

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- Ultra low quiescent current: 2 μ A(typ.)
- High input voltage (up to 18V)
- Maximum output current: 400mA
- Output voltage accuracy: tolerance $\pm 2\%$
- TO92, SOT89 and SOT23 package

Applications

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

General Description

The 73-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 μ A. 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.

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400 mA Low Power LDO

Selection Table

Part No.	Output Voltage	Package	Marking
7315-A	1.5V		
7318-A	1.8V		
7325-A	2.5V	TO92 SOT89 SOT23	73-A(for TO92) 73-A#(for SOT89) 3A#(for SOT23)
7327-A	2.7V		
7328-A	2.8V		
7330-A	3.0V		
7333-A	3.3V		
7336-A	3.6V		
7340-A	4.0V		
7344-A	4.4V		
7350-A	5.0V		

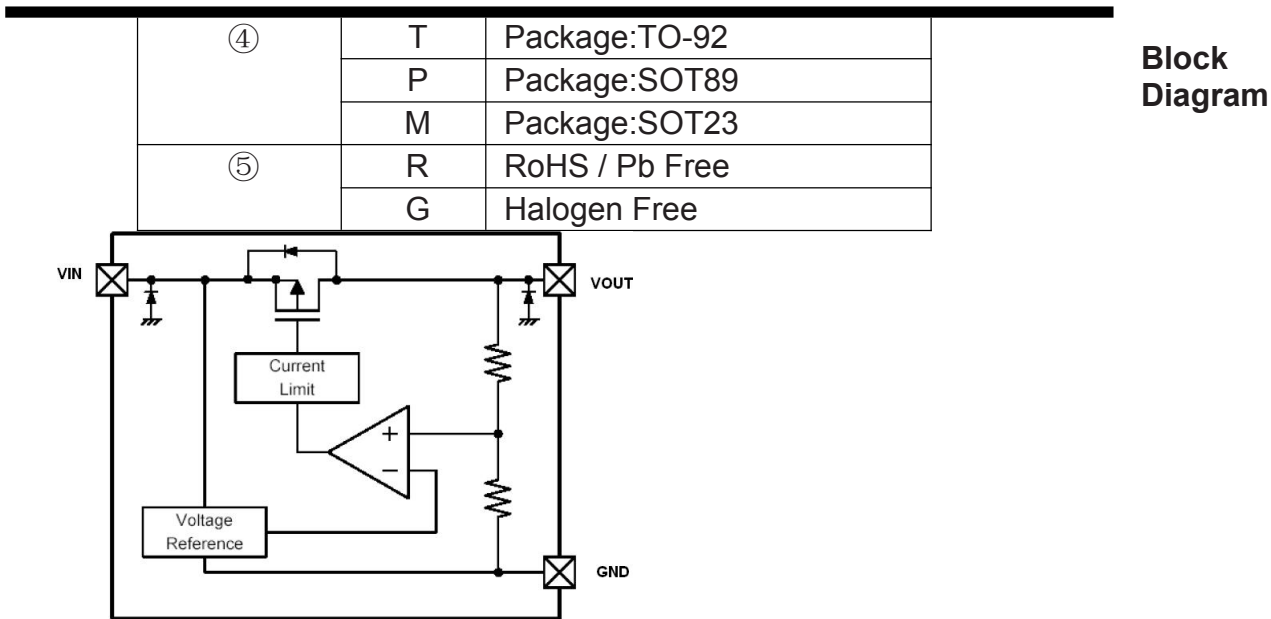
Note: "" stands for Order Information

73①②③④⑤

Designator	Symbol	Description
① ②	Integer	Output Voltage(2.5~5.0V)
③	M	Standard
④	T	Package:TO-92
	P	Package:SOT89
	M	Package:SOT23
⑤	R	RoHS / Pb Free
	G	Halogen Free

SOT89 & SOT23 packages will add a "#" mark at the end of the marking. output voltages.

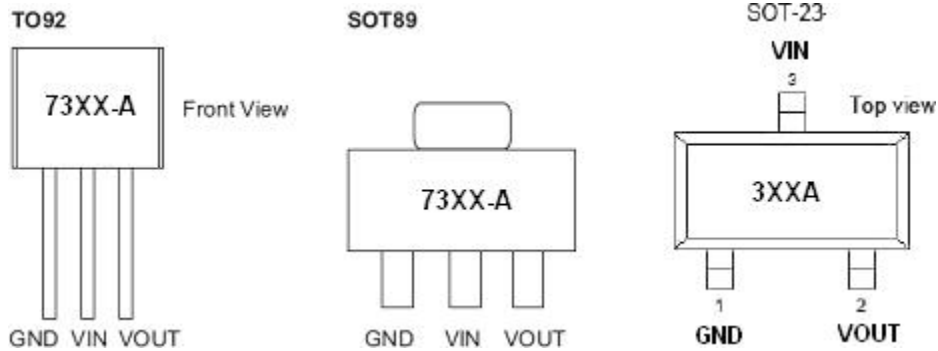
Block Diagram



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

Pin Assignment

3 73XXA series 400mA Low Power LDO



Absolute Maximum Ratings

Supply Voltage-0.3V to 18V
 Operating Temperature-40°C to 85°C
 Storage Temperature-50°C to 125°C

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	°C/W
		SOT89	200	°C/W
		TO92	200	°C/W
P_D	Power Dissipation	SOT23	0.20	W
		SOT89	0.50	W
		TO92	0.50	W

Note: P_D is measured at $T_a = 25^\circ\text{C}$

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Electrical Characteristics

7315-A, +1.5V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	3.5V	I _{OUT} =40mA	1.47	1.50	1.53	V
I _{OUT}	Output Current	3.5V	-	-	250	-	mA
Δ V _{OUT}	Load Regulation	3.5V	1mA ≤ I _{OUT} ≤ 60mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	650	750	mV
I _{SS}	Current Consumption	3.5V	No load	-	2.0	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	2.5V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.5V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

7318-A, +1.8V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	3.8V	I _{OUT} =10mA	1.764	1.800	1.836	V
I _{OUT}	Output Current	3.8V	-	-	250	-	mA
Δ V _{OUT}	Load Regulation	3.8V	1mA ≤ I _{OUT} ≤ 60mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	620	720	mV
I _{SS}	Current Consumption	3.8V	No load	-	2.0	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	2.8V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.8V	I _{OUT} =10mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

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7325-A, +2.5V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	3.5V	I _{OUT} =40mA	2.45	2.500	2.55	V
I _{OUT}	Output Current	3.5V	-	180	250	-	mA
Δ V _{OUT}	Load Regulation	3.5V	1mA ≤ I _{OUT} ≤ 60mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	100	-	mV
ISS	Current Consumption	3.5V	No load	-	2.5	3	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.5V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.5V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

7327-A, +2.7V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	3.7V	I _{OUT} =10mA	2.646	2.700	2.754	V
I _{OUT}	Output Current	3.7V	-	200	250	-	mA
Δ V _{OUT}	Load Regulation	3.7V	1mA ≤ I _{OUT} ≤ 60mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	100	-	mV
ISS	Current Consumption	3.7V	No load	-	2.5	3	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.7V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.7V	I _{OUT} =10mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

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7328-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
Δ V _{OUT}	Load Regulation	4.8V	1mA ≤ I _{OUT} ≤ 60mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	520	620	mV
I _{SS}	Current Consumption	4.8V	No load	-	2.0	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.8V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.8V	I _{OUT} =10mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

7330-A, +3.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4V	I _{OUT} =40mA	2.94	3.00	2.06	V
I _{OUT}	Output Current	4V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	4V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	100	-	mV
I _{SS}	Current Consumption	4V	No load	-	2.5	3	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

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7333-A, +3.3V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4.3V	I _{OUT} =40mA	3.234	3.300	3.366	V
I _{OUT}	Output Current	4.3V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	4.3V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	100	-	mV
ISS	Current Consumption	4.3V	No load	-	2.5	3	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.3V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.3V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

7336-A, +3.6V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4.6V	I _{OUT} =40mA	3.528	3.600	3.672	V
I _{OUT}	Output Current	4.6V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	4.6V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	80	-	mV
ISS	Current Consumption	4.6V	No load	-	2.5	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.6V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.6V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

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7340-A, +4.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	5.0V	I _{OUT} =40mA	3.920	4.000	4.080	V
I _{OUT}	Output Current	5.0V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	5.0V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	80	-	mV
ISS	Current Consumption	5.0V	No load	-	2.5	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	5V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.0V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the out

7344-A, +4.4V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	5.4V	I _{OUT} =40mA	4.312	4.400	4.488	V
I _{OUT}	Output Current	5.4V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	5.4V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	80	-	mV
ISS	Current Consumption	5.4V	No load	-	2.5	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	5.4V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.4V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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.

put voltage from the value at V_{IN} = V_{OUT}+1V with a fixed load.

73XXA series

400 mA Low Power LDO

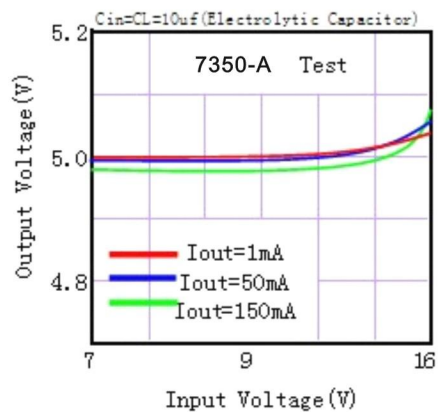
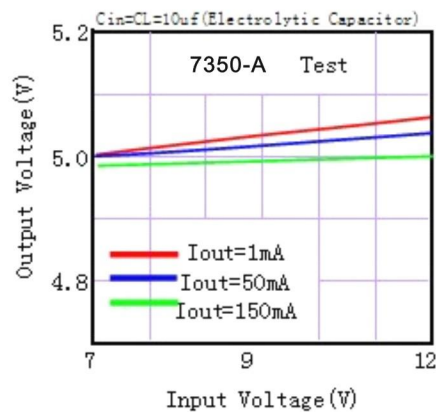
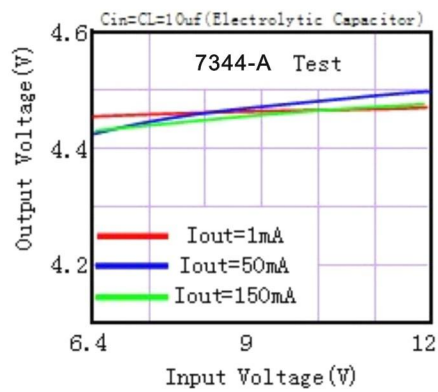
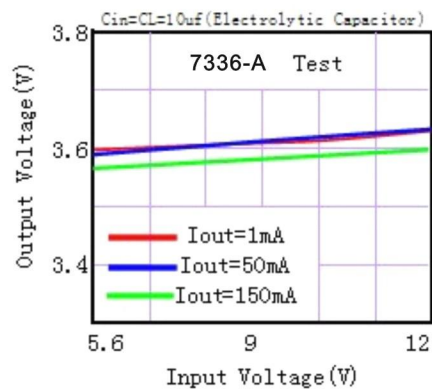
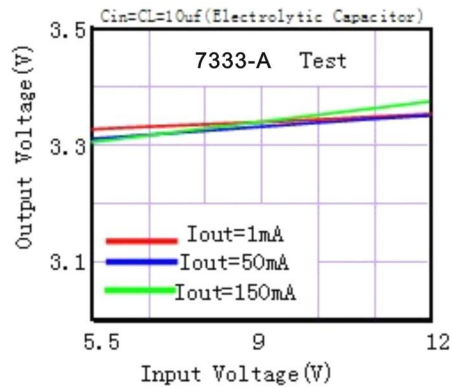
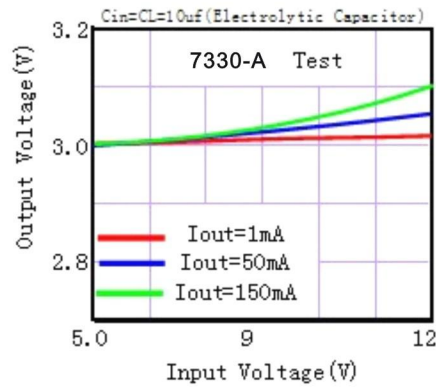
7350-A, +5.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	6V	I _{OUT} =40mA	4.9	5.00	5.1	V
I _{OUT}	Output Current	6V	-	250	-	-	mA
Δ V _{OUT}	Load Regulation	6V	1mA ≤ I _{OUT} ≤ 80mA	-	45	90	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =40mA, Δ V _{OUT} =2%	-	80	-	mV
ISS	Current Consumption	6V	No load	-	2.5	3.0	μ A
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	6V ≤ V _{IN} ≤ 12V I _{OUT} =40mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	18	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6V	I _{OUT} =40mA -40°C < T _a < 85°C	-	±0.5	-	mV/°C

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

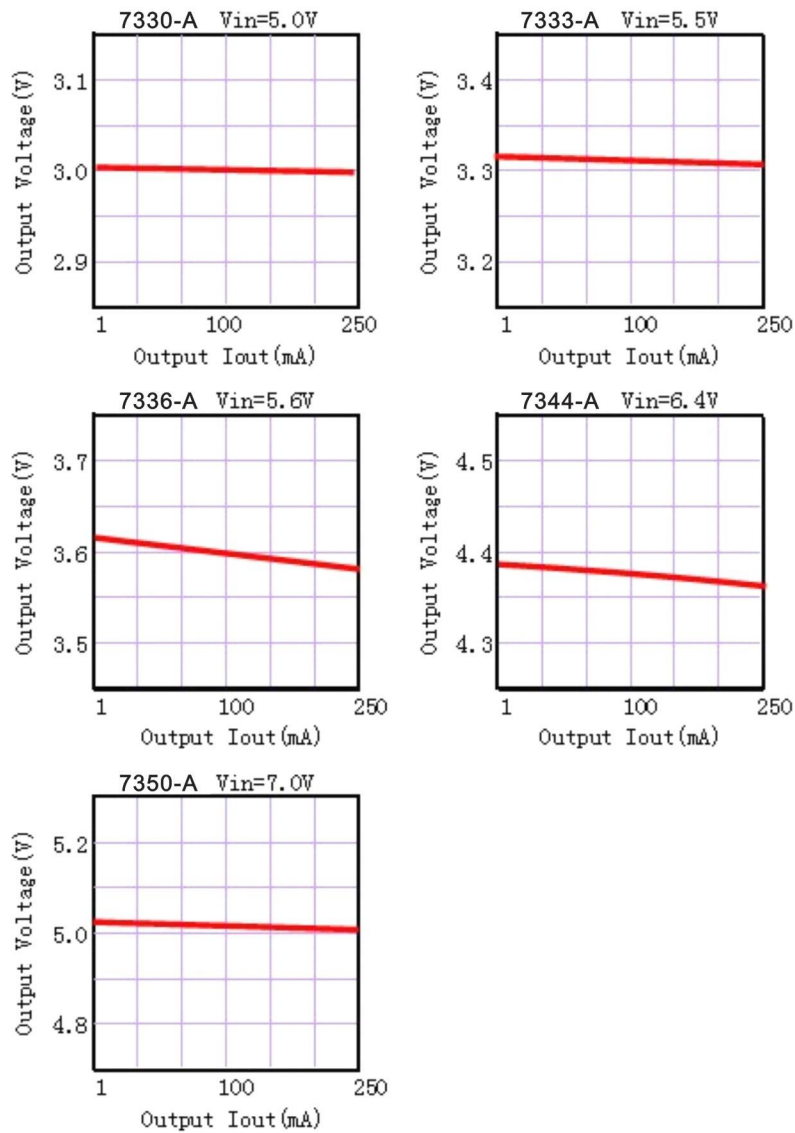
(1) Output Voltage vs Input voltage



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400 mA Low Power LDO

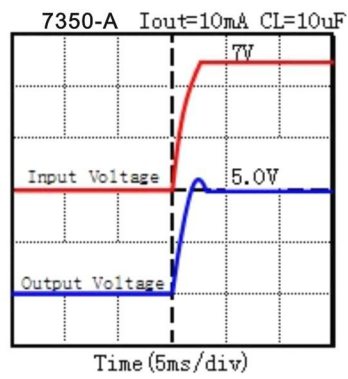
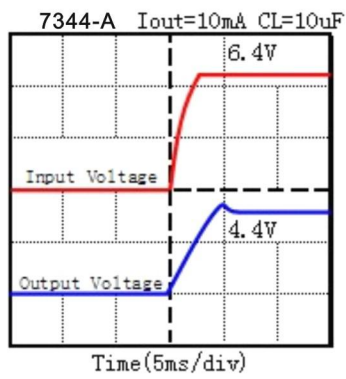
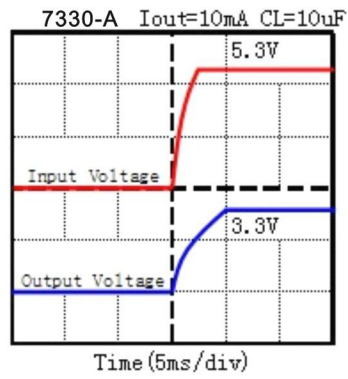
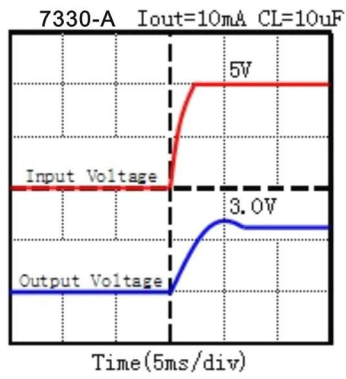
(2) Output Voltage vs. Output Current



73XXA series

400 mA Low Power LDO

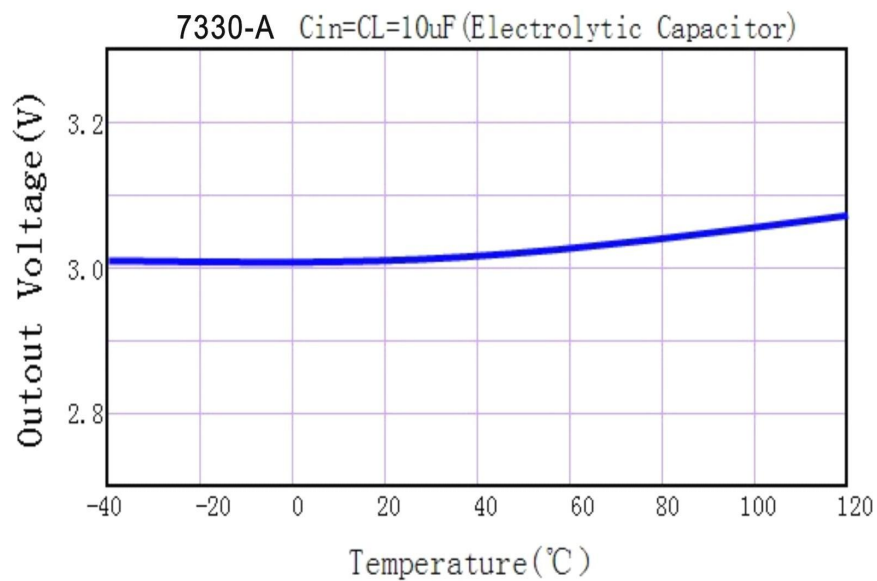
(3) Input Transient Response



(4) Output Voltage vs. Ambient Temperature

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(5) MAX Output Current Vs. Input Voltage

7330-A

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

7333-A

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

7350-A

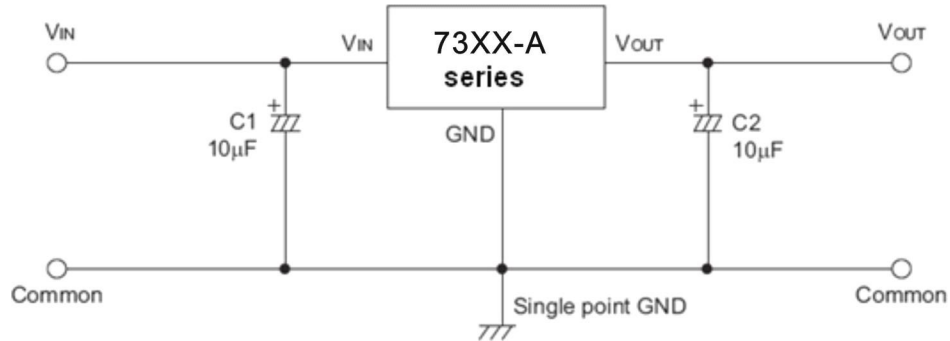
Input Voltage	Max Output Current
7V	250mA
9V	200mA
12V	150mA
15V	100mA

73XX-A series

400 mA Low Power LDO

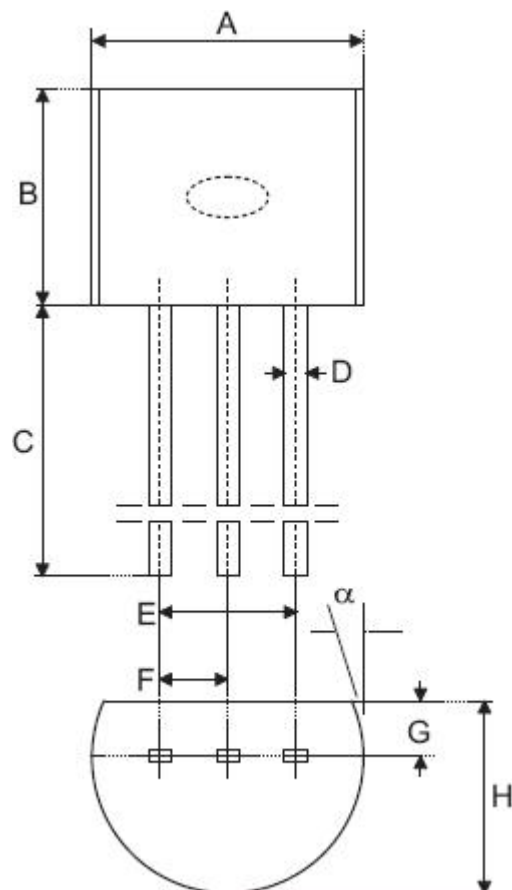
Application Circuits

Basic Circuits



Package Information

3-pin TO92 Outline Dimensions

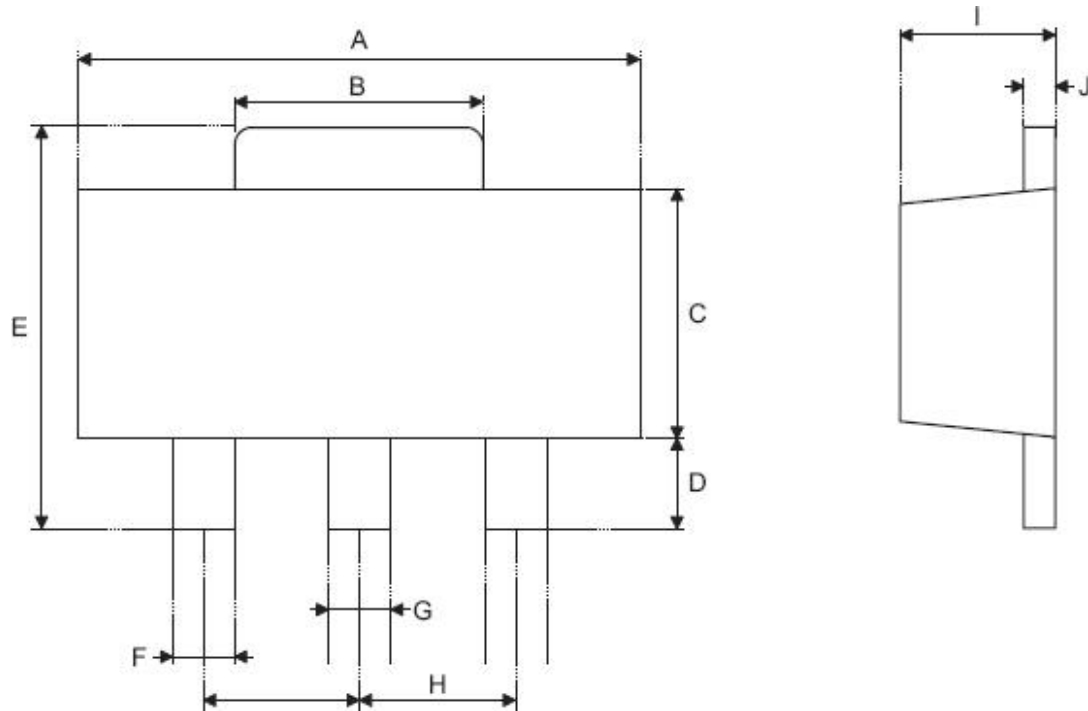


73XXA series

400 mA Low Power LDO

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°

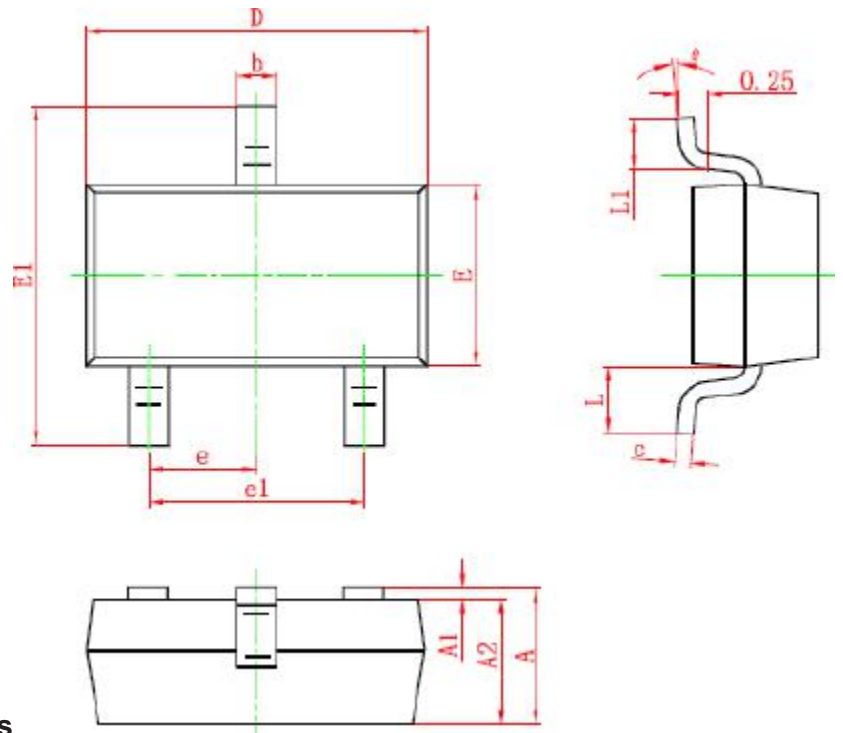
3-pin SOT89 Outline Dimensions



Symbol	Dimensions in 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

73XXA series

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3-pin SOT23 Outline Dimensions

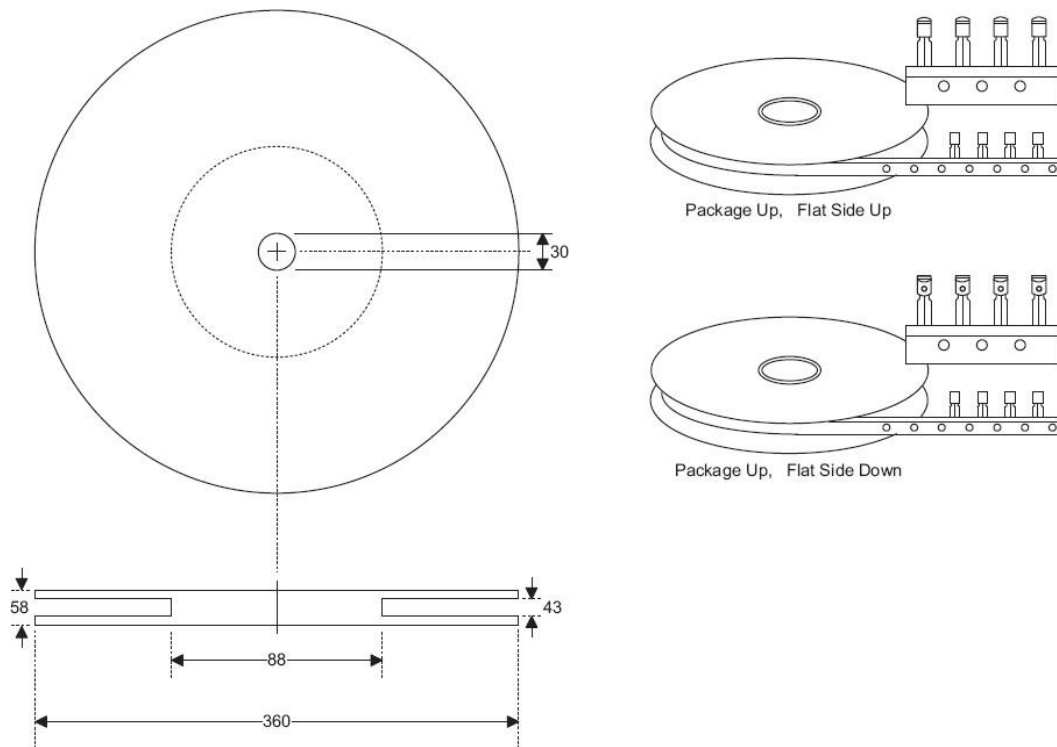
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037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

Product Tape and Reel Specifications

3-pin TO92 Reel Dimensions (Unit: mm)

73XXA series

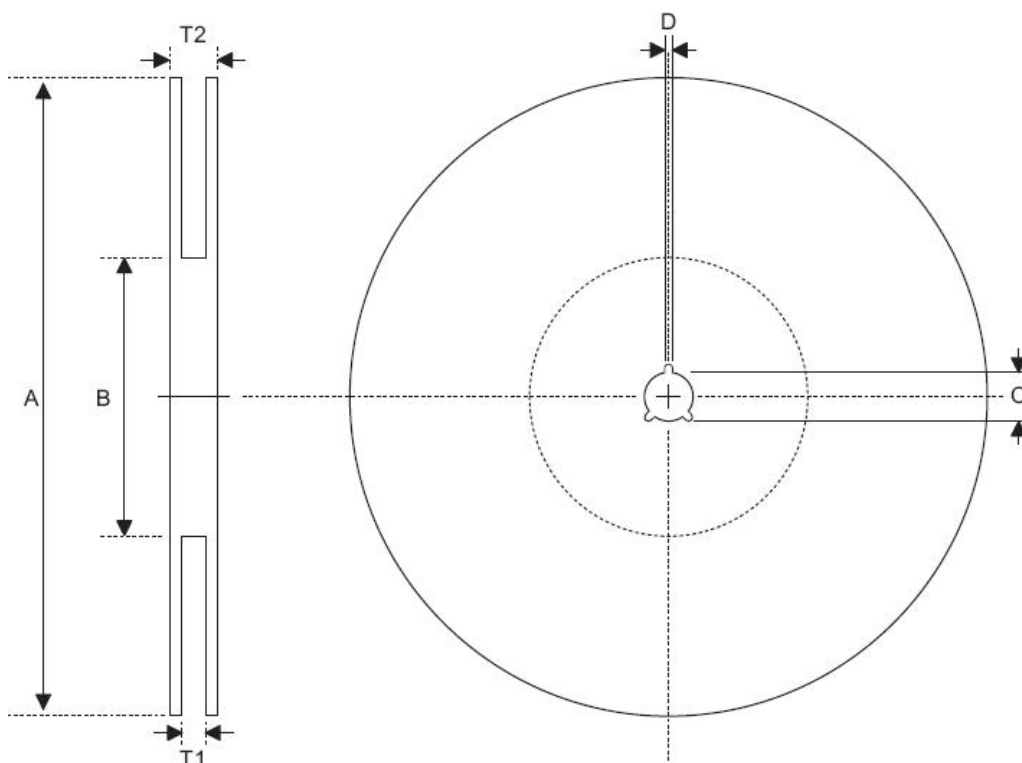
400 mA Low Power LDO



Reel Dimensions

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SOT89

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180.0±1.0
B	Reel Inner Diameter	62.0±1.5
C	Spindle Hole Diameter	12.75 ^{+0.15/-0.00}
D	Key Slit Width	1.90±0.15
T1	Space Between Flange	12.4 ^{+0.2/-0.00}
T2	Reel Thickness	17.0 ^{+0.0/-0.4}

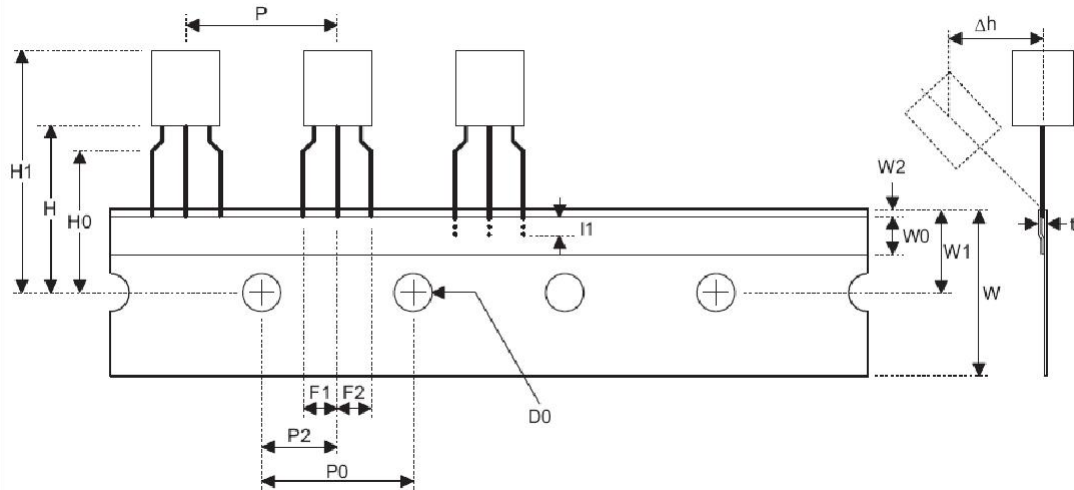
SOT23-5

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	178.0±1.0
B	Reel Inner Diameter	62.0±1.0
C	Spindle Hole Diameter	13.0±0.2
D	Key Slit Width	2.50±0.25
T1	Space Between Flange	8.4 ^{+1.5/-0.0}
T2	Reel Thickness	11.4 ^{+1.5/-0.0}

Carrier Tape Dimensions

B-A series

400 mA Low Power LDO



TO92

Symbol	Description	Dimensions in mm
I1	Taped Lead Length	(2.5)
P	Component Pitch	12.7±1.0
P ₀	Perforation Pitch	12.7±0.3
P ₂	Component to Perforation (Length Direction)	6.35±0.40
F ₁	Lead Spread	2.5 ^{+0.4/-0.1}
F ₂	Lead Spread	2.5 ^{+0.4/-0.1}
Δh	Component Alignment	0.0±0.1
W	Carrier Tape Width	18.0 ^{+1.0/-0.5}
W ₀	Hold-down Tape Width	6.0±0.5
W ₁	Perforation Position	9.0±0.5
W ₂	Hold-down Tape Position	(0.5)
H ₀	Lead Clinch Height	16.0±0.5
H ₁	Component Height	Less than 24.7
D ₀	Perforation Diameter	4.0±0.2
t	Taped Lead Thickness	0.7±0.2
H	Component Base Height	19.0±0.5

Note: Thickness less than 0.38_0.05mm~0.5mm

P0 Accumulated pitch tolerance: _1mm/20pitches.

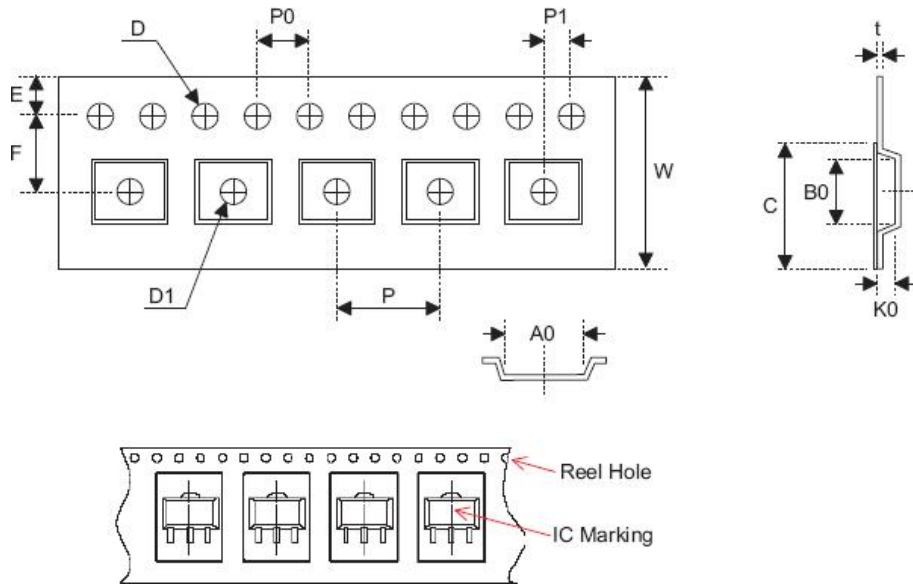
() Bracketed figures are for consultation only

Carrier Tape Dimensions

B-A series

400

mA Low Power LDO



SOT89

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	12.0 ^{+0.3/-0.1}
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation (Width Direction)	5.50±0.05
D	Perforation Diameter	1.5 ^{+0.1/-0.0}
D1	Cavity Hole Diameter	1.5 ^{+0.1/-0.0}
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	Carrier Tape Thickness	0.300±0.013
C	Cover Tape Width	9.3±0.1

SOT23-5

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	8.0±0.3
P	Cavity Pitch	4.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation (Width Direction)	3.50±0.05
D	Perforation Diameter	1.5 ^{+0.1/-0.0}
D1	Cavity Hole Diameter	1.5 ^{+0.1/-0.0}
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.00±0.05
A0	Cavity Length	3.15±0.10
B0	Cavity Width	3.2±0.1
K0	Cavity Depth	1.4±0.1
t	Carrier Tape Thickness	0.20±0.03
C	Cover Tape Width	5.3±0.1