3-Terminal Positive Voltage Regulator ME78L05

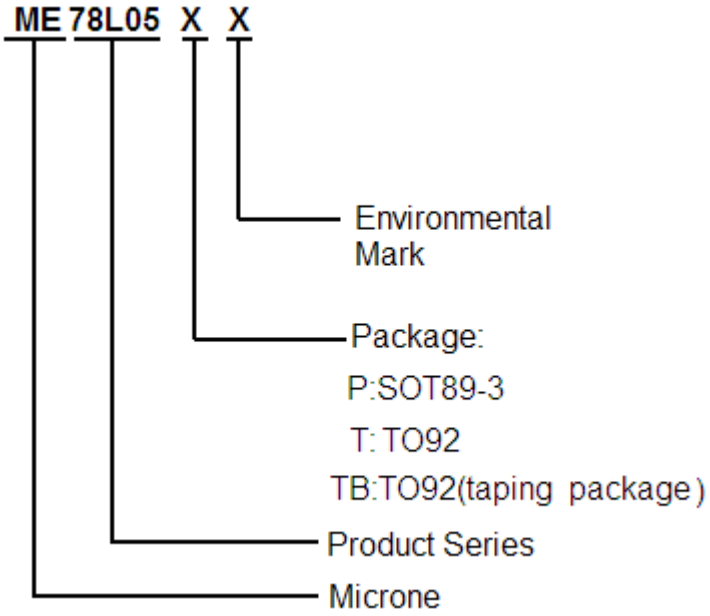
General Description

ME78L05 is three-terminal positive regulators. One of these regulators can deliver up to 100 mA of output current. The internal limiting and thermal -shutdown features of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor Comb-ination, an effective improvement in output impe-dance can be obtained, together with lower quiescent current.

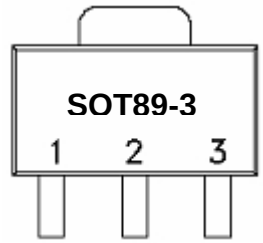
Features

- ●Output Current of 100mA
- ●Output Voltages of 5V±5% over the temperature range
- ●Thermal Overload Protection
- ●Short Circuit Protection
- ●Output transistor safe area protection
- ●No external components
- ●Package：SOT89-3 and TO92(Taping Package)

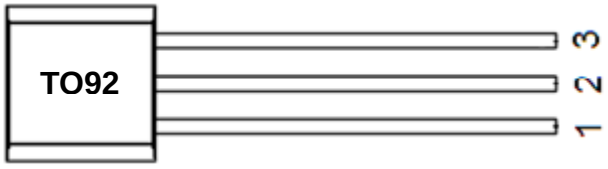
Selection Guide



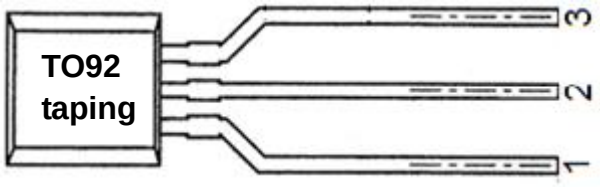
Pin Configuration



1. Output
2. GND
3. Input

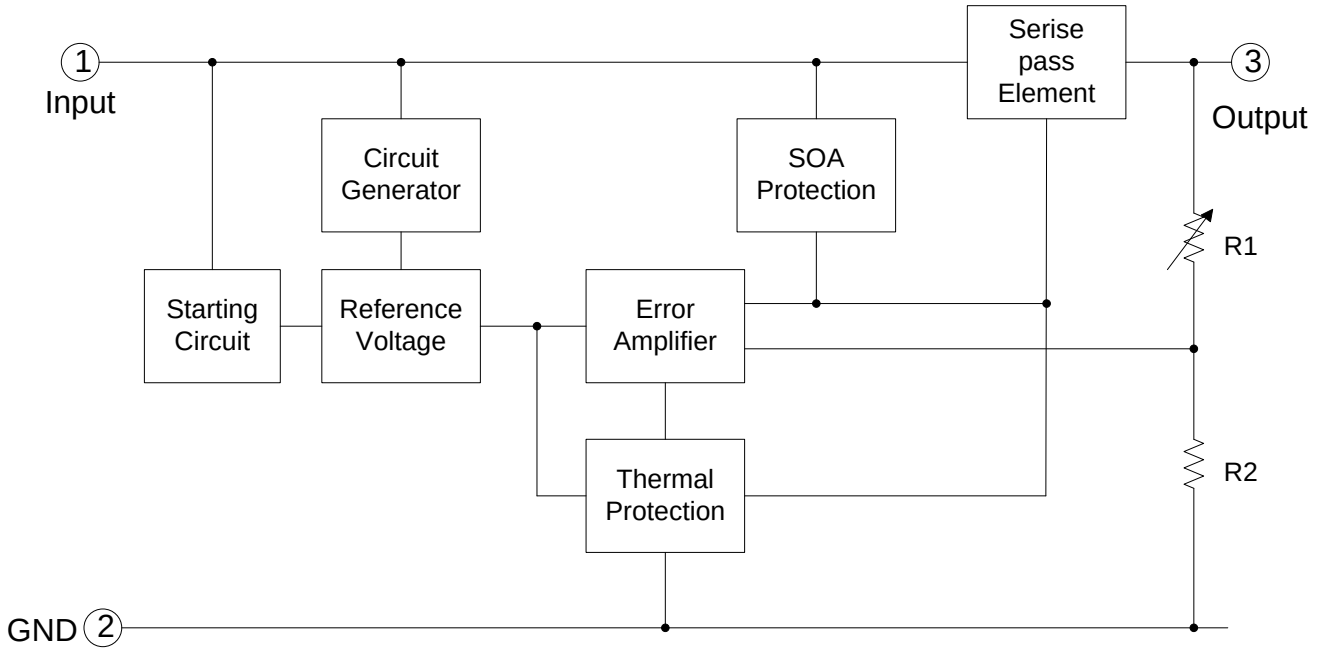


1.Output 2.GND 3.Input



1.Output 2.GND 3.Input

Block Diagram



Maximum Ratings(Ta=25℃)

Parameter	Rating	Unit
Input supply voltage : VIN	30	V
MAX. Output current:Iout	100	mA
Max Power:Pmax	0.35	W
Maximum junction temperature: T_j	-25～125	℃
Storage temperature :T_{str}	-55～150	℃
Soldering temperature and time	+260（Recommended 10S）	℃

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage.

These values must therefore not be exceeded under any conditions.

Electrical Characteristics

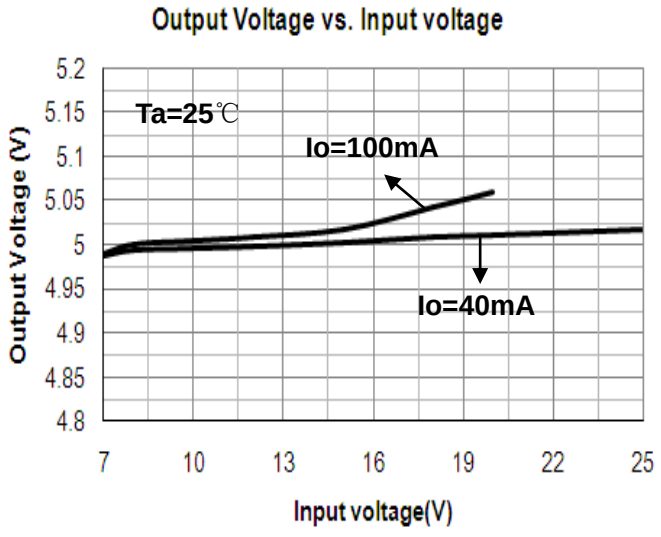
(Cin =0.33μF, Co =0.1μF,0≤Tj≤125^{O}C, unless otherwise noted)

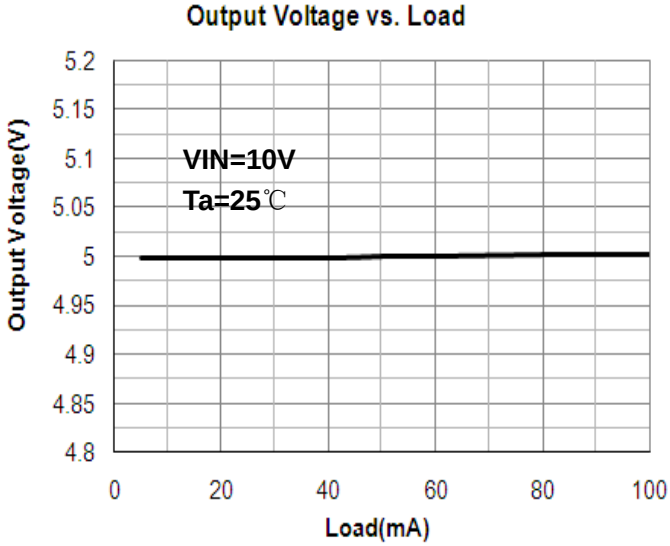
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	I_O=40mA, VIN=10V	4.82	5.0	5.18	V
		I_O=1mA～40mA VIN=7V～20V	4.8	5.0	5.2	
		I_O=1mA～10mA VIN=10V	4.75	5.0	5.25	
Line Regulations	LNR	VIN=7V～20V,I_O=40mA	-150	-	150	mV
		VIN=8V～20V,I_O=40mA	-100	-	100	
Load Regulation	LDR	VIN=10V,I_O=1mA-100mA	-60	-	60	mV
		VIN=10V,I_O=1mA-40mA	-30	-	30	
Dropout Voltage	V_{DIF}	Tj=25^{O}C,Io=100mA	-	2	-	V
Output noise Voltage	V_N	f=10Hz to 100KHz	-	40	-	μV/Vo
Ripple Rejection	PSRR	Tj=25^{O}C,f=120Hz,Io=40mA VIN=8V～20V	-	80	-	dB
Peak Output Current	I_{pk}	Tj=25^{O}C	-	500	-	mA
Quiescent Current	I_Q	VIN=10V,I_{OUT}=40mA	-	-	5.5	mA
Quiescent Current Change	ΔI_Q	VIN=8V～20V,I_O=40mA	-1.5	-	1.5	mA
		VIN=10V,I_O=1mA～40mA,	-0.1	-	0.1	

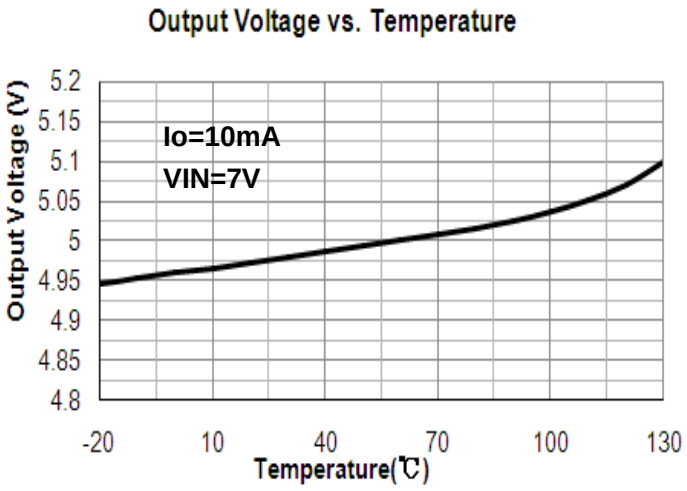
LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

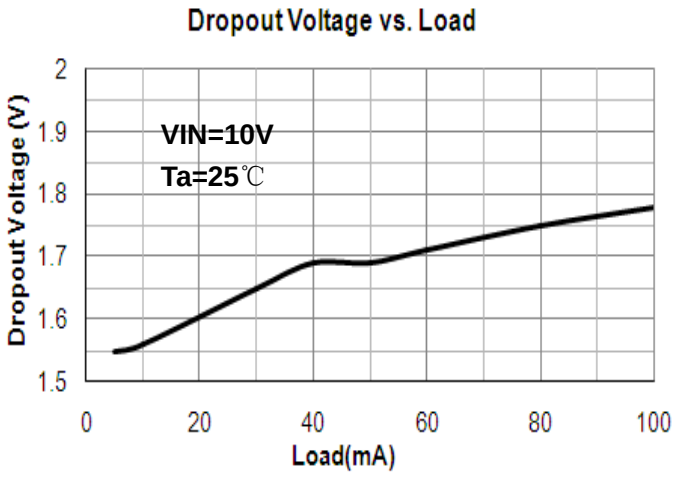
LDR: Load Regulation.The change in output voltage for a change in load current at constant chip temperature.

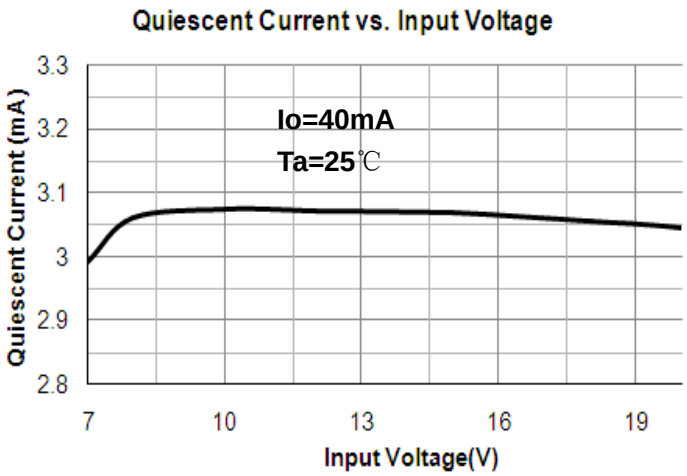
Type Characteristics

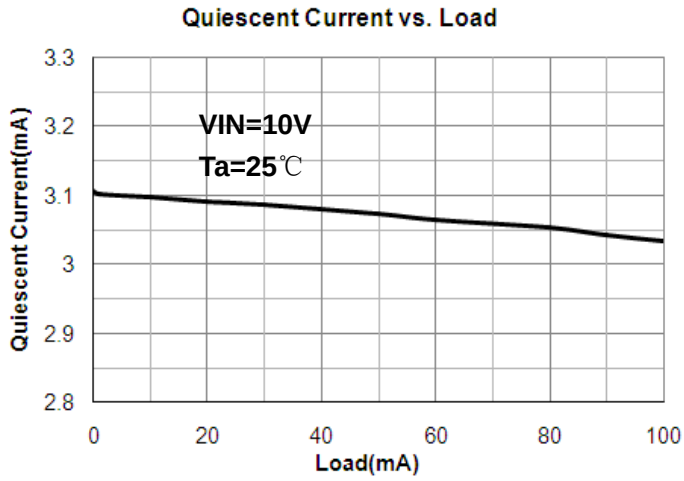












Operation Description

ME78L05 is 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, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

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 0.33μFor 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 regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Typical Application Circuit

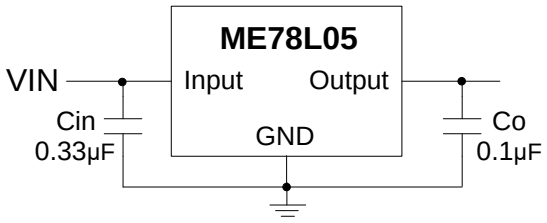


Fig.1 Fixed Output Regulator

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.

- Cin is required if regulator is located an appreciable distance from power supply filter.
- Co is not needed for stability; however, it does improve transient response.

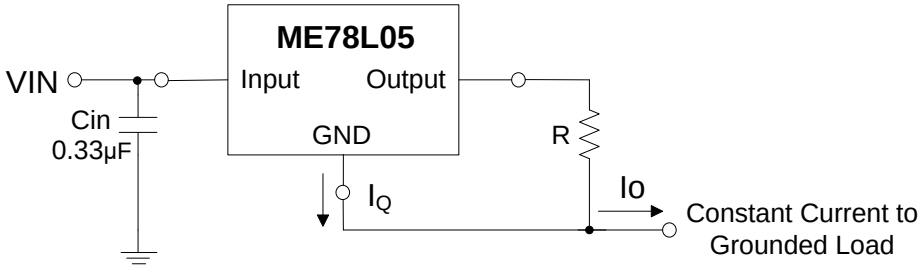


Fig.2 Constant Current Regulator

The ME78L05 regulatorcan also be used as a current source when connected as Fig.2. In order to minimize dissipation the ME78L05 is chosen in this application. Resistor R determines the current as follows:

$$I_O = \frac{5V}{R} + I_Q$$

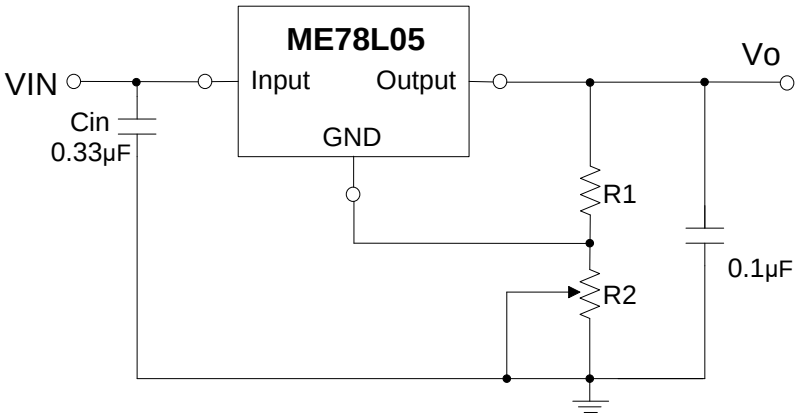


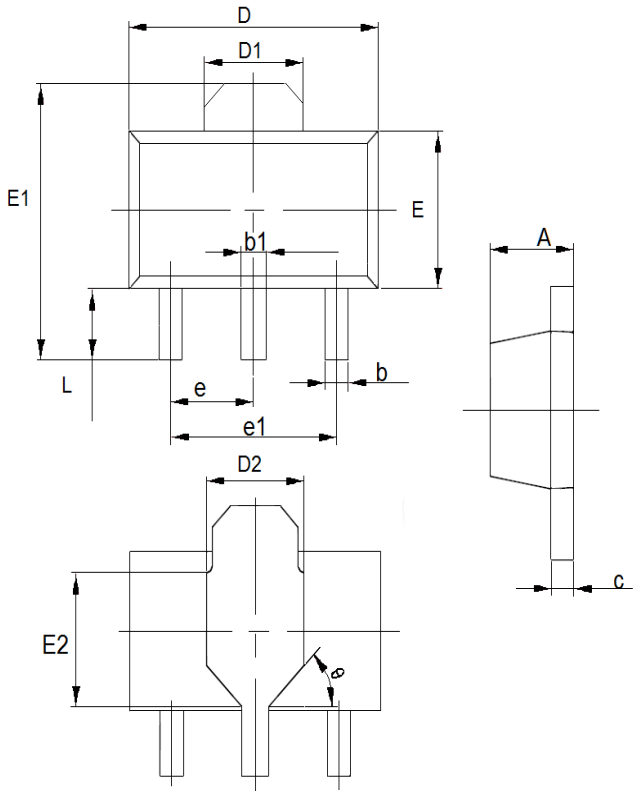
Fig.3 Adjustable Output Regulator

$Vo=5V+5V/R1+I_Q)*R2$

$5V/R1>3*I_Q$

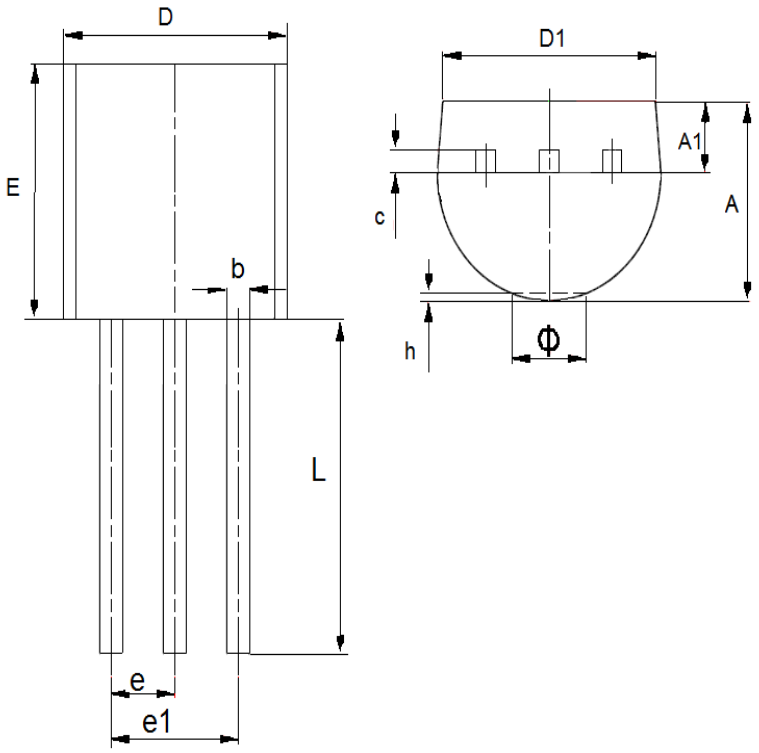
Package Information

Package Type:SOT89-3



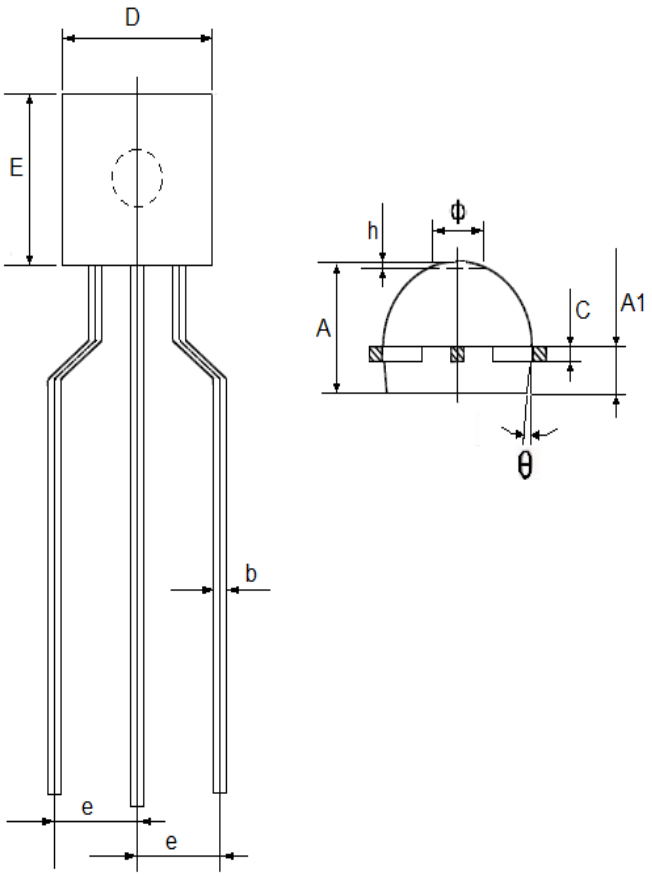
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
θ	45°		45°	

Packaging Type: TO-92



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.3	3.7	0.1299	0.1457
A1	1.1	1.4	0.0433	0.0551
b	0.38	0.55	0.015	0.0217
c	0.36	0.51	0.0142	0.0201
D	4.3	4.7	0.1693	0.185
D1	3.43	—	0.135	—
E	4.3	4.7	0.1693	0.185
e	1.27TYP		0.05TYP	
e1	2.44	2.64	0.0961	0.1039
L	14.1	14.5	0.5551	0.5709
h	0	0.38	0	0.015
Φ	—	1.6	—	0.063

Packaging Type: TO-92 taping package



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.4	3.7	0.1339	0.1457
A1	1.15	1.4	0.0453	0.0551
b	0.36	0.5	0.0142	0.0197
c	0.38		0.0150	
D	4.4	4.7	0.1732	0.1850
E	4.4	4.7	0.1732	0.1850
e	2.2	2.8	0.0866	0.1102
Φ	1.5		0.0591	
θ	5°		5°	
h	0.2		0.0079	

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