250mA Low Power LDO

■ General Description

The LN73XX series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 15V. The series features extremely low quiescent current which is typically 2μA. They are available with several fixed output voltages ranging from 2.1V to 5.0V. CMOS technology ensures low voltage drop and low quiescent current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

■ Applications

- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

■ Features

- Low power consumption
- Lowvoltagedrop
- Low temperature coefficient
- Ultra low quiescent current: 2μA(typ.)
- High input voltage:(up to 18V)
- Maximum output current : 250mA
- Output voltage accuracy: tolerance ±2%
- TO92,SOT89 and SOT23 package

■ Package

- SOT-89-3L
- TO-92

■ Selection Table

Part No.	Output Voltage	Package	Marking
LN7325	2.5V	TO92 SOT89 SOT23	73XX-A(for TO92) 73XX-A(for SOT89) 3XX(for SOT23-3)
LN7328	2.8V		
LN7330	3.0V		
LN7333	3.3V		
LN7336	3.6V		
LN7340	4.0V		
LN7344	4.4V		
LN7350	5.0V		

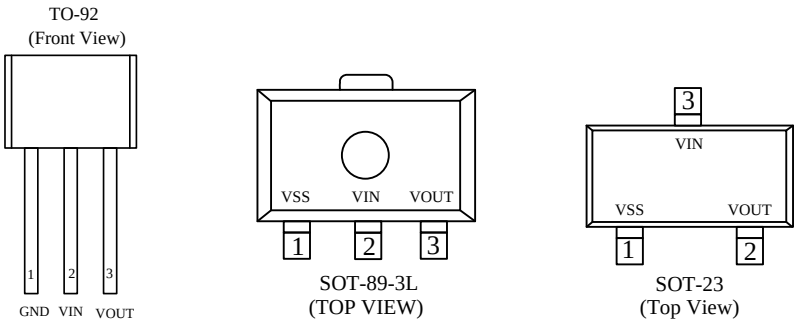
Note:"XX" stands for output voltages. Other voltages can be specially customized

■ Ordering Information

LN73 ①②③④⑤

Item	Symbol	Description
①②	Integer	Output voltage(2.5~5.0V)
③	M	Standard
④	T	Package: TO-92
	P	Package: SOT-89-3
	N	Package:SOT23
	M	Package:SOT23-3
	M5	Package:SOT23-5
⑤	R	RoHS/PbFree
	G	Halogen Free

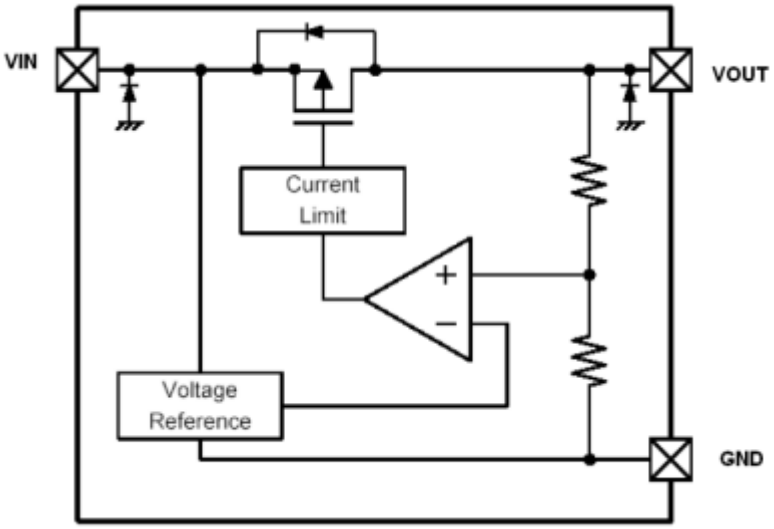
■ Pin Configuration



■ Pin Assignment

Pin Number			Pin Name	Function Description
TO-92	SOT-89-3	SOT-23-3		
2	2	3	VIN	Power Input
1	1	1	GND	Ground
3	3	2	VOUT	Output

■ Function Block Diagram



■ Absolute Maximum Ratings

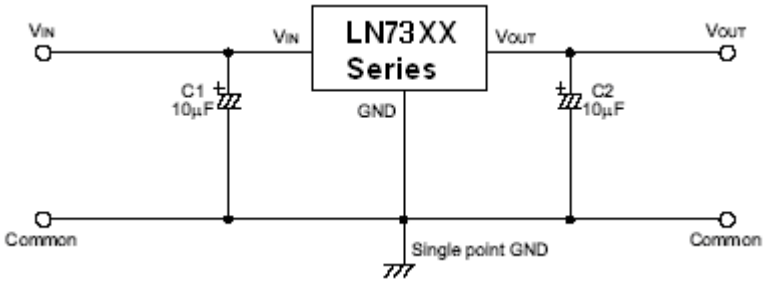
Parameter		Symbol	Maximum Rating	Unit
Input Voltage		Vin	-0.3～18	V
Power Dissipation	SOT-23	Pd	0.20	W
	SOT-89		0.50	
	TO-92		0.50	
Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT-23	θ JA	500	℃/W
	SOT-89		200	
	TO-92		200	
Operating Ambient Temperature		Topr	-30～+85	℃
Storage Temperature		Tstg	-50～+125	℃

Note1: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Note2: Pd is measured at Ta=25℃

■ Typical Application Circuit

1、Basic circuit



■ Electrical Characteristics

LN7325xxx,+2.5V Output Type T_a=25℃

Symbol	Parameters	Test Conditions		Min.	Typ.	Max.	Unit	Testing Circuit
		V_{IN}	Conditions					
V_{OUT}	Output Voltage Tolerance	3.5V	I_{OUT}=40mA	2.45	2.500	2.55	V	1
I_{OUT}	Output Current	3.5V	-	180	250	-	mA	3
$\triangle V_{OUT}$	Load Regulation	3.5V	1mA≤I_{OUT}≤60mA	-	45	90	mV	1
V_{DIF}	Voltage Drop	-	I_{OUT}=40mA, Δ VOUT=2%	-	100	-	mV	1
I_{SS}	Current Consumption	3.5V	No Load	-	2.5	3	uA	2
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	V_{OUT+}1V≤V_{IN}≤12 I_{OUT}=40mA	-	0.2	-	%/V	1
V_{IN}	Input Voltage	-	-	-	-	15	V	-
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.5V	I_{OUT}=40mA -40℃≤T_a≤85℃	-	±0.5	-	$\frac{mV}{℃}$	1

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% Change in the output voltage from the value at VIN =VOUT+1Vwith a fixed load.

LN7328xxx,+2.8V Output Type T_a=25℃

Symbol	Parameters	Test Conditions		Min.	Typ.	Max.	Unit	Testing Circuit
		V_{IN}	Conditions					
V_{OUT}	Output Voltage Tolerance	3.8V	I_{OUT}=10mA	2.774	2.800	2.856	V	1
I_{OUT}	Output Current	3.8V	-	180	250	-	mA	3
$\triangle V_{OUT}$	Load	3.8V	1mA≤I_{OUT}≤60mA	-	45	90	mV	1

	Regulation							
V_{DIF}	Voltage Drop	-	I_{OUT}=40mA, Δ VOUT=2%	-	100	-	mV	1
I_{SS}	Current Consumption	3.8V	No Load	-	2.5	3	uA	2
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	V_{OUT+}1V≤V_{IN}≤12 I_{OUT}=40mA	-	0.2	-	%/V	1
V_{IN}	Input Voltage	-	-	-	-	15	V	-
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.8V	I_{OUT}=10mA -40℃≤T_a≤85℃	-	±0.5	-	$\frac{mV}{°C}$	1

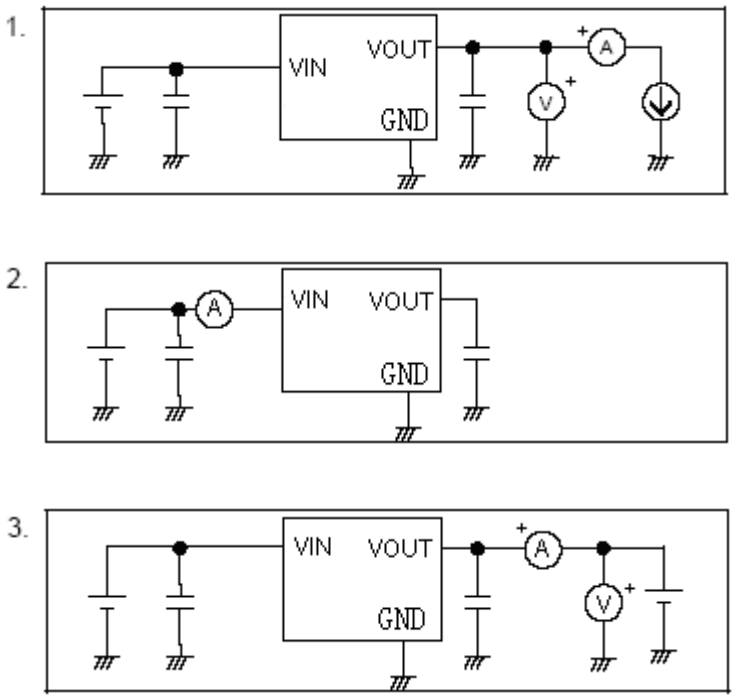
Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% Change in the output voltage from the value at VIN =VOUT+1Vwith a fixed load.

LN73XXxxx, Output Type (VOUT=3.0V 3.3V,3.6V,4.0V,4.4V,5.0V) T_a=25℃

Symbol	Parameters	Test Conditions		Min.	Typ.	Max.	Unit	Testing Circuit
		V_{IN}	Conditions					
V_{OUT}	Output Voltage Tolerance	V_{OUT+}1V	I_{OUT}=40mA	0.98×V_{OUT}	V_{OUT}[1]	1.02× V_{OUT}	V	1
I_{OUT}	Output Current	V_{OUT+}1V	-	250	-	-	mA	3
△V_{OUT}	Load Regulation	V_{OUT+}1V	1mA≤I_{OUT}≤80mA	-	45	90	mV	1
V_{DIF}	Voltage Drop	-	I_{OUT}=40mA, Δ VOUT=2%	-	100	-	mV	1
I_{SS}	Current Consumption	V_{OUT+}1V	No Load	-	2.5	3	uA	2
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	V_{OUT+}1V≤V_{IN}≤12 I_{OUT}=40mA	-	0.2	-	%/V	1
V_{IN}	Input Voltage	-	-	-	-	15	V	-
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	V_{OUT+}1V	I_{OUT}=40mA -40℃≤T_a≤85℃	-	±0.5	-	$\frac{mV}{°C}$	1

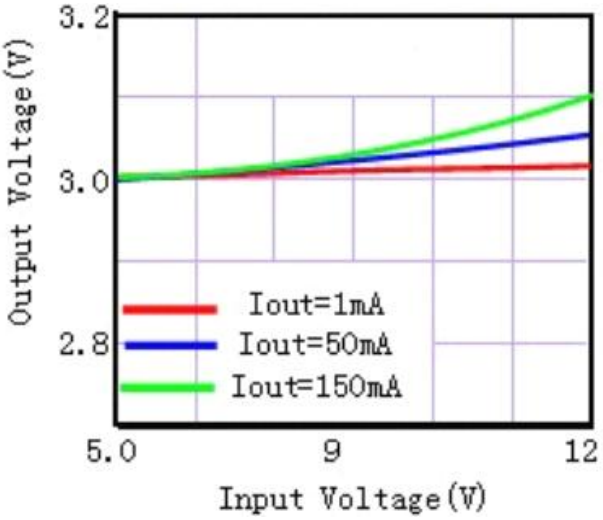
Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% Change in the output voltage from the value at VIN =VOUT+1Vwith a fixed load.

■ Testing Circuits

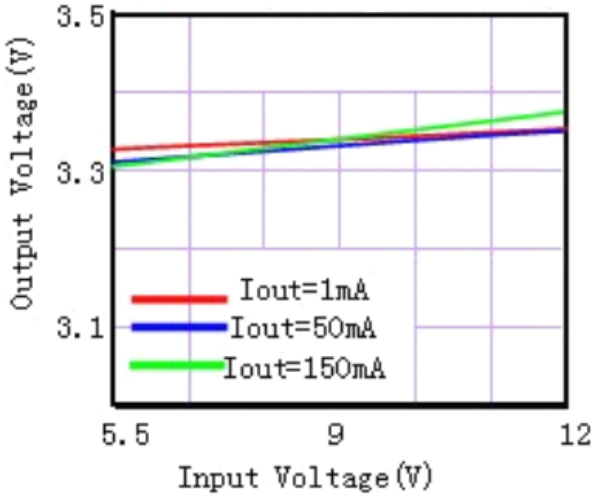


■ Typical Performance Characteristics

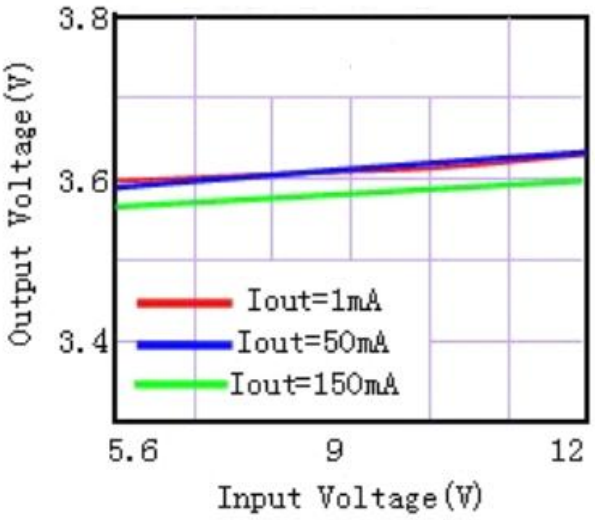
- **1、Output Voltage vs. Input voltage Cin=CL=10uF**



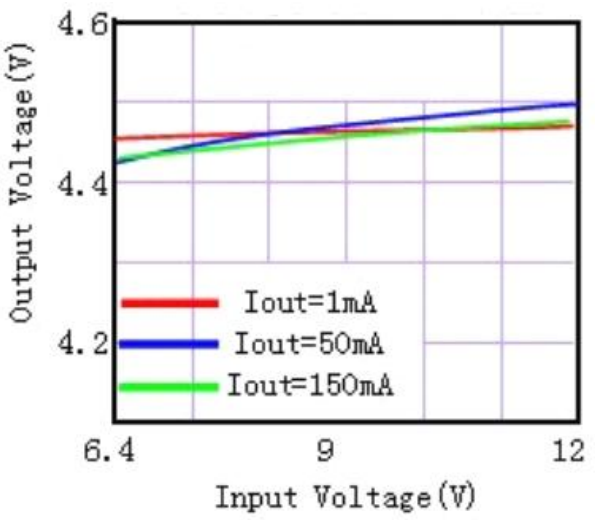
VOUT=3.0V



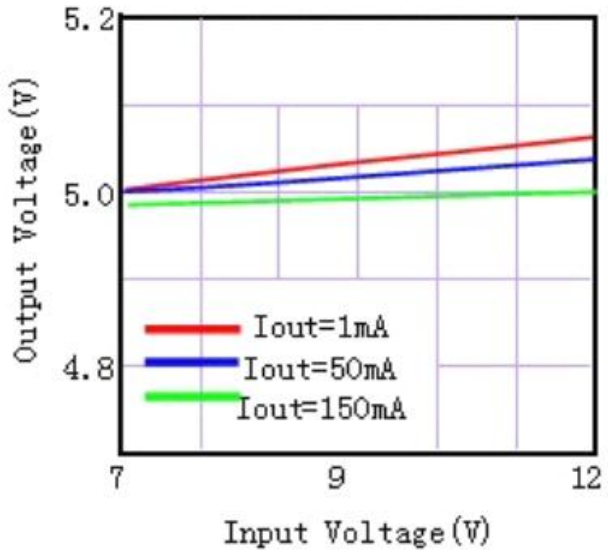
VOUT=3.3V



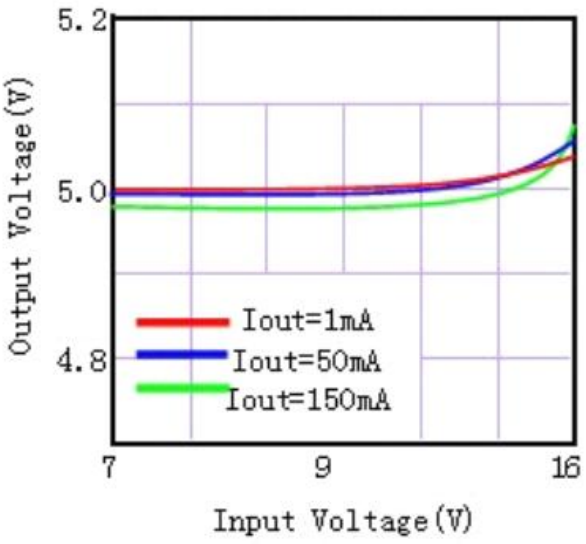
VOUT=3.6V



VOUT=4.4V

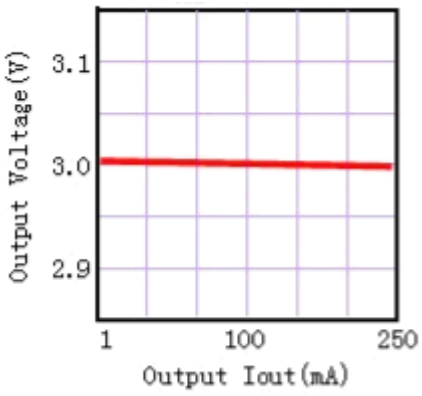


VOUT=5.0V

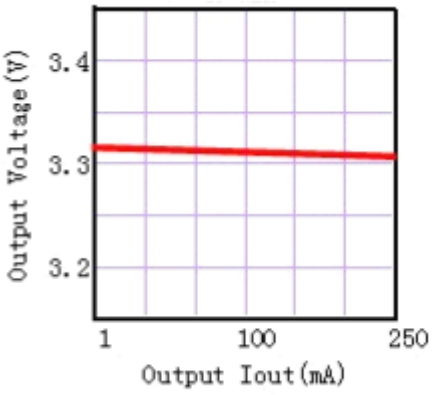


VOUT=5.0V

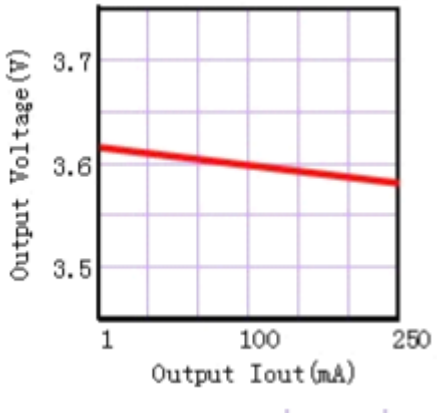
- **2、Output Voltage vs. Output Current**



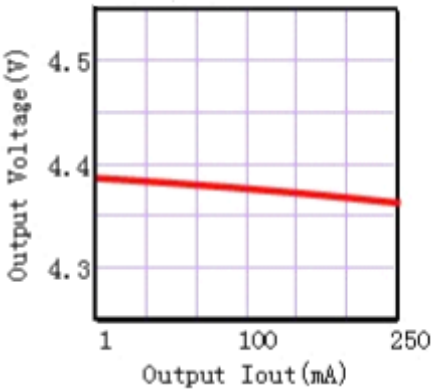
VIN=5.0V, VOUT=3.0V



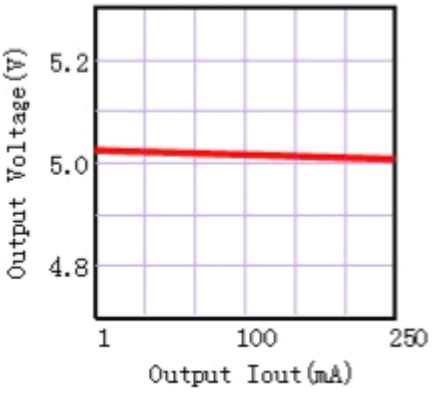
VIN=5.5V, VOUT=3.3V



VIN=5.6V, VOUT=3.6V

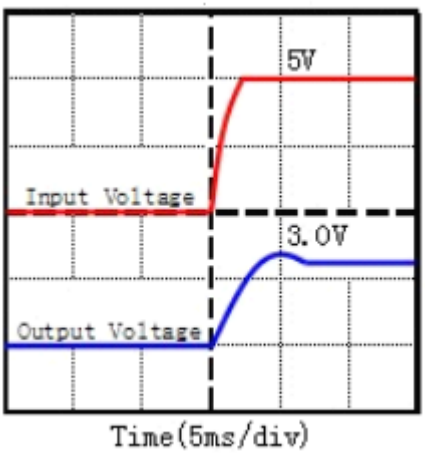


VIN=6.4V, VOUT=4.4V

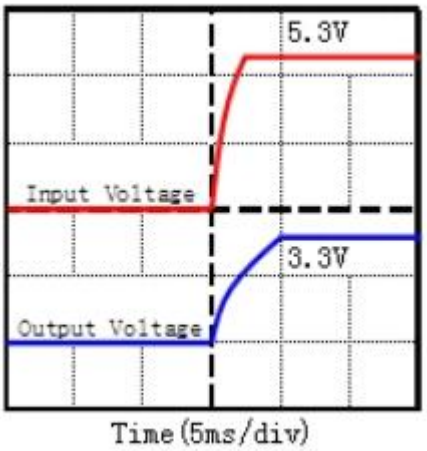


VIN=7.0V, VOUT=5.0V

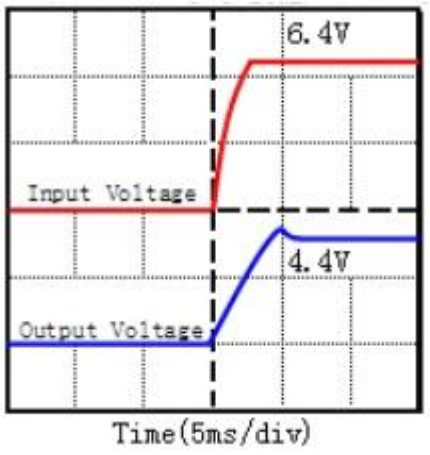
- **3、Input Transient Response**



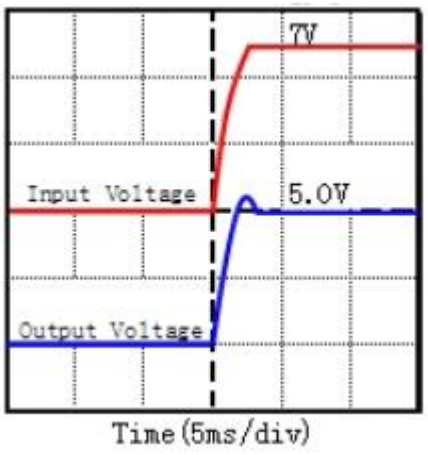
VOUT=3.0V, Iout=10mA, CL=10uF



VOUT=3.3V, Iout=10mA, CL=10uF



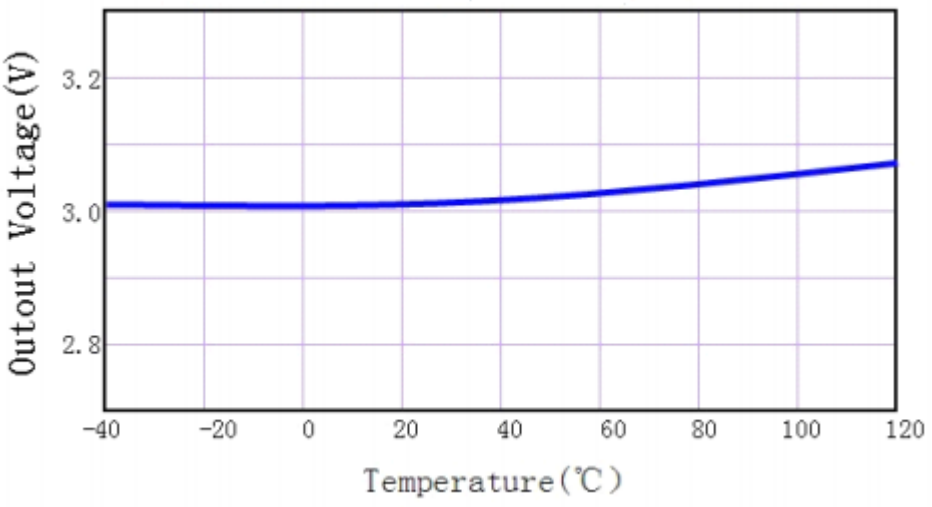
VOUT=4.4V, Iout=10mA, CL=10uF



VOUT=5.0V, Iout=10mA, CL=10uF

- **4、Input Transient Response**

Cin=CL=10Uf, VOUT=3.0V



- **5、MAX Output Current Vs. Input Voltage**

LN7330

Input Voltage	Max Output Current
5V	250mA
9V	200mA
12V	150mA
15V	100mA

LN7333

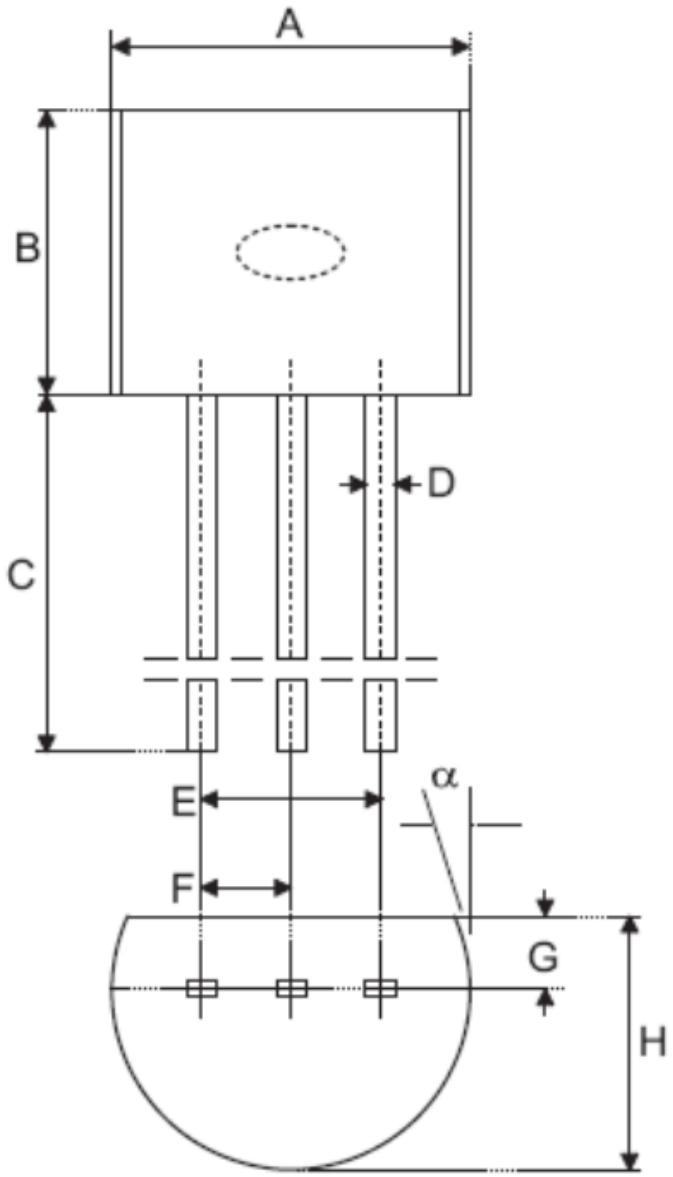
Input Voltage	Max Output Current
5.3V	250mA
9V	200mA
12V	150mA
15V	100mA

LN7350

Input Voltage	Max Output Current
7V	250mA
9V	200mA
12V	150mA
15V	100mA

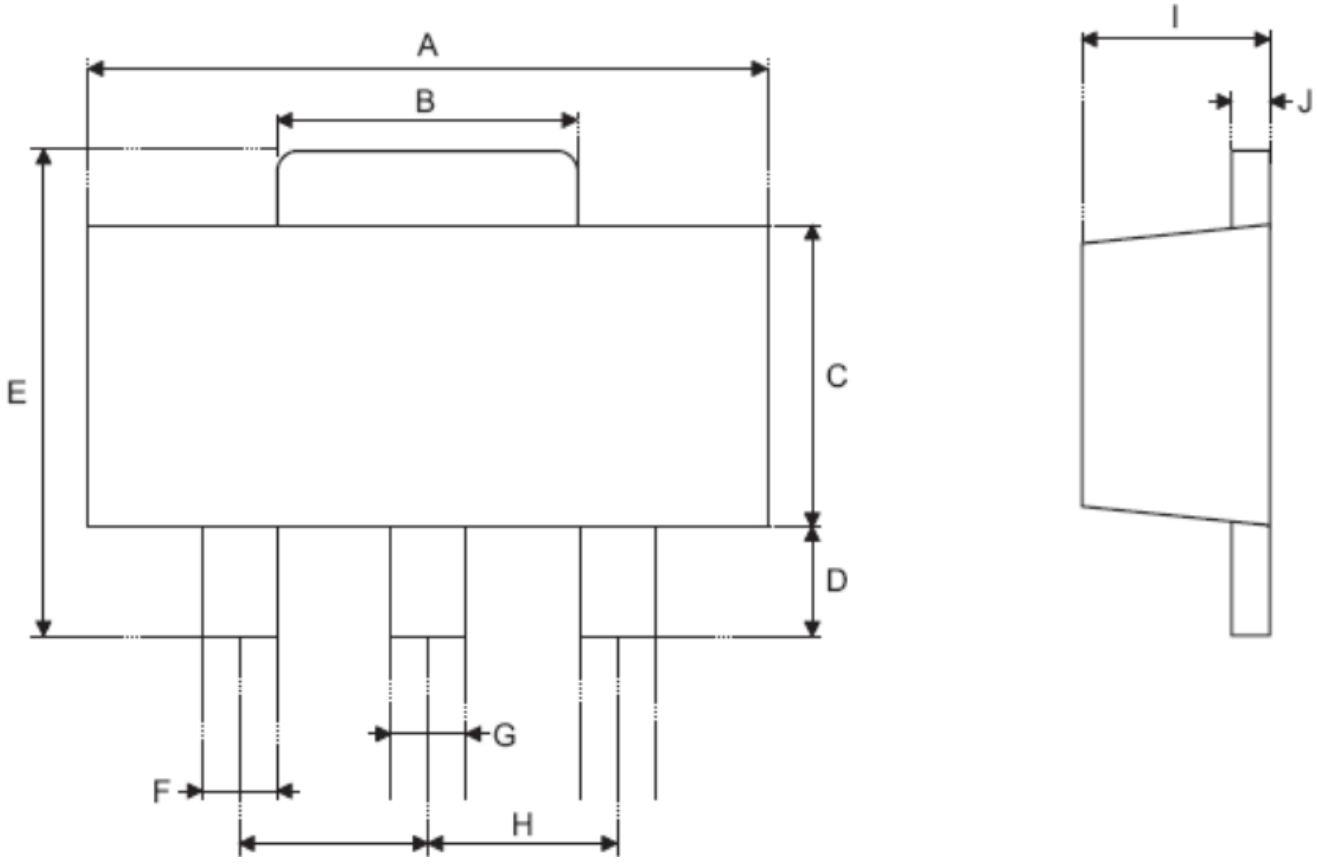
■ Package Information

- **3-Pin TO-92 Outline Dimensions**



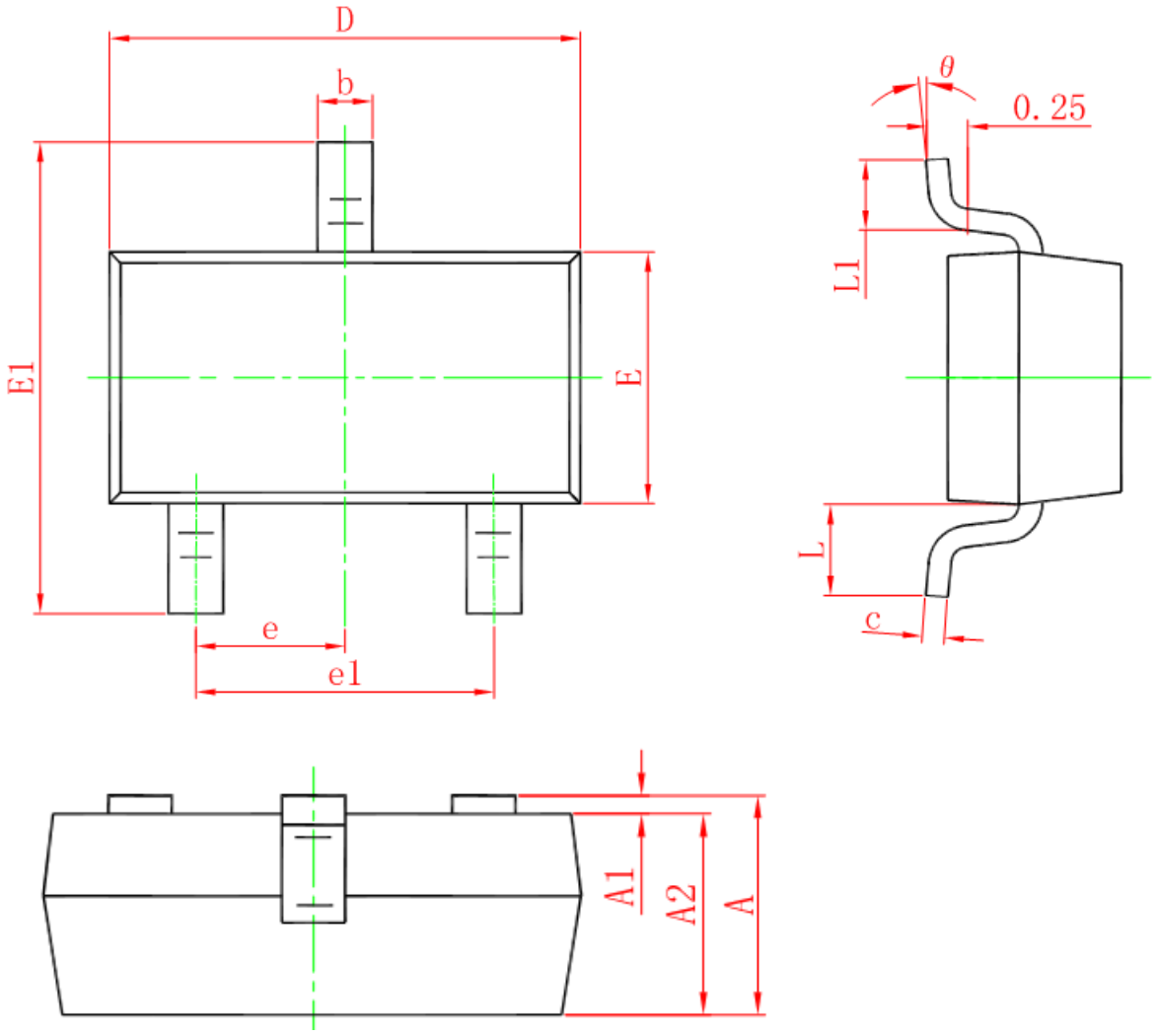
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	200
B	170	—	200
C	500	—	—
D	11	—	20
E	90	—	110
F	45	—	55
G	45	—	65
H	130	—	160
I	8	—	18
α	4°	—	6°

- **3-Pin STO-89 Outline Dimensions**



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	—	181
B	59	—	72
C	90	—	102
D	35	—	47
E	155	—	167
F	14	—	19
G	17	—	22
H	—	59	—
I	55	—	63
J	14	—	17

- **3-Pin STO-23 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°