

Features

- Output Current of 150mA
- Thermal Overload Protection
- Short Circuit Protection
- Output transistor safe area protection
- No external components
- Package: SOT89-3, SOT23 and TO92
- Output voltage accuracy: tolerance $\pm 5\%$

General Description

QN78LXX is three-terminal positive regulators. One of these regulators can deliver up to 150 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 Combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.

Selection Table

Part No.	Output Voltage	Package	Marking
QN78L05	5.0V	SOT23, SOT89, TO92	78L05

Pin Configuration

SOT89 (Top View)

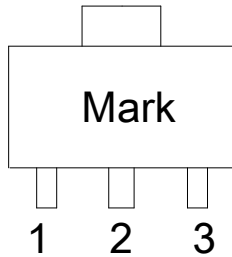


Table1: QN78LXX series (SOT89 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VOUT	Output voltage pin
2	GND	GND pin
3	VIN	Input voltage pin

SOT23 (Top View)

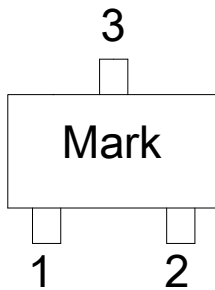


Table2: QN78LXX series (SOT23 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VOUT	Output voltage pin
2	VIN	Input voltage pin
3	GND	GND pin

TO92 (Top View)

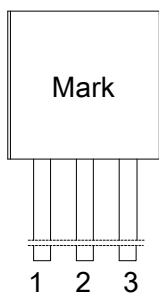
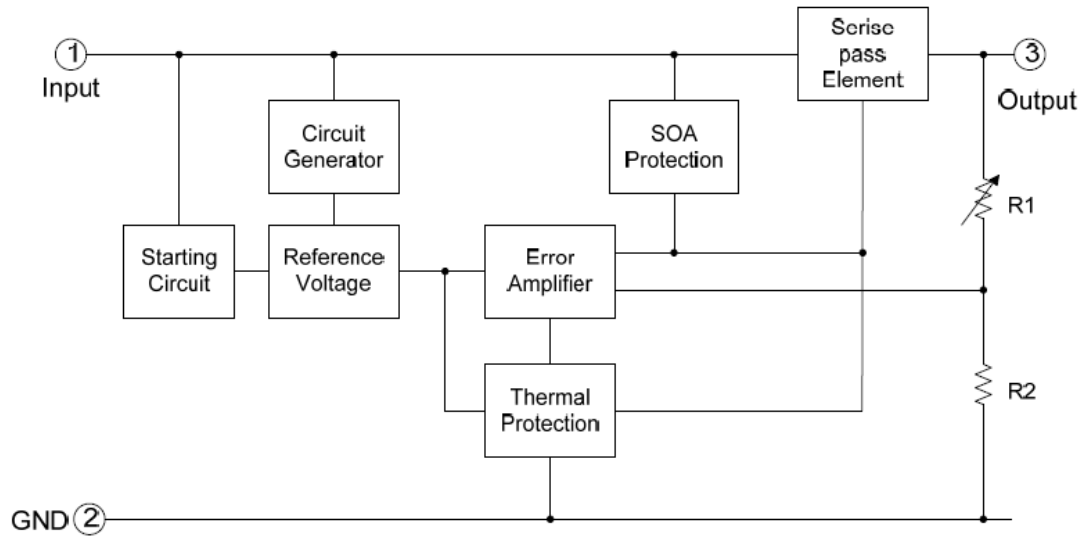


Table3: QN78LXX series (TO92 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VOUT	Output voltage pin
2	GND	GND pin
3	VIN	Input voltage pin

Block Diagram

Absolute Maximum Ratings (Ta=25°C)

Parameter	Rating	Unit
Input supply voltage: VIN MAX	30	V
MAX. Output current: Iout	150	mA
MAX Power:		
Pmax	SOT89	0.5
	SOT23	0.2
	TO92	0.5
Junction temperature: Tj	-55~150	°C
Operation temperature: Topr	-40~125	°C
Storage temperature: Tstr	-55~155	°C
Soldering temperature and time	+260(Recommended 10S)	°C
ESD Rating, (HBM)	2	KV

Note: 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

 QN78L05T(C_{in}=0.33uF, C_o=0.1uF, T_a=25°C, unless otherwise noted)

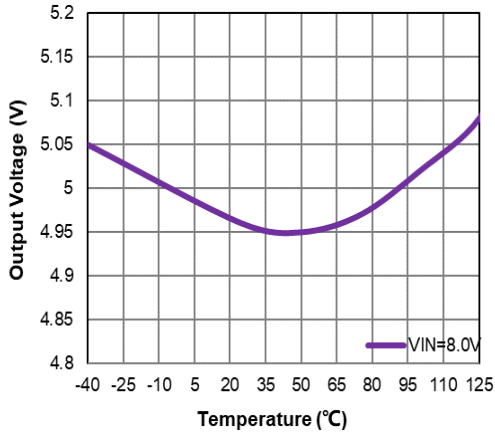
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V _{out}	I _o =40mA, V _{IN} =10V	4.82	5.0	5.18	V
		I _o =1mA~40mA, V _{IN} =7V~18V	4.8	5.0	5.2	
		I _o =1mA~10mA, V _{IN} =10V	4.75	5.0	5.25	
Line Regulation	LNR	V _{IN} =7V~18V, I _o =20mA	-150	-	150	mV
		V _{IN} =8V~18V, I _o =20mA	-100	-	100	
Load Regulation	LDR	V _{IN} =10V, I _o =1mA~100mA	-100	-	100	mV
		V _{IN} =10V, I _o =1mA~40mA	-30	-	30	
Dropout Voltage	V _{DIF}	T _a =25°C, I _o =100mA	-	2	-	V
Output noise Voltage	V _N	F=10Hz to 100KHz	-	40	-	uV/V _o
Ripple Rejection	PSRR	T _a =25°C, f=120Hz, I _o =40mA, V _{IN} =8V~20V	-	80	-	dB
Quiescent Current	I _Q	V _{IN} =10V, I _O UT=40mA	-	-	5.5	mA
Quiescent Current Change	ΔI _Q	V _{IN} =8V~18V, I _o =20mA	-1.5	-	1.5	mA
		V _{IN} =10V, I _O UT=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.

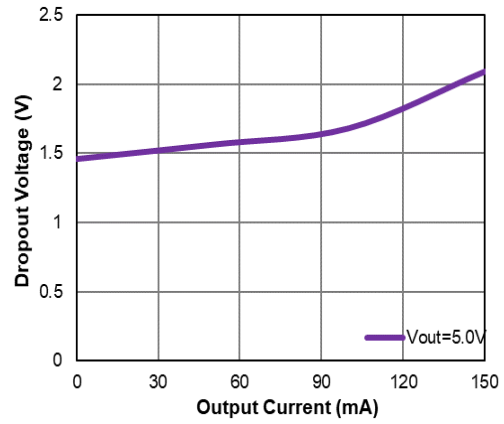
LDR: Load Regulation. The change in output voltage for a change in load current at constant chip temperature.

Typical Performance Characteristics

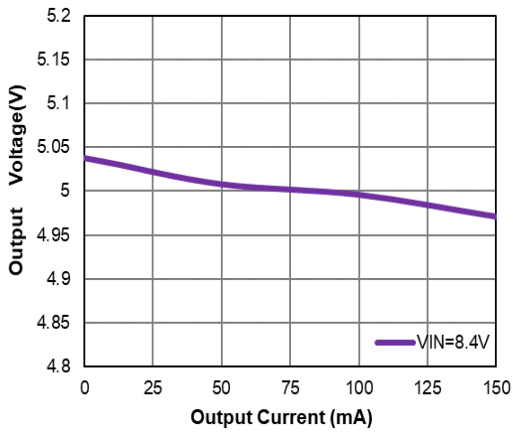
(1) Output Voltage VS Temperature



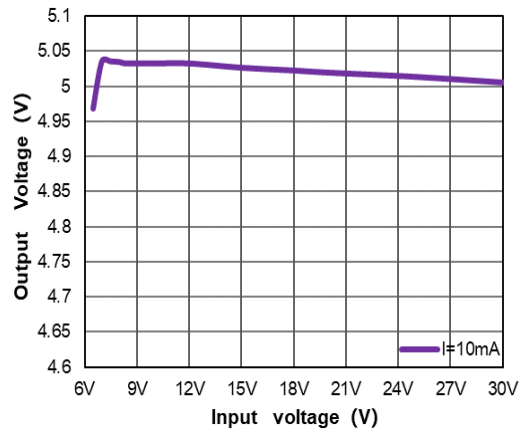
(2) Dropout Voltage VS Output Current



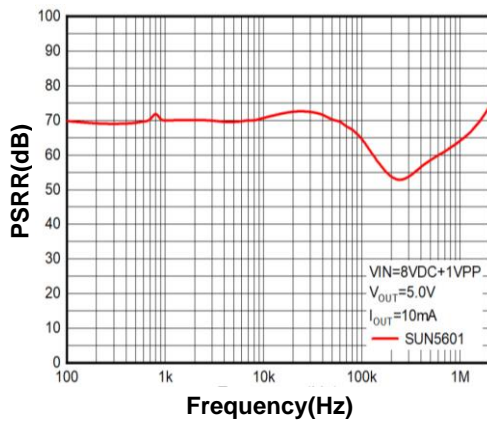
(3) Output Voltage VS Output Current



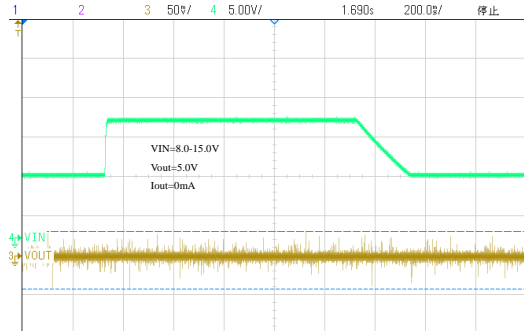
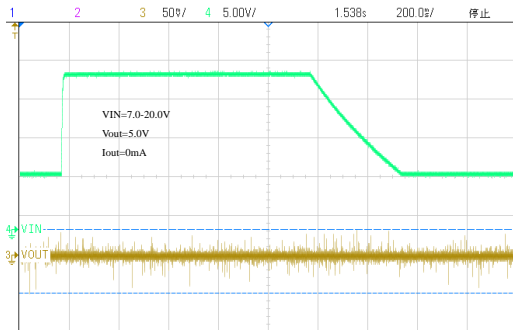
(4) Output Voltage VS Input voltage



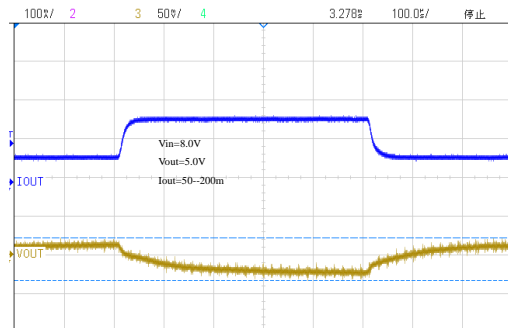
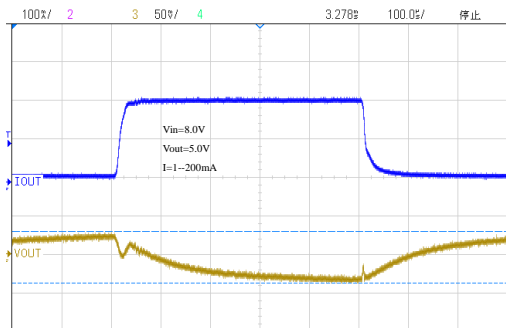
(5) PSRR VS Frequency



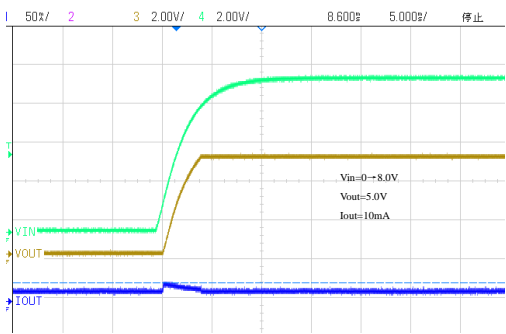
(6) Input Transient Response



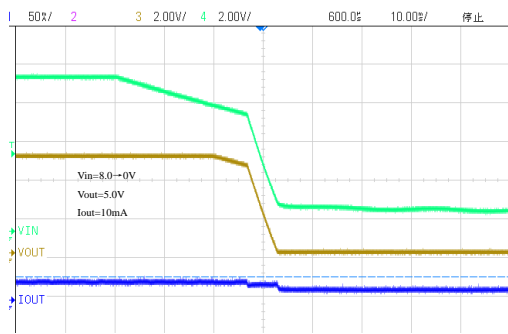
(7) Load Transient Response



(8) Power ON



(9) Power OFF



Operation Description

QN78LXX is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, 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 0.33 μ F 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 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

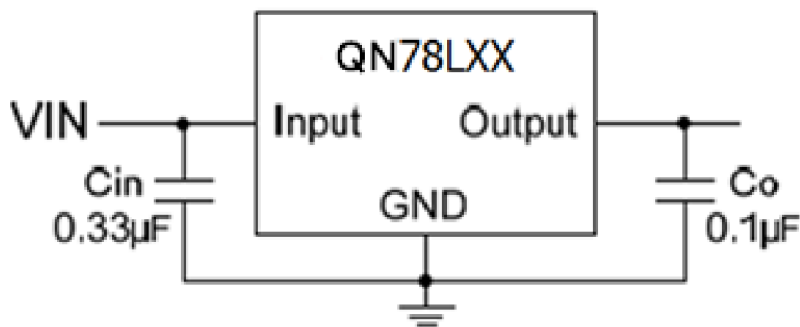


Fig.1 Typical Application

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.

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.

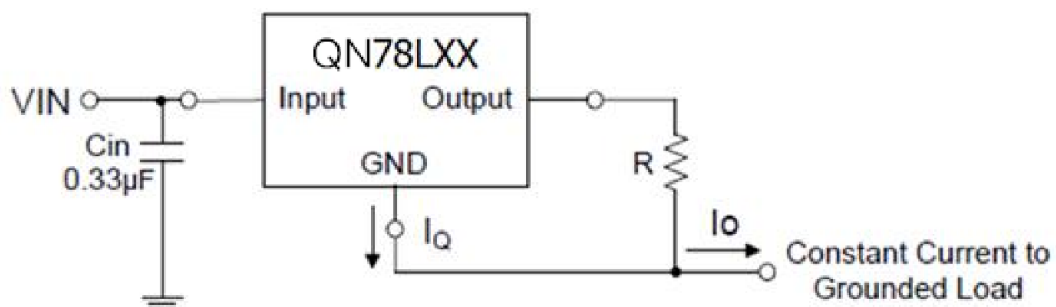
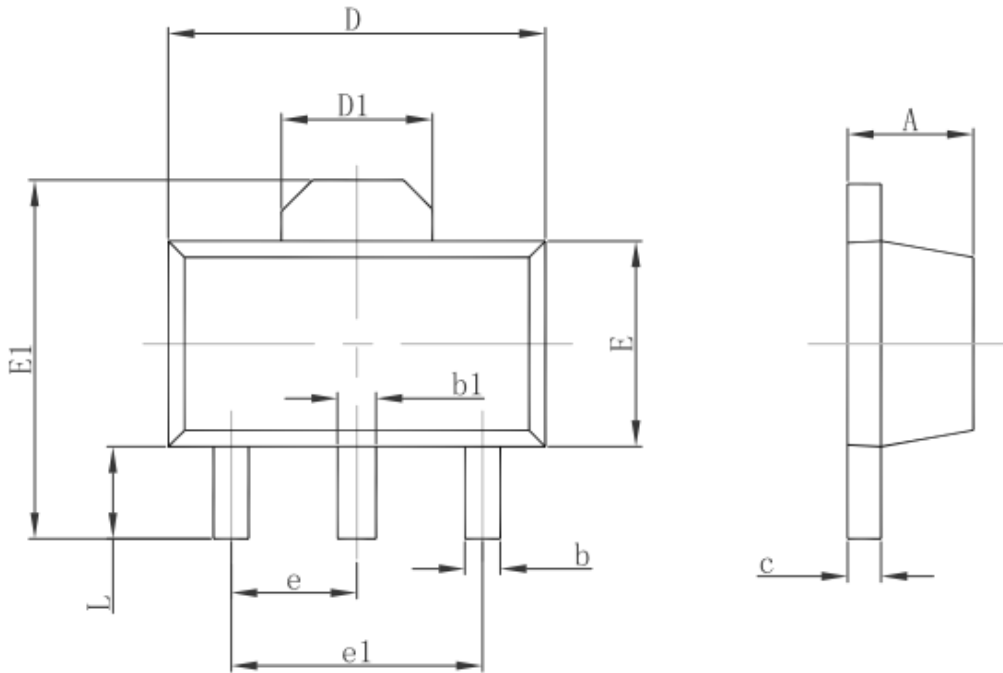
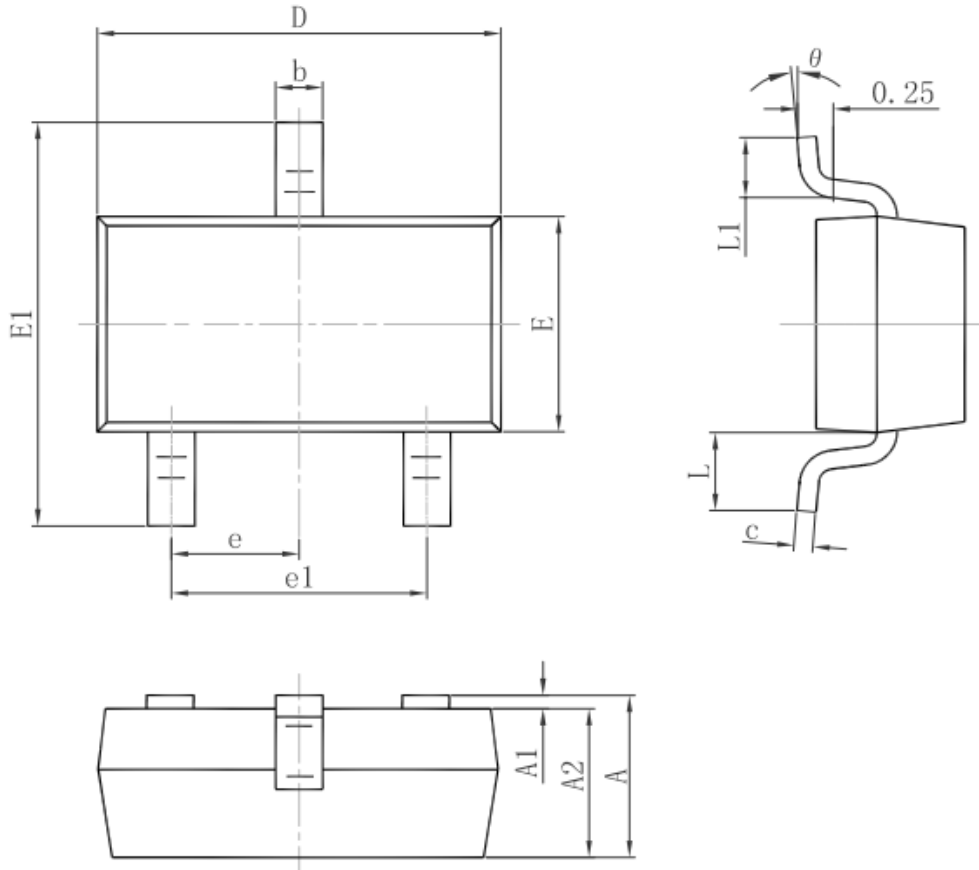


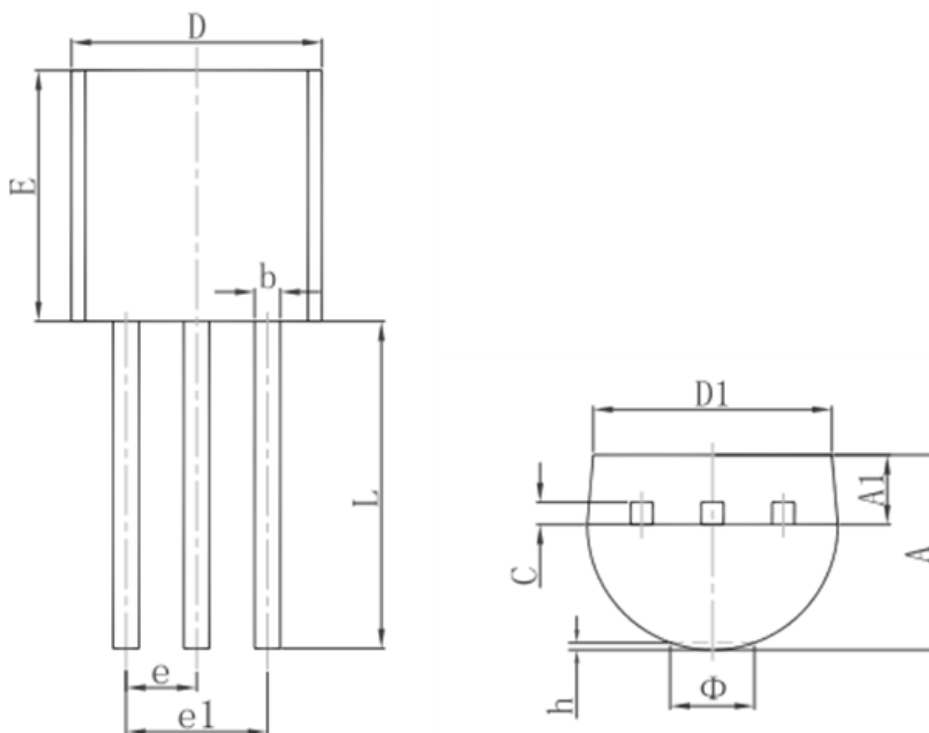
Fig.2 Constant Current Regulator

Package Information
3-pin SOT89 Outline Dimensions


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

3-pin SOT23 Outline Dimensions


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

3-pin TO92 Outline Dimensions


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

修订记录

日期	修订版本	描述	编写人
2022-06-14	V2.4	增加12-18V电压值	郭玲博
2023-07-03	V3.0	增加3.3V 电性能参数	郭玲博
2024-05-11	V4.0	变更曲线	郭玲博