Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- Ultra low quiescent current: $2\mu A$(typ.)

- High input voltage (up to 15V)
- Maximum output current: 250mA
- Output voltage accuracy: tolerance $\pm2\%$
- TO92, SOT89, SOT23 and SOT23-3 package

Applications

- Battery-powered equipment
- Communication equipment

- Audio/Video equipment

General Description

The H73XX-A series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 18V. The series features extremely low quiescent current which is typically $2\mu A$. They are available with several fixed output voltages ranging from 2.5V 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.

Selection Table

| Part No.	Output Voltage	Package	Marking
H7325-A	2.5V		
H7328-A	2.8V		
H7330-A	3.0V	TO92	73XX-A(for TO92)
H7333-A	3.3V	SOT89	73XX-A(for SOT89)
H7336-A	3.6V	SOT23-3	3XX(for SOT23-3)
H7340-A	4.0V	SOT23	3XX(for SOT23)
H7344-A	4.4V		
H7350-A	5.0V		

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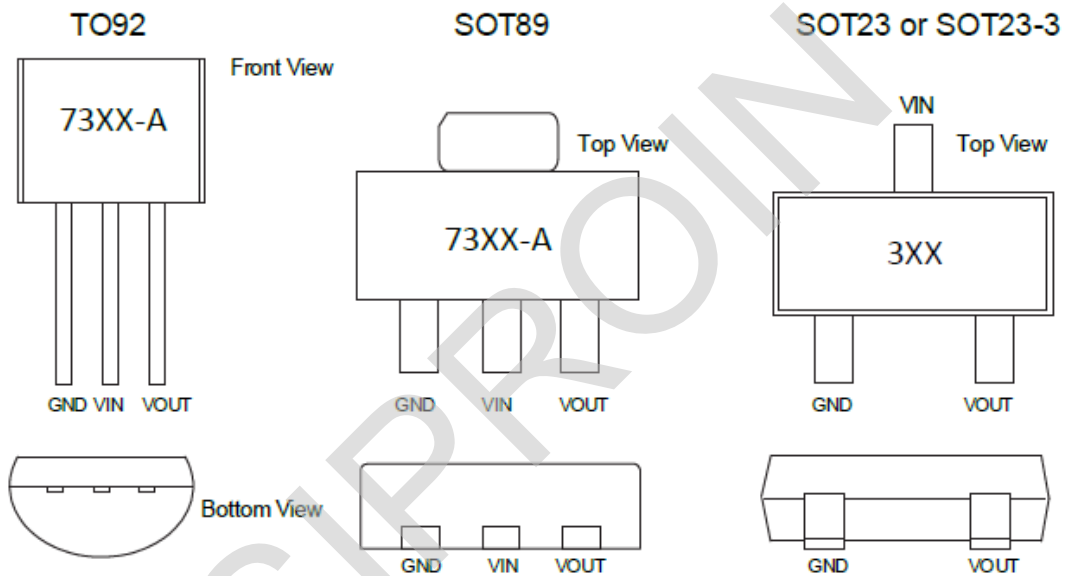
Order Information

H73①②−A③④

Designator	Symbol	Description
① ②	Integer	Output Voltage(2.5~5.0V)
③	T	Package:TO-92
	P	Package:SOT89-3
	N	Package:SOT23
	M	Package:SOT23-3
④	R	RoHS / Pb Free
	G	Halogen Free

Block Diagram
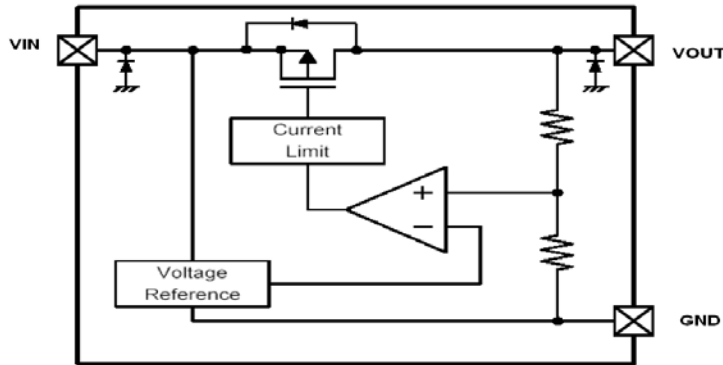
*Diodes inside the circuit are an ESD protection diode and a parasitic diode.

Pin Assignment

Absolute Maximum Ratings

Supply Voltage ....-0.3V to 18V

Storage Temperature ....-50℃ to 125℃

Operating Temperature ....-30℃ to 85℃

Note: 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.

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23	500	℃/W
		SOT89	200	℃/W
		TO92	200	℃/W
P_D	Power Dissipation	SOT23	0.20	W
		SOT89	0.50	W
		TO92	0.50	W

Note: P_D is measured at Ta= 25℃

Electrical Characteristics

H7325-A, +2.5V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.5V	I_{OUT}=40mA	2.450	2.500	2.550	V
I_{OUT}	Output Current	4.5V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	4.5V	1mA≤I_{OUT}≤60mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	100	-	mV
ISS	Current Consumption	4.5V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.5V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	4.5V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7328-A, +2.8V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.8V	I_{OUT}=10mA	2.744	2.800	2.856	V
I_{OUT}	Output Current	4.8V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	4.8V	1mA≤I_{OUT}≤60mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	100	-	mV
ISS	Current Consumption	4.8V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.8V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	4.8V	IOUT=10mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7330-A, +3.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5V	I_{OUT}=40mA	2.940	3.000	3.060	V
I_{OUT}	Output Current	5V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	5V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	100	-	mV
ISS	Current Consumption	5V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	5V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7333-A, +3.3V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.3V	I_{OUT}=40mA	3.234	3.300	3.366	V
I_{OUT}	Output Current	5.3V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	5.3V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	100	-	mV
ISS	Current Consumption	5.3V	No load	-	2.0	3	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.3V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	5.3V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7336-A, +3.6V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.6V	I_{OUT}=40mA	3.528	3.600	3.672	V
I_{OUT}	Output Current	5.6V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	5.6V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	80	-	mV
ISS	Current Consumption	5.6V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.6V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	5.6V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7340-A, +4.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	6.0V	I_{OUT}=40mA	3.920	4.000	4.080	V
I_{OUT}	Output Current	6.0V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	6.0V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	80	-	mV
ISS	Current Consumption	6.0V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	5V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	6.0V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7344-A, +4.4V Output Type

| Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	6.4V	I_{OUT}=40mA	4.312	4.400	4.488	V
I_{OUT}	Output Current	6.4V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	6.4V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	80	-	mV
ISS	Current Consumption	6.4V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	5.4V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	6.4V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

H7350-A, +5.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	7V	I_{OUT}=40mA	4.900	5.000	5.100	V
I_{OUT}	Output Current	7V	-	-	250	-	mA
$\triangle V_{OUT}$	Load Regulation	7V	1mA≤I_{OUT}≤80mA	-	45	90	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=40mA, $\triangle V_{OUT}$=2%	-	80	-	mV
ISS	Current Consumption	7V	No load	-	2.0	3.0	μA
$\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OU}}$	Line Regulation	-	6V≤V_{IN}≤12V I_{OUT}=40mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\dfrac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	7V	IOUT=40mA -40℃<Ta<85℃	-	±0.5	-	mV/℃

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 V_{IN} = V_{OUT}+1V with a fixed load.

Typical Performance Characteristics

(1) Output Voltage vs Input voltage
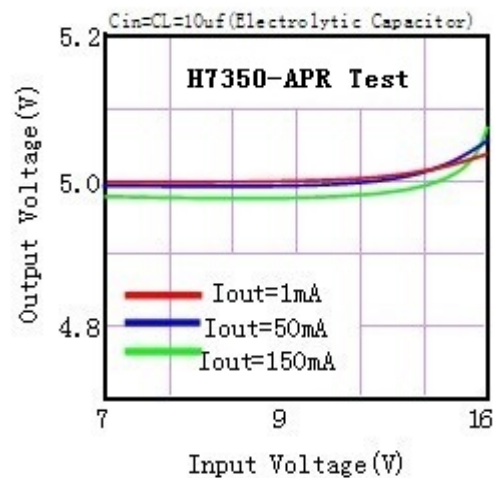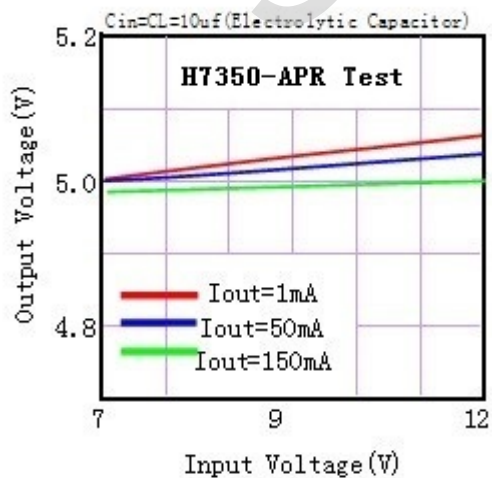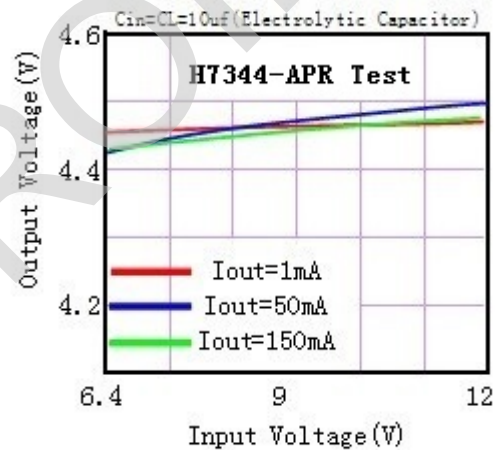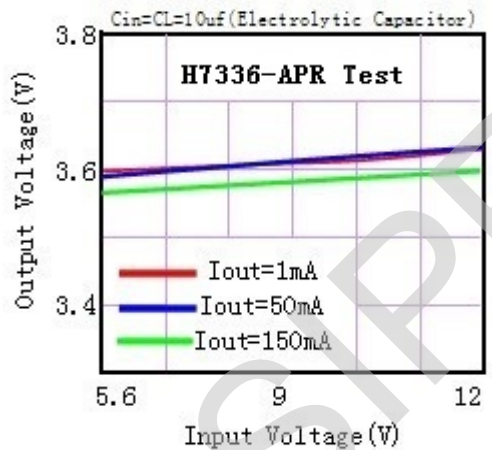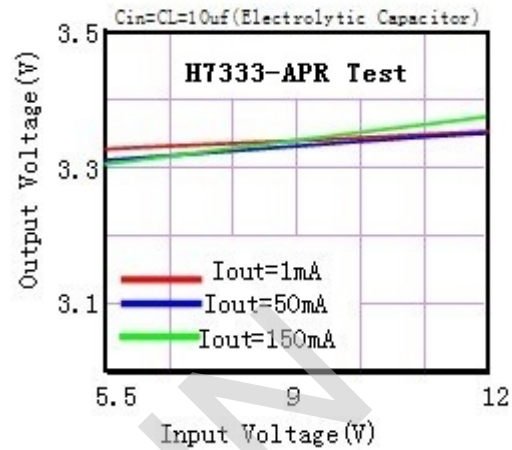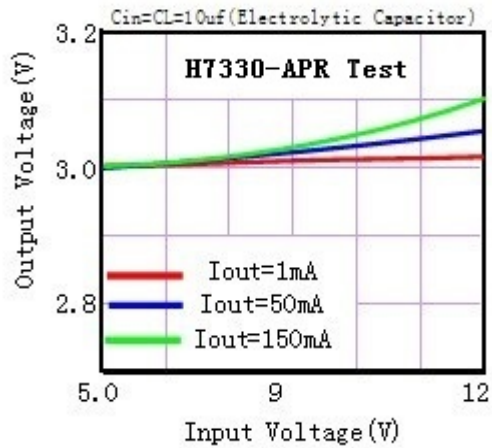
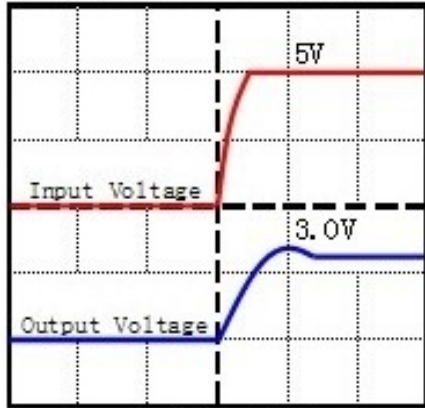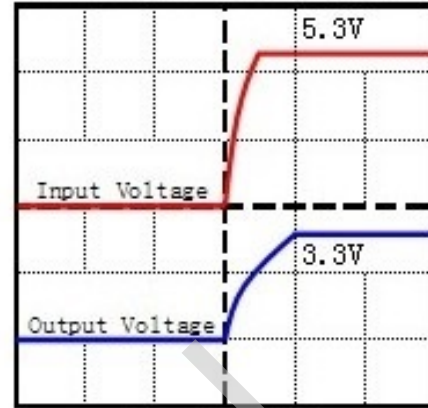(2) Output Voltage vs.Output Current
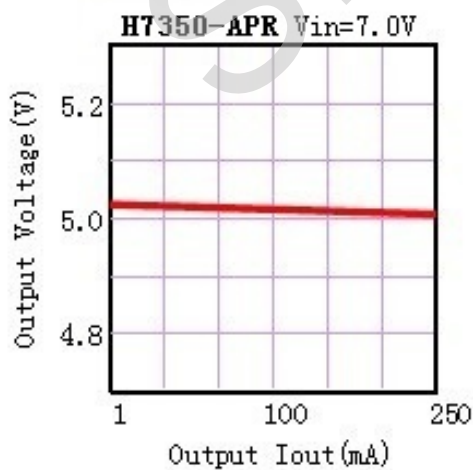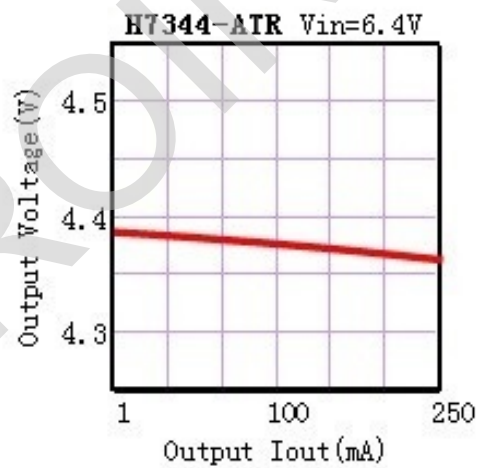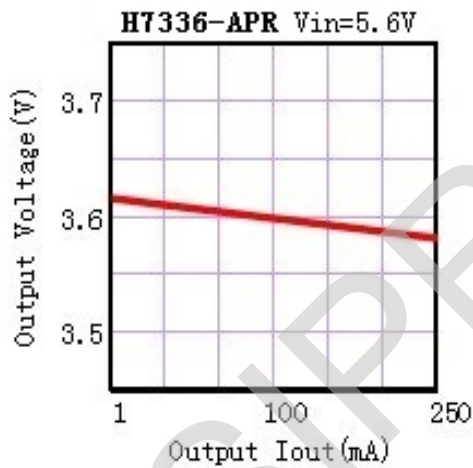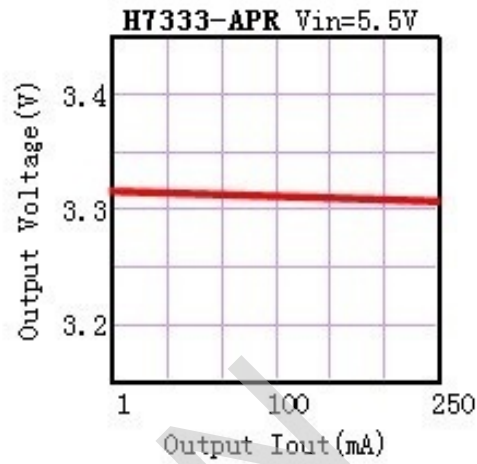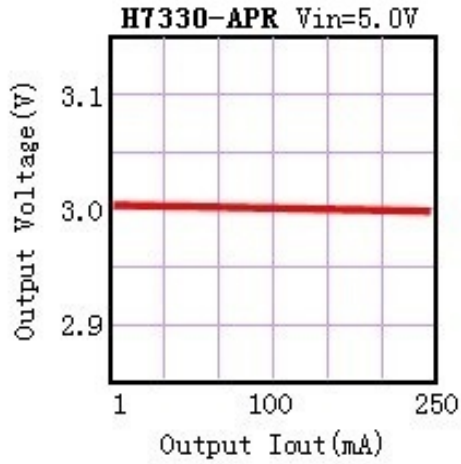
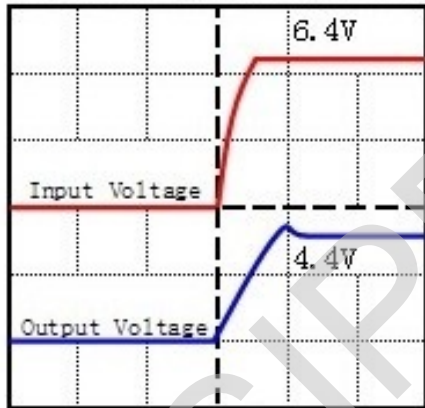(3) Input Transient Response

H7330-ATR Iout=10mA CL=10uF

H7333-ATR Iout=10mA CL=10uF

H7344-ATR Iout=10mA CL=10uF
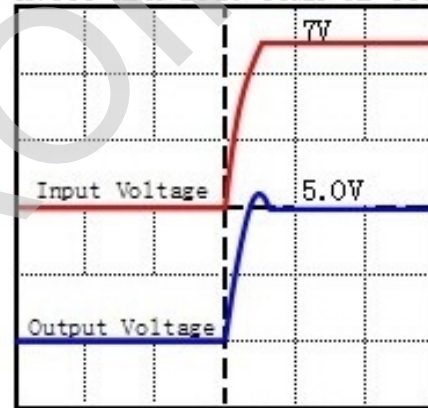

H7350-APR Iout=10mA CL=10uF
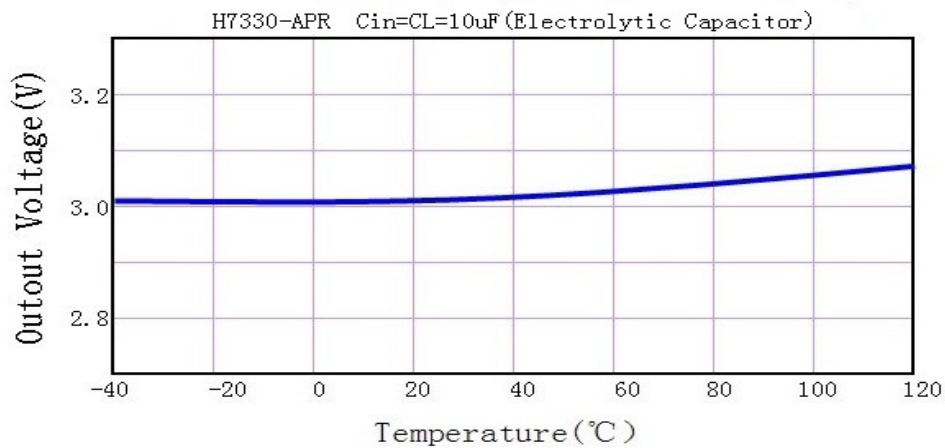
(4) Output Voltage vs.Ambient Temperature

H7330-APR Cin=CL=10uF(Electrolytic Capacitor)

(5) MAX Output Current Vs. Input Voltage

H7330-APR

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

H7333-APR

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

H7350-APR

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

Application Circuits
Basic Circuits
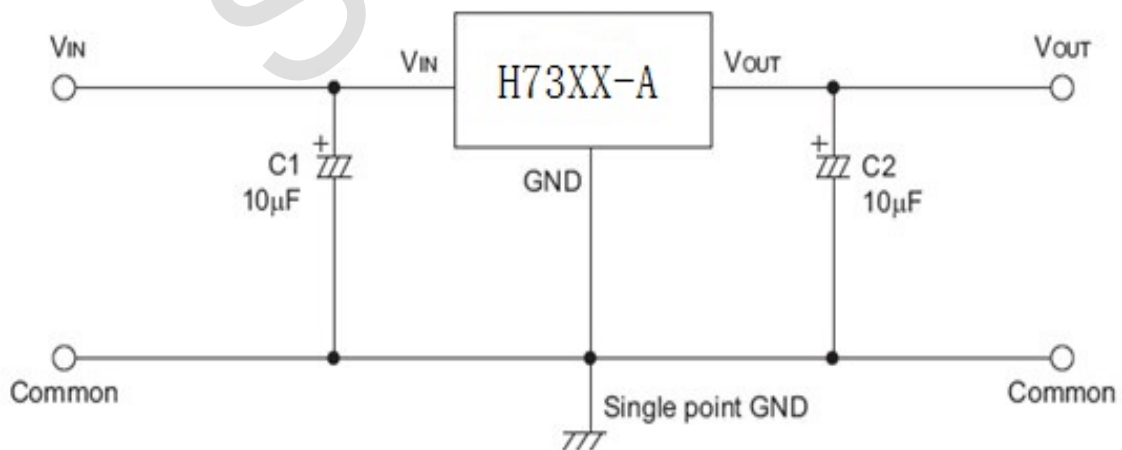
Package Information
3-pin TO92 Outline Dimensions
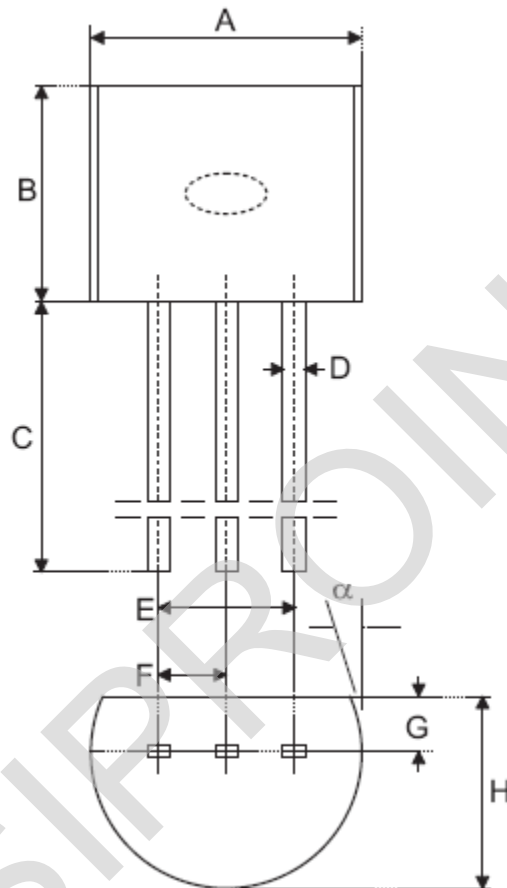
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	200
B	170	—	200
C	500	—	—
D	11	—	20
E	90	—	110
F	45	—	55
G	45	—	65
H	130	—	160
I	8	—	18
α	4°	—	6°

3-pin SOT89 Outline Dimensions
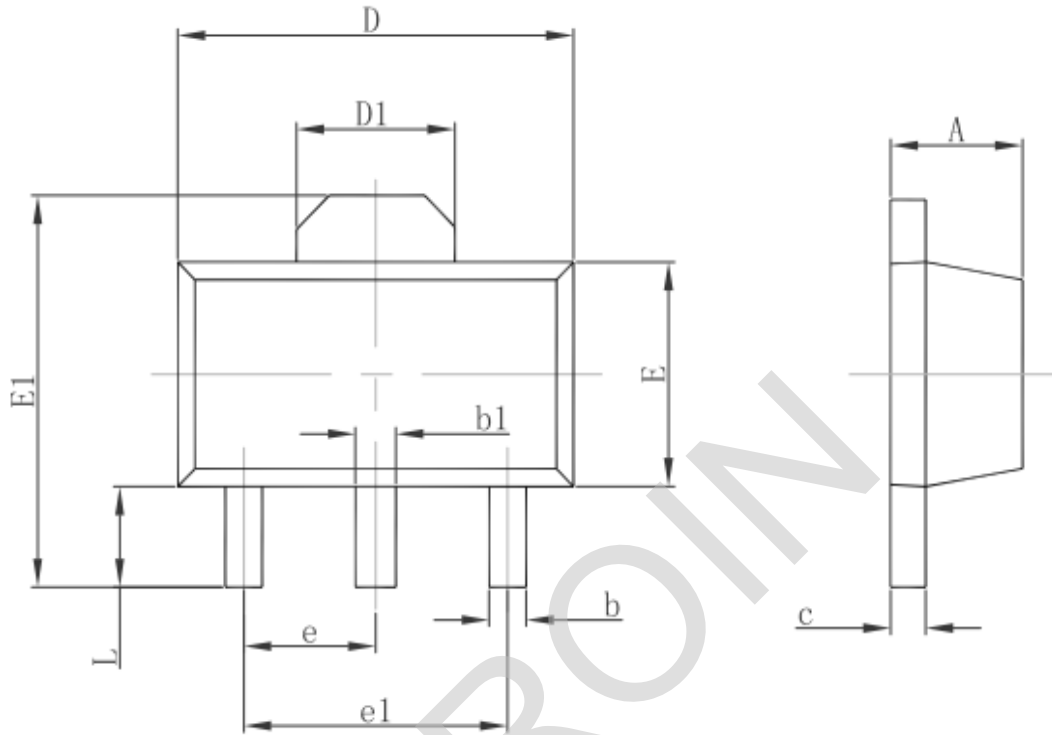
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

3-pin SOT23 Outline Dimensions
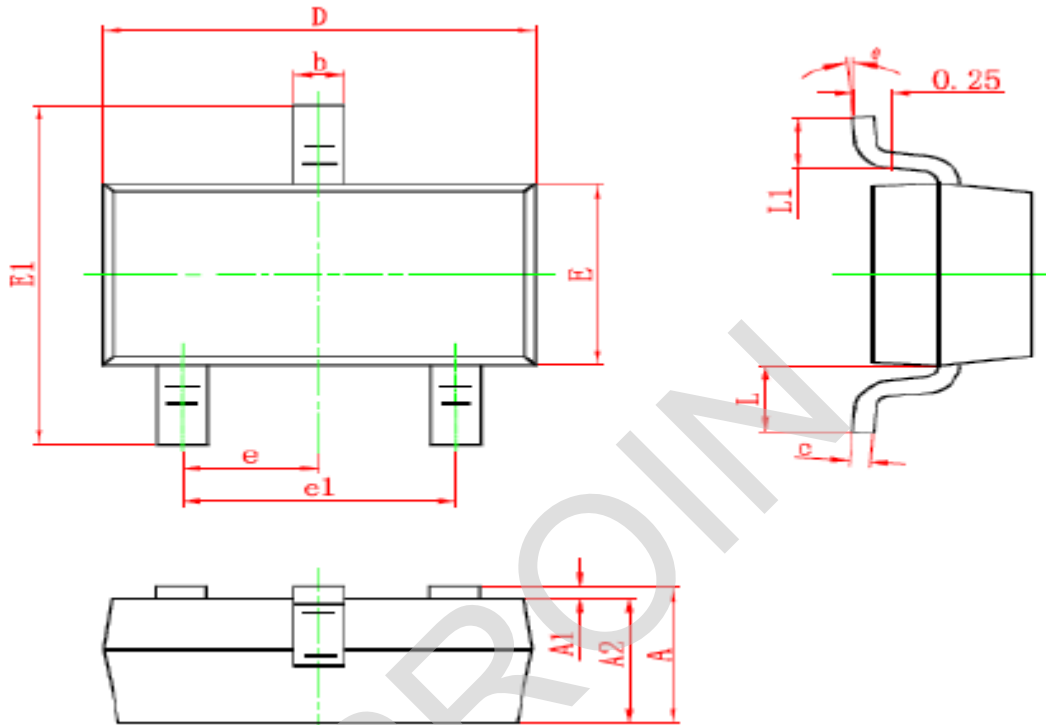
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 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°	6°

3-pin SOT23-3 Outline Dimensions

SOT-23-3L PACKAGE OUTLINE DIMENSIONS
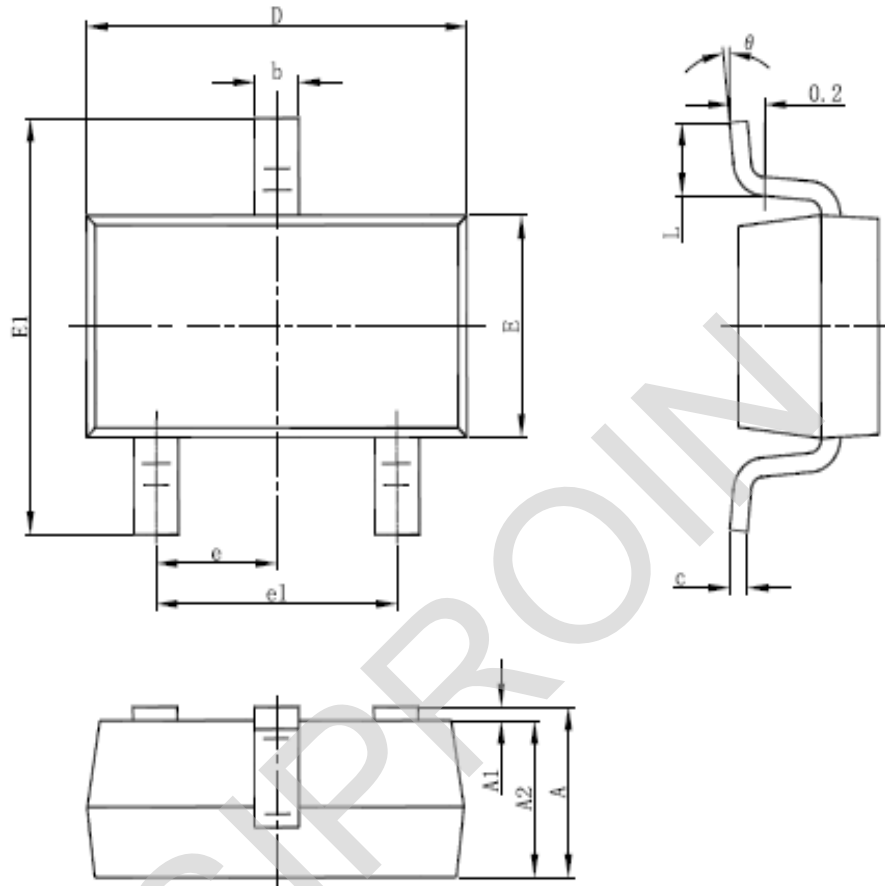
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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