LR73XX

Low Power 250mA CMOS LDO

Features

- Ultra low quiescent current: 1μA (typ.)
- High input voltage (up to 12V)
- Output voltage:
  1.5V, 2.5V, 3.0V, 3.3V, 3.6V, 4.4V, 5.0V
- Output voltage accuracy: tolerance ±3%
- Maximum output current: 250mA
- Low dropout voltage
- Low temperature coefficient
- TO-92, SOT-89package

Applications

- Battery-powered equipment
- Voltage regulator for microprocessor
- Voltage regulator for LAN cards
- Wireless Communication equipment
- Audio/Video equipment

General Description

The LR73XX series is a set of three-terminal, low power, high voltage regulators implemented in CMOS technology. The series features extremely low quiescent current which is typically 1μA. They allow input voltages as high as 12V. The device provides large current with a significantly small dropout voltage.

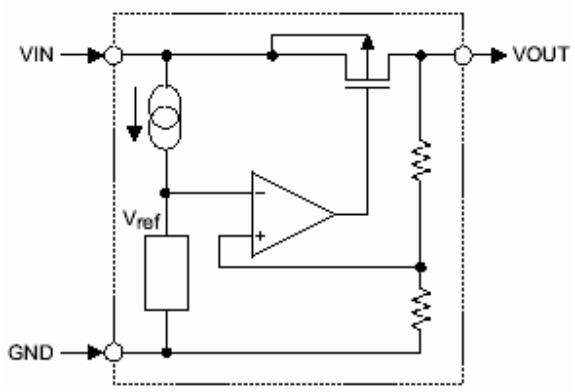
The LR73XX consists of a high-precision voltage reference, an error correction circuit, and a current limited output driver. They are available with several fixed output voltages ranging from 1.5V to 5.0V. CMOS technology ensures low dropout voltage and low current consumption. Although designed primarily as fixed voltage regulators, these devices can be used with external components to generate variable voltages and current.

Selection Table

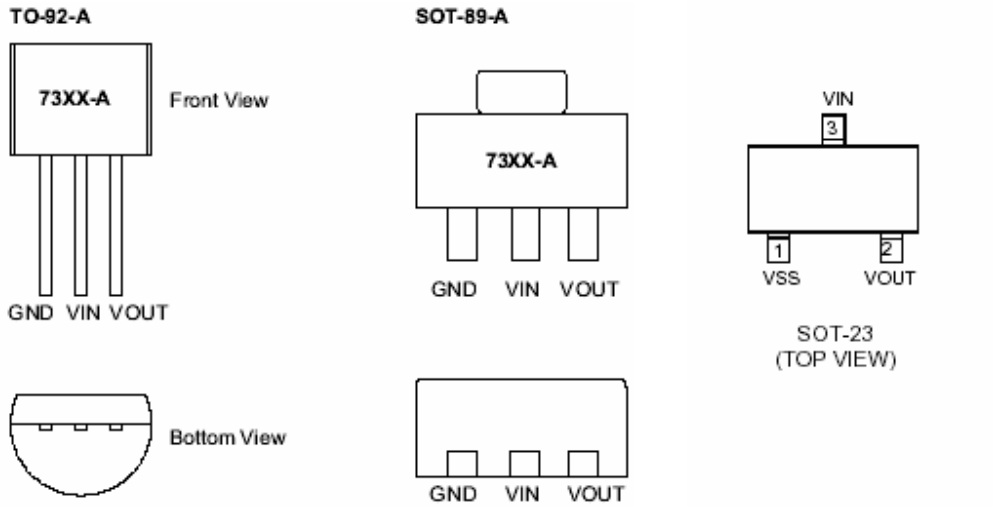
Part No.	Output Voltage	Tolerance	Package	Marking
LR7315	1.5V	±3%	TO-92-A SOT-89-A	73XX-A (for TO-92-A) 73XX-A (for SOT-89)
LR7325	2.5V	±3%		
LR7330	3.0V	±3%		
LR7333	3.3V	±3%		
LR7336	3.6V	±3%		
LR7344	4.4V	±3%		
LR7350	5.0V	±3%		

Note: “XX” stands for output voltages

Block Diagram



Pin Assignment



Absolute Maximum Ratings

Supply Voltage .....V_{SS}-0.3V to V_{SS}+15V
Power Consumption (*1) 500mW
Power Consumption (*2) 500mW

Storage Temperature .....-50℃ to 125℃
Operating Temperature .....-40℃ 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.

*1: applied to TO-92
*2: applied to SOT-89

Electrical Characteristics

LR7315, +1.5V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	2.5V	I_{OUT}=40mA	1.455	1.5	1.545	V
I_{OUT}(MAX)	Maximum Output Current	2.5V	$V_{OUT}\geq$1.62V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	2.5V	1mA$\leq I_{OUT}\leq$60mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	170	——	mV
I_{SS}	Quiescent Current	2.5V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 2.5V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	2.5V	I_{OUT}=40mA -40°C<Ta<85°C	——	±0.7	——	ppm/°C

L R7325, +2.5V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	3.5V	I_{OUT}=40mA	2.425	2.5	2.575	V
I_{OUT}(MAX)	Maximum Output Current	3.5V	$V_{OUT}\geq$2.25V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	3.5V	1mA$\leq I_{OUT}\leq$60mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	170	——	mV
I_{SS}	Quiescent Current	3.5V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 3.5V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	3.5V	I_{OUT}=40mA -40°C<Ta<85°C	——	±0.7	——	ppm/°C

L R7330, +3.0V Output Type

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	4V	I_{OUT}=40mA	2.91	3	3.09	V
I_{OUT}(MAX)	Maximum Output Current	4V	$V_{OUT}\geq$2.7V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	4V	1mA$\leq I_{OUT}\leq$80mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	95	——	mV
I_{SS}	Quiescent Current	4V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 4V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	4V	I_{OUT}=40mA -40°C<Ta<85°C	——	±0.7	——	ppm/°C

LR7333, +3.3V Output Type Ta=25℃

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	4.3V	I_{OUT}=40mA	3.201	3.3	3.399	V
I_{OUT}(MAX)	Maximum Output Current	4.3V	$V_{OUT}\geq$2.97V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	4.3V	1mA$\leq I_{OUT}\leq$80mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	90	——	mV
I_{SS}	Quiescent Current	4.3V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 4.3V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	4.3V	I_{OUT}=40mA -40℃<Ta<85℃	——	±0.7	——	ppm/℃

LR7336, +3.6V Output Type Ta=25℃

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	4.6V	I_{OUT}=40mA	3.492	3.6	3.708	V
I_{OUT}(MAX)	Maximum Output Current	4.6V	$V_{OUT}\geq$3.15V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	4.6V	1mA$\leq I_{OUT}\leq$80mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	80	——	mV
I_{SS}	Quiescent Current	4.6V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 4.6V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	4.6V	I_{OUT}=80mA -40℃<Ta<85℃	——	±0.7	——	ppm/℃

LR7344, +4.4V Output Type Ta=25℃

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	5.4V	I_{OUT}=40mA	4.268	4.4	4.532	V
I_{OUT}(MAX)	Maximum Output Current	5.4V	$V_{OUT}\geq$3.15V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	5.4V	1mA$\leq I_{OUT}\leq$80mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	80	——	mV
I_{SS}	Quiescent Current	5.4V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 4.6V$\leq V_{IN}\leq$12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	5.4V	I_{OUT}=80mA -40℃<Ta<85℃	——	±0.7	——	ppm/℃

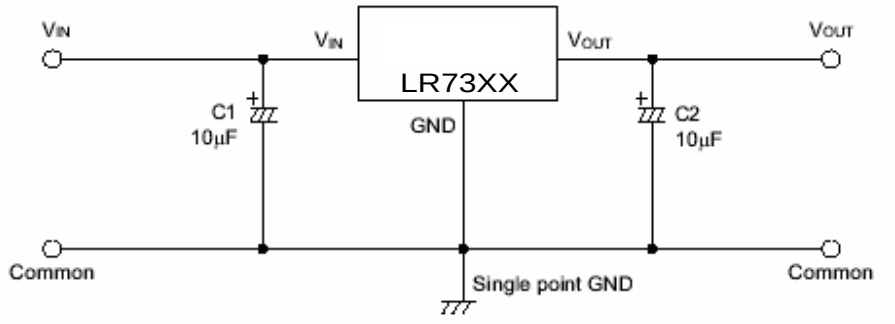
LR7350, +5.0V Output Type Ta=25℃

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V_{OUT}	Output Voltage	6V	I_{OUT}=40mA	4.85	5	5.15	V
I_{OUT}(MAX)	Maximum Output Current	6V	V_{OUT}≥4.5V	250	——	——	mA
$\triangle V_{OUT}$*	Load Regulation	6V	1mA≤I_{OUT}≤ 100mA	——	45	90	mV
V_{DROP}**	Dropout Voltage	——	I_{OUT}=40mA	——	60	——	mV
I_{SS}	Quiescent Current	6V	No load	——	1	2.5	μA
$\frac{\triangle V_{OUT}}{V_{IN}\times\triangle V_{OUT}}$	Line Regulation	——	I_{OUT}=40mA 6V≤V_{IN}≤12V	——	0.2	0.3	%/V
V_{IN}	Input Voltage	——	——	——	——	15	V
$\frac{\triangle V_{OUT}}{\triangle Ta}$	Temperature Coefficient	6V	I_{OUT}=80mA -40℃<Ta<85℃	——	±0.7	——	ppm/℃

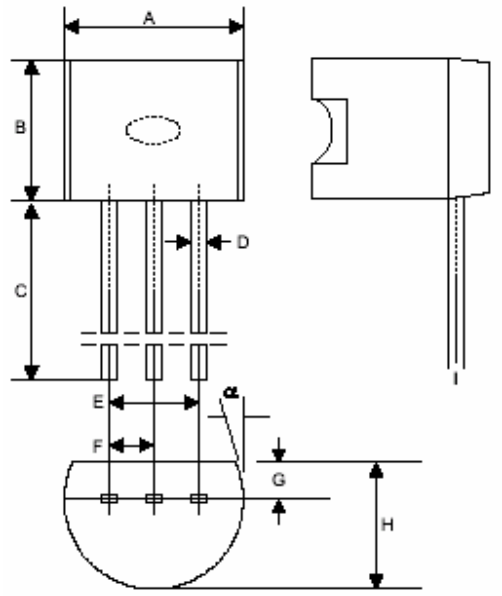
Note: "*"Regulation is measured at constant junction temperature, using pulsed ON time.

"**" Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V_{OUT} inside target value ±2%.

Application Circuits

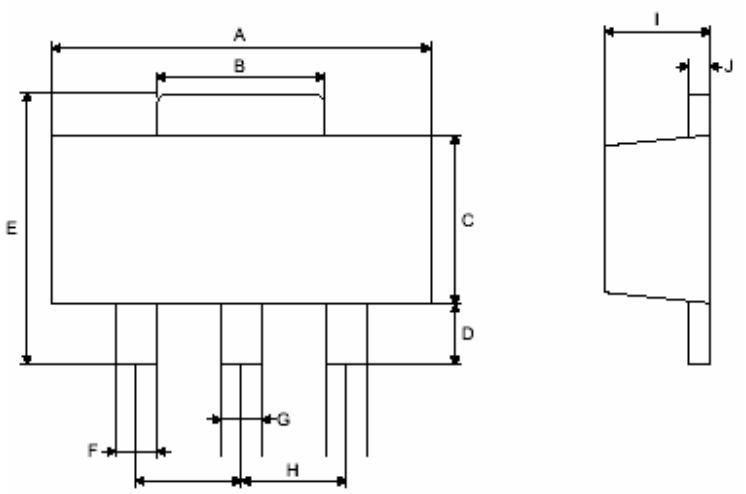


Package Information
TO-92 Outline Dimensions



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°

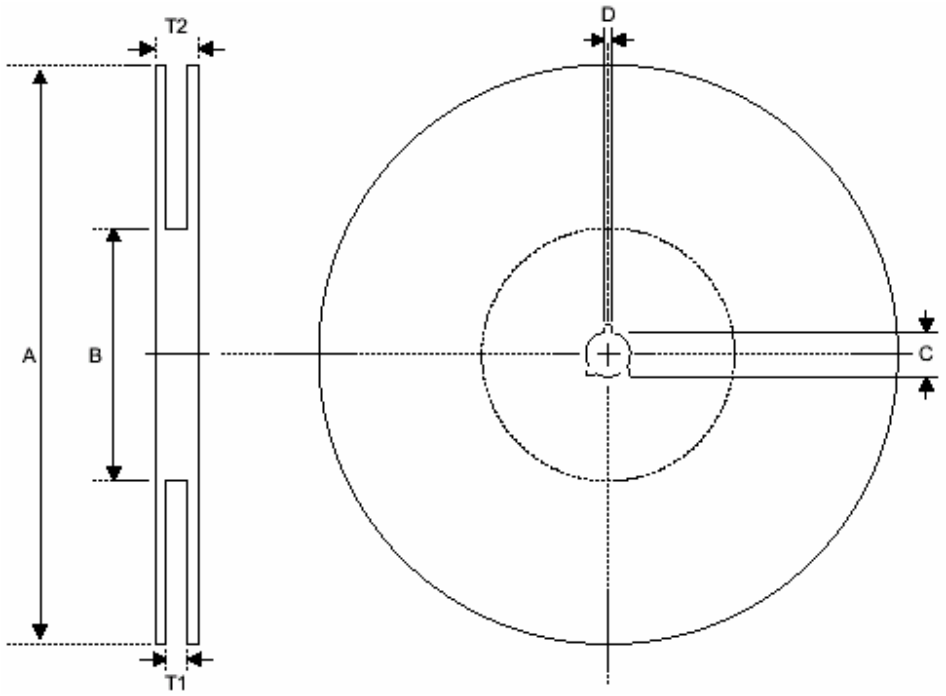
SOT-89 Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	——	181
B	64	——	72
C	90	——	102
D	35	——	47
E	155	——	167
F	14	——	19
G	17	——	22
H	——	59	——
I	55	——	63
J	14	——	17

Product Tape and Reel Specifications

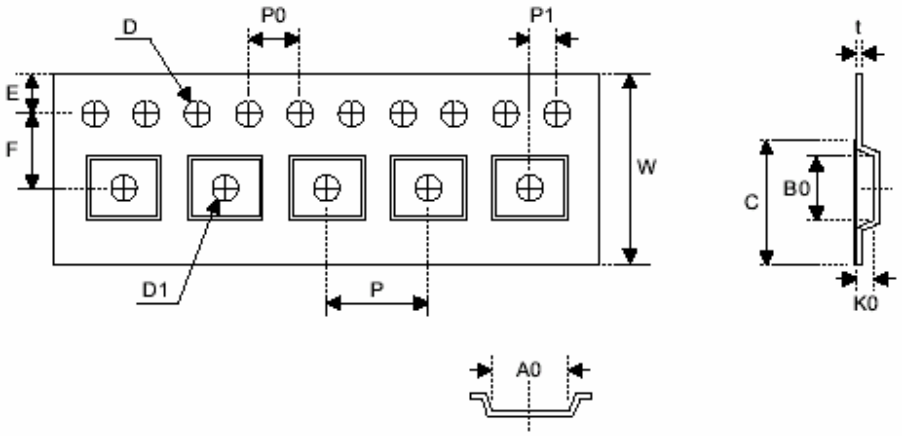
SOT-89 Reel Dimensions



SOT-89

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	12.75+0.15
D	Key Slit Width	1.9±0.15
T1	Space Between Flange	12.4+0.2
T2	Reel Thickness	17±0.4

SOT-89 Carrier Tape Dimensions



SOT-89

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±0.1
F	Cavity to Perforation (Width Direction)	5.5±0.05
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.1
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.10
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	CarrierTape Thickness	0.30±0.013
C	Cover Tape Width	9.3