --	55 45	150 100	mV mV
Load regulation	Reg_{LOAD}	T_J=+25℃, 1.0mA ≤I_{OUT} ≤100mA T_J=+25℃, 1.0mA ≤ I_{OUT} ≤40mA	-- --	11 5.0	60 30	mV mV
Output voltage	V_{OUT}	7.0V ≤V_{IN} ≤20V,1.0mA ≤ I_{OUT} ≤40mA V_{IN} =10V, 1.0mA ≤I_{OUT} ≤70mA	4.75 4.75	-- --	5.25 5.25	V
Input bias current change	I_{IB}	T_J=+25℃ T_J=+125℃	-- --	3.8 --	6.0 5.5	mA
Input bias current change	△I_{IB}	8.0V ≤V_I ≤20V 1.0mA ≤Io ≤40mA	-- --	-- --	1.5 0.1	mA
Output noise voltage	V_N	T_A=+25℃, 10Hz ≤f ≤100kHz	--	40	--	μV
Ripple rejection	RR	I_{OUT}=40mA, f=120Hz, 8.0V ≤V_{IN} ≤18V, T_J=+25℃	41	49	--	dB
Dropout voltage	V_{IN}-V_{OUT}	T_J=+25℃	--	1.7	--	V

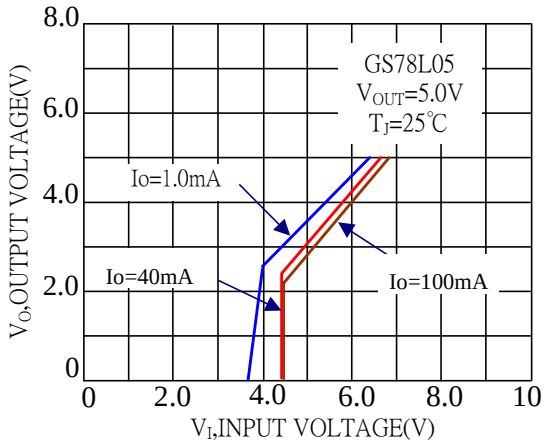
Standard Application



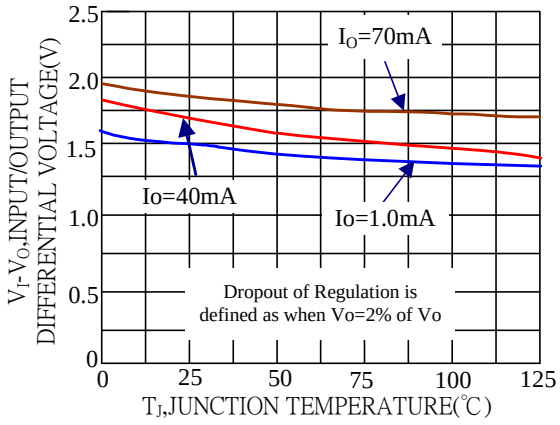
A common ground is required between the input and the output voltages.
* C_{IN} is required if regulator is located an appreciable distance form power supply filter.
**C_{OUT} is not needed for stability, however, it does improve transient response.

Typical Performance Characteristics

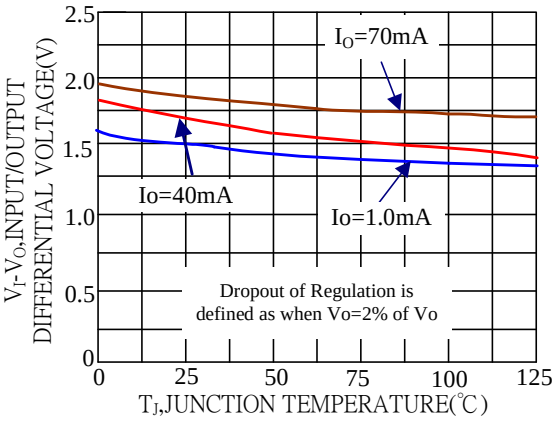
Dropout Characteristics



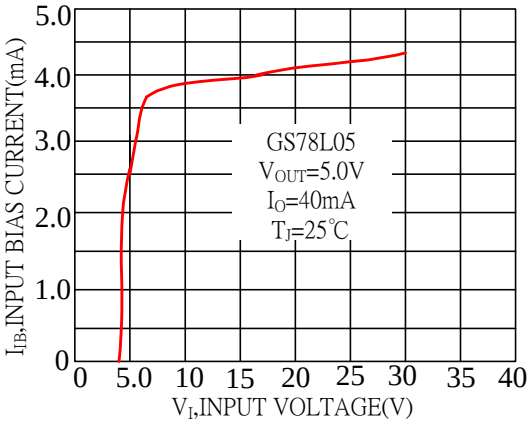
Dropout Voltage versus Junction Temperature



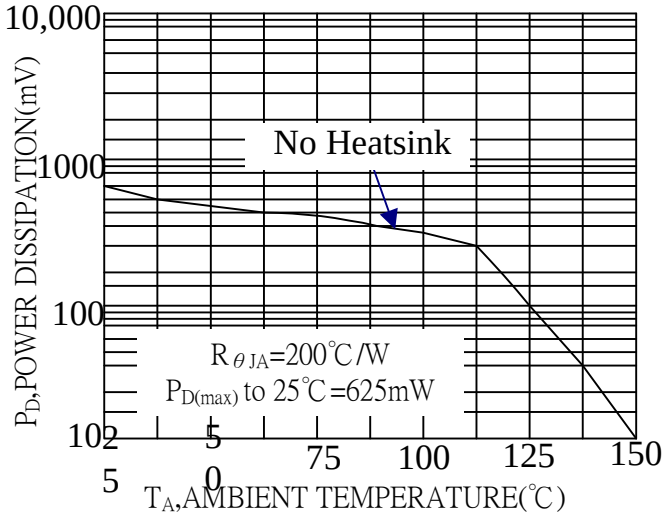
Input Bias Current versus Ambient Temperature



Input Bias Current versus Input Voltage



Maximum Average Power Dissipation versus Ambient Temperature TO-92 Type Package



Typical Applications

Design Considerations

The GS78LXX 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 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. The input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33 µF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Good construction techniques 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.

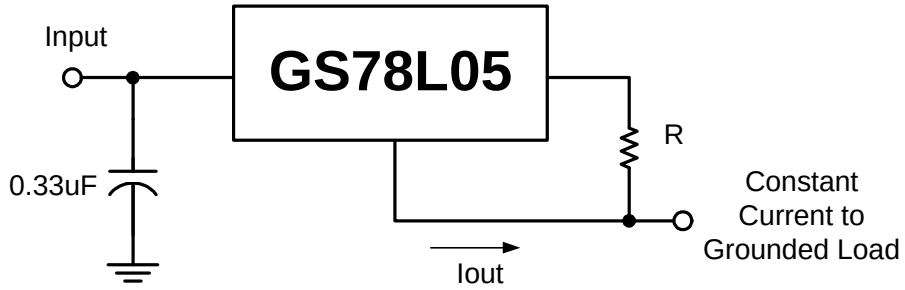
Current Regulator

The GS78LXX regulators can also be used as a current source when connected as above. In order to minimize dissipation the GS78L05 is chosen in this application. Resistor R determines the current as follows:

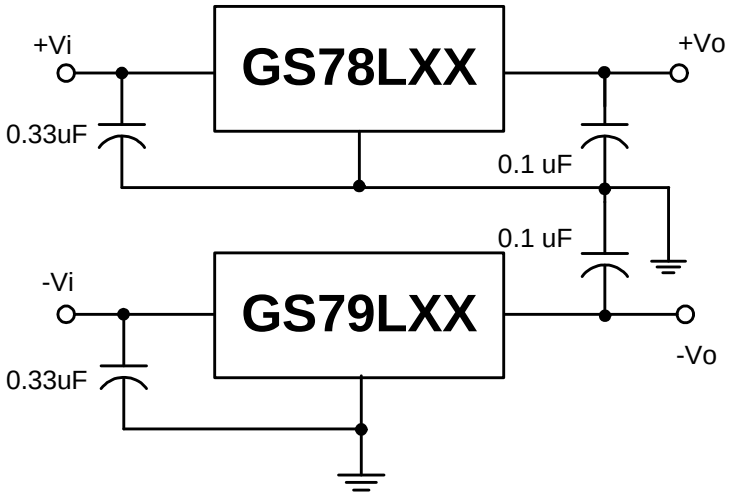
$$\mathbf{Io} = \frac{5.0V}{R} + \mathbf{I_B}$$

I_{IB}=3.8mA over line and load changes

For example, a 100mA current source would require R to be a 50Ω, 1/2 W resistor and the output voltage compliance would be the input voltage less 7V.

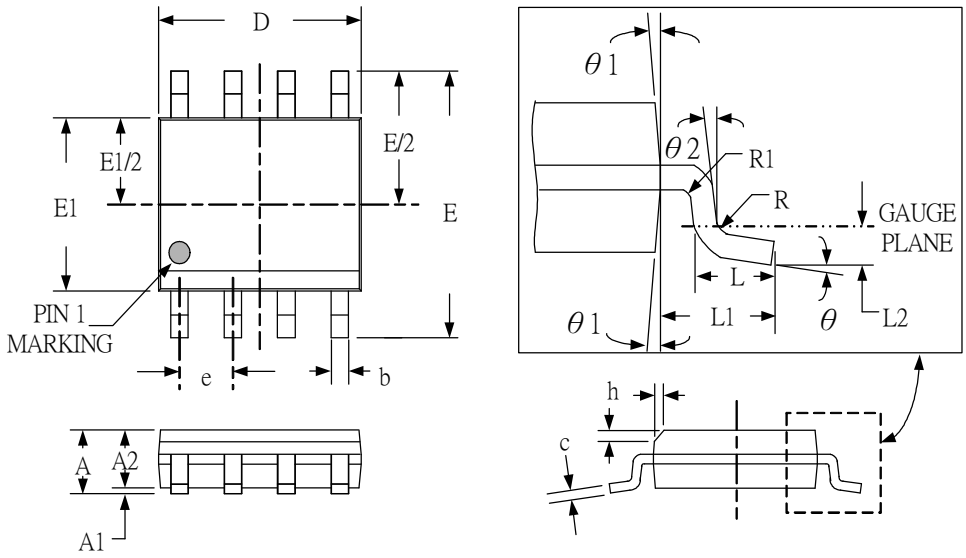


Positive and Negative Regulator



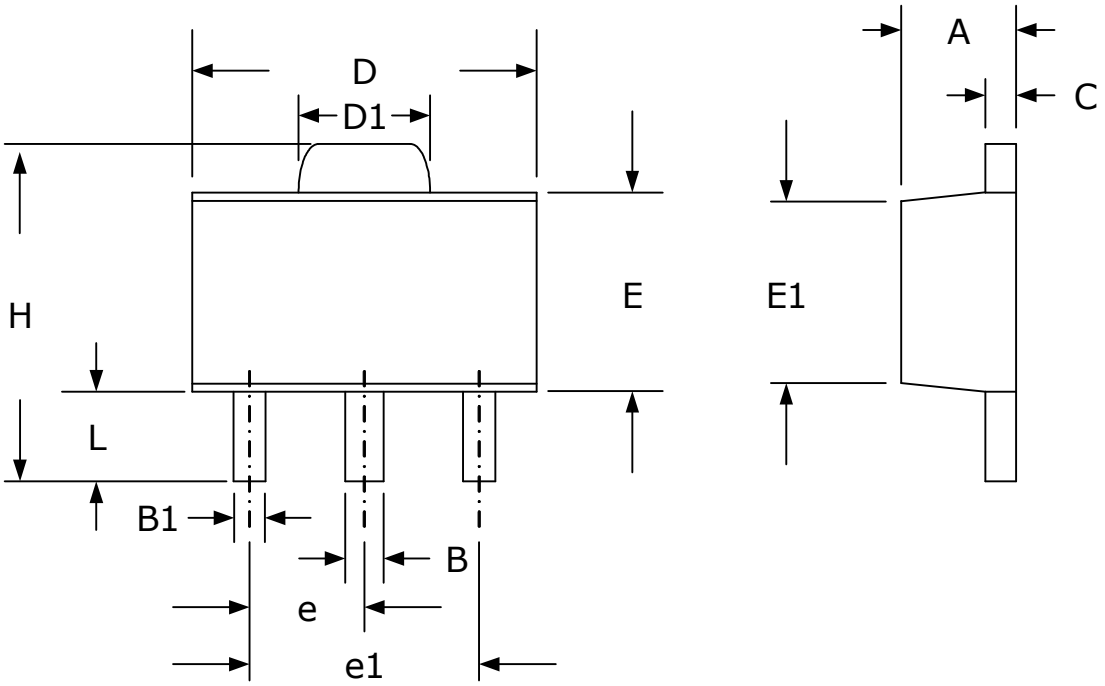
Package Dimension

SOP-8 PLASTIC PACKAGE



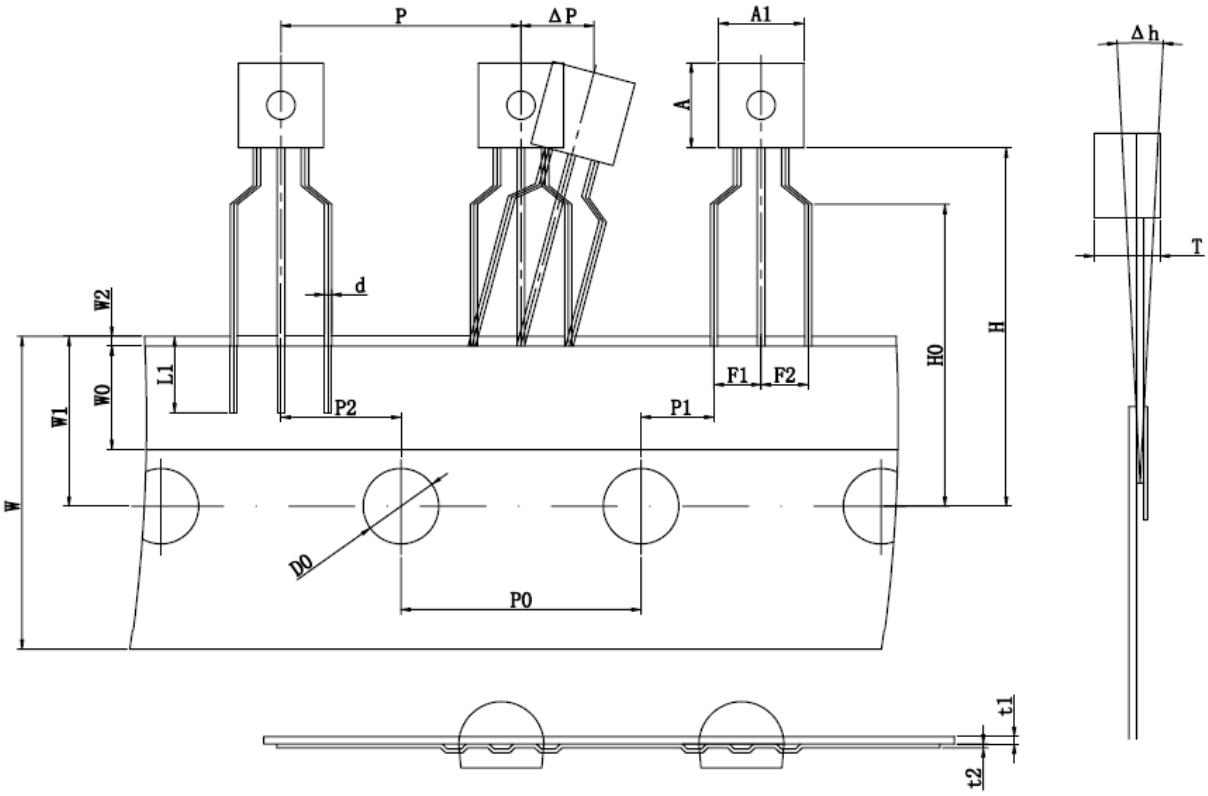
Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.053	.069
A1	0.10	0.25	.004	.010
A2	1.25	1.65	.049	.065
b	0.31	0.51	.012	.020
c	0.17	0.25	.007	.010
D	4.90 (TYP)		.193 (TYP)	
E	6.00 (TYP)		.236 (TYP)	
E1	3.90 (TYP)		.154 (TYP)	
e	1.27 (TYP)		.050 (TYP)	
L	0.40	1.27	.016	.050
L1	1.04 (TYP)		.041 (TYP)	
L2	0.25 (TYP)		.010 (TYP)	
R	0.07	-	.003	-
R1	0.07	-	.003	-
h	0.25	0.50	.010	.020
θ	0°	8°	0°	8°
θ1	5°	15°	5°	15°
θ2	0°	-	0°	-

SOT-89 PLASTIC PACKAGE



Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	1.40	1.60	.055	.063
B	0.44	0.56	.017	.022
B1	0.36	0.48	.014	.019
C	0.35	0.44	.014	.017
D	4.40	4.60	.173	.181
D1	1.62	1.83	.064	.072
E	2.29	2.60	.090	.102
E1	2.13	2.29	.084	.090
e	1.50 (TYP)		.059 (TYP)	
e1	3.00 (TYP)		.118 (TYP)	
H	3.94	4.25	.155	.167
L	0.89	1.20	.035	.047

TO-92 PLASTIC PACKAGE



Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A1	4.4	4.6	*.173*	*.181*
A	4.4	4.6	*.173*	*.181*
T	3.4	3.6	.133	.142
d	.36	.40	.014	.016
P	12.4	13.0	.487	.512
P0	12.5	12.9	.491	.508
P2	6.05	6.65	.238	.262
F1,F2	2.2	2.8	.086	.110
△h	-1.0	1.0	-.039	.039
W	17.5	19	.688	.748
W0	5.5	6.5	.216	.256
W1	8.5	9.5	.334	.374
W2	-	1	-	.039
H	19.	21	.747	.827
H0	15.5	16.5	.609	.650
L1	2.5	-	.098	-
D0	3.8	4.2	.149	.165
t1	.35	.45	.014	.018
t2	.15	.25	.006	.010
P1	3.55	4.15	.140	.163
△P	-1	1	-.039	.039

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