

# LR75XX

## 100mA CMOS Low Power LDO

### Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 24V)
- High output current : 100mA ( $P_d = 250mW$ )
- Output voltage accuracy: tolerance  $\pm 3\%$
- TO-92, SOT-89 and SOT-25 package

### Applications

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

### General Description

The LR75XX-1 series is a set of three-terminal high current low voltage regulator implemented in CMOS technology. They can deliver 100mA output current and allow an input voltage as high as 24V. They are available with several fixed output voltages ranging from 3.0V 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.

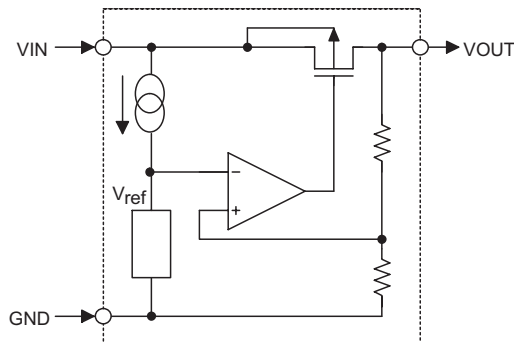
### Selection Table

Part No.	Output Voltage	Tolerance	Package	Marking
LR7530-1	3.0V	$\pm 3\%$	TO-92 SOT-89 SOT-25	75XX-1 (for TO-92) 75XX-1 (for SOT-89) 5XX (for SOT-25)
LR7533-1	3.3V	$\pm 3\%$		
LR7536-1	3.6V	$\pm 3\%$		
LR7544-1	4.4V	$\pm 3\%$		
LR7550-1	5.0V	$\pm 3\%$		

Note: "XX" stands for output voltages.

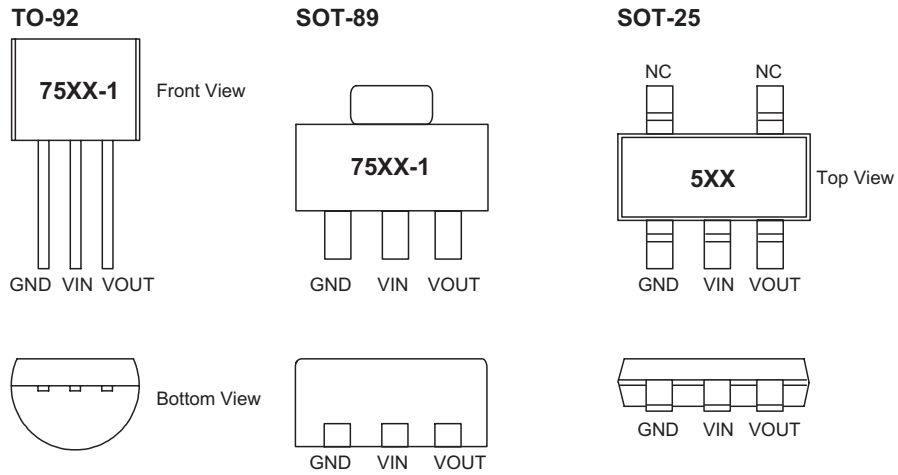
For lead free devices, TO-92 package will add a "#" mark at the end of the date code, whereas SOT-89 & SOT-25 packages will add a "#" mark at the end of the marking.

### Block Diagram



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## Pin Assignment



## Absolute Maximum Ratings

Supply Voltage .....	0.3V to 26V	Storage Temperature .....	-50 to 125
Power Consumption (*1) .....	250mW	Operating Temperature .....	-40 to 85
Power Consumption (*2) .....	150mW		

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 SOT89 and TO-92

\*2: applied to SOT-25

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## Electrical Characteristics

### LR7530-1, +3.0V Output Type

Ta=25

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V <sub>OUT</sub>	Output Voltage Tolerance	5V	I <sub>OUT</sub> =10mA	2.91	3.0	3.09	V
I <sub>OUT</sub>	Output Current	5V	—	60	100	—	mA
V <sub>OUT</sub>	Load Regulation	5V	1mA I <sub>OUT</sub> 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop	—	I <sub>OUT</sub> =1mA	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5V	No load	—	3.5	7	μA
$\frac{V_{OUT}}{V_{IN}} \times \frac{V_{OUT}}{V_{OUT}}$	Line Regulation	—	4V V <sub>IN</sub> 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	24	V
$\frac{V_{OUT}}{T_a}$	Temperature Coefficient	5V	I <sub>OUT</sub> =10mA 0 <T <sub>a</sub> <70	—	±0.45	—	mV/

### LR7533-1, +3.3V Output Type

Ta=25

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V <sub>OUT</sub>	Output Voltage Tolerance	5.5V	I <sub>OUT</sub> =10mA	3.201	3.3	3.399	V
I <sub>OUT</sub>	Output Current	5.5V	—	60	100	—	mA
V <sub>OUT</sub>	Load Regulation	5.5V	1mA I <sub>OUT</sub> 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop	—	I <sub>OUT</sub> =1mA	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5.5V	No load	—	3.5	7	μA
$\frac{V_{OUT}}{V_{IN}} \times \frac{V_{OUT}}{V_{OUT}}$	Line Regulation	—	4.5V V <sub>IN</sub> 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	24	V
$\frac{V_{OUT}}{T_a}$	Temperature Coefficient	5.5V	I <sub>OUT</sub> =10mA 0 <T <sub>a</sub> <70	—	±0.5	—	mV/

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**LR7536-1, +3.6V Output Type**
**Ta=25**

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V <sub>OUT</sub>	Output Voltage Tolerance	5.6V	I <sub>OUT</sub> =10mA	3.492	3.6	3.708	V
I <sub>OUT</sub>	Output Current	5.6V	—	60	100	—	mA
V <sub>OUT</sub>	Load Regulation	5.6V	1mA I <sub>OUT</sub> 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop	—	I <sub>OUT</sub> =1mA	—	100	—	mV
I <sub>SS</sub>	Current Consumption	5.6V	No load	—	3.5	7	μA
$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	Line Regulation	—	4.5V V <sub>IN</sub> 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	24	V
$\frac{V_{OUT}}{T_a}$	Temperature Coefficient	5.6V	I <sub>OUT</sub> =10mA 0 <T <sub>a</sub> <70	—	±0.6	—	mV/

**LR7544-1, +4.4V Output Type**
**Ta=25**

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VIN	Condition				
V <sub>OUT</sub>	Output Voltage Tolerance	6.4V	I <sub>OUT</sub> =10mA	4.268	4.4	4.532	V
I <sub>OUT</sub>	Output Current	6.4V	—	60	100	—	mA
V <sub>OUT</sub>	Load Regulation	6.4V	1mA I <sub>OUT</sub> 50mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop	—	I <sub>OUT</sub> =1mA	—	100	—	mV
I <sub>SS</sub>	Current Consumption	6.4V	No load	—	3.5	7	μA
$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	Line Regulation	—	5.4V V <sub>IN</sub> 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	24	V
$\frac{V_{OUT}}{T_a}$	Temperature Coefficient	6.4V	I <sub>OUT</sub> =10mA 0 <T <sub>a</sub> <70	—	±0.7	—	mV/

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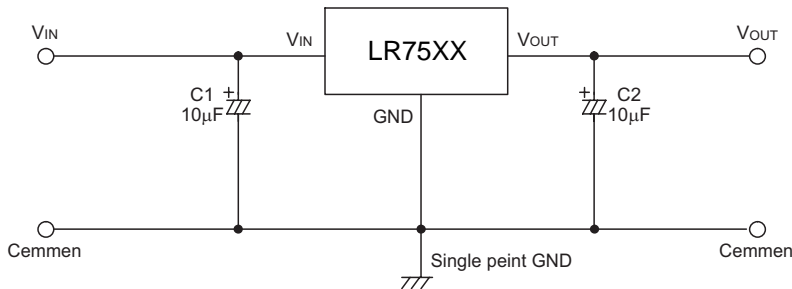
LR7550-1, +5.0V Output Type

Ta=25

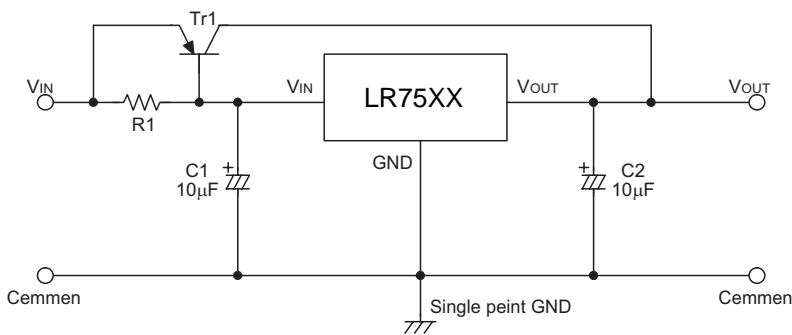
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Condition				
V <sub>OUT</sub>	Output Voltage Tolerance	7V	I <sub>OUT</sub> =10mA	4.85	5.0	5.15	V
I <sub>OUT</sub>	Output Current	7V	—	100	150	—	mA
V <sub>OUT</sub>	Load Regulation	7V	1mA I <sub>OUT</sub> 70mA	—	60	150	mV
V <sub>DIF</sub>	Voltage Drop	—	I <sub>OUT</sub> =1mA	—	100	—	mV
I <sub>SS</sub>	Current Consumption	7V	No load	—	3.5	7	μA
$\frac{V_{OUT}}{V_{IN}} \times \frac{V_{OUT}}{V_{OUT}}$	Line Regulation	—	6V V <sub>IN</sub> 24V I <sub>OUT</sub> =1mA	—	0.2	—	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	24	V
$\frac{V_{OUT}}{T_a}$	Temperature Coefficient	7V	I <sub>OUT</sub> =10mA 0 < T <sub>a</sub> < 70	—	±0.75	—	mV/

## Application Circuits

### Basic Circuits

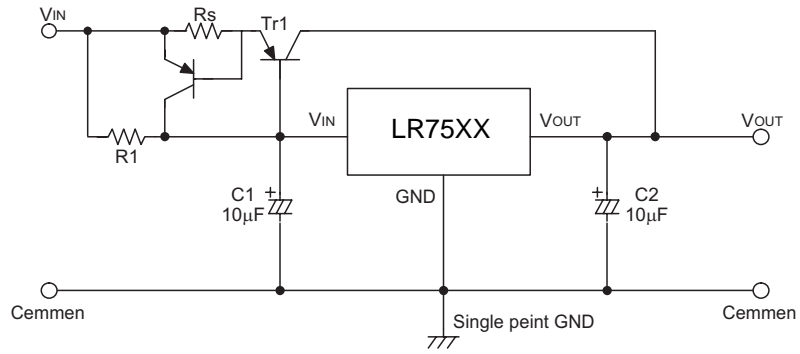


### High Output Current Positive Voltage Regulator

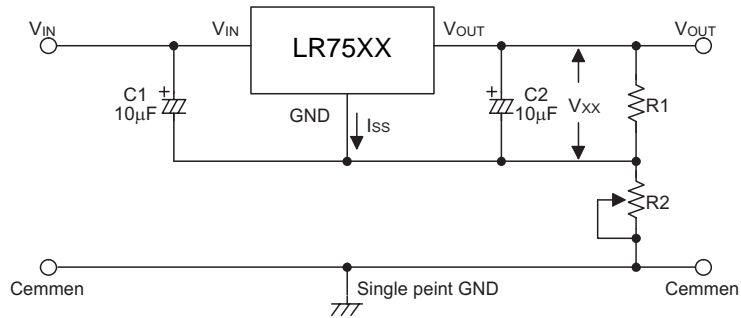


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## Short-Circuit Protection by Tr1

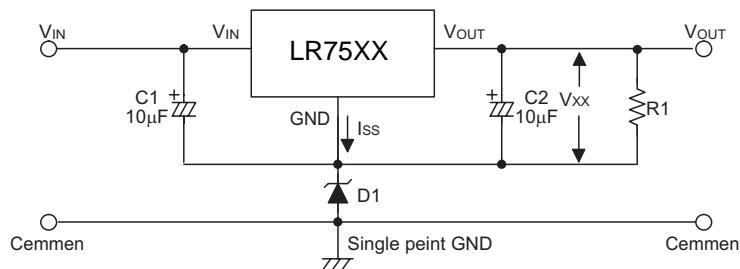


## Circuit for Increasing Output Voltage



$$V_{OUT} = V_{xx} \left( 1 + \frac{R2}{R1} \right) + I_{SS} R2$$

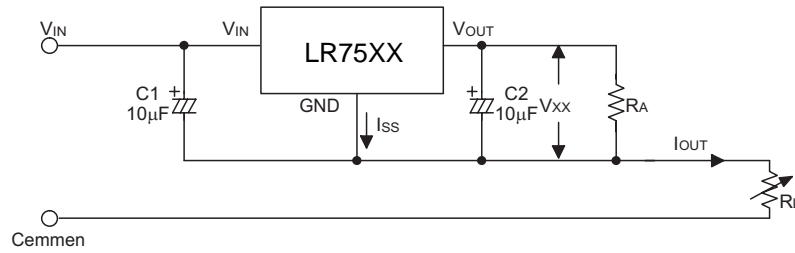
## Circuit for Increasing Output Voltage



$$V_{OUT} = V_{xx} + V_{D1}$$

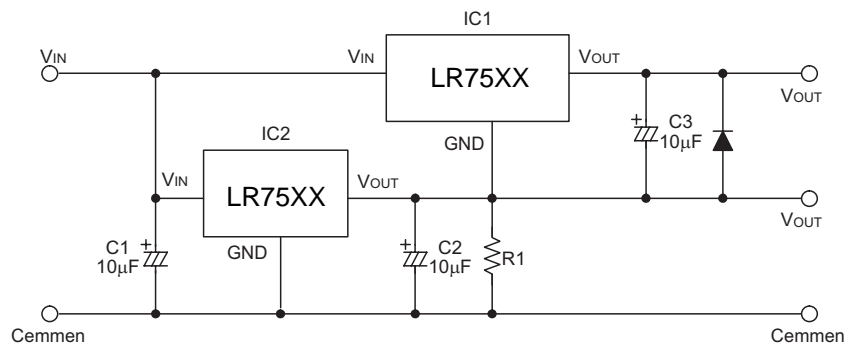
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## Constant Current Regulator



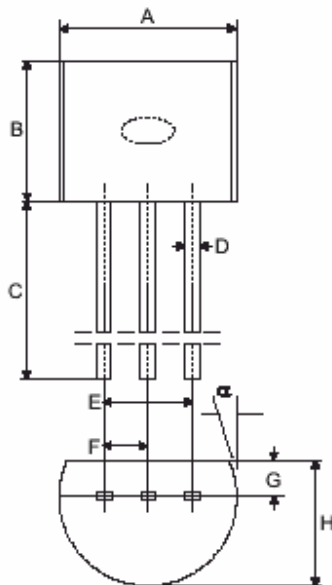
$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

## Dual Supply



## Package Information

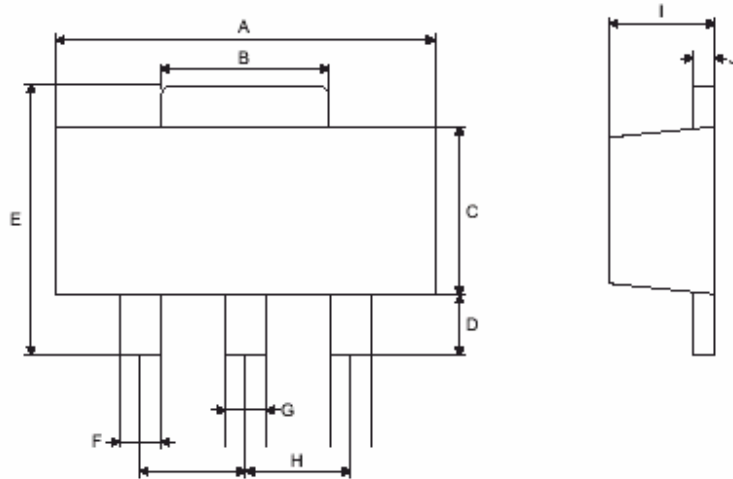
### 3-pin TO-92 Outline Dimensions



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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
	40	—	60

### 3-pin SOT-89 Outline Dimensions

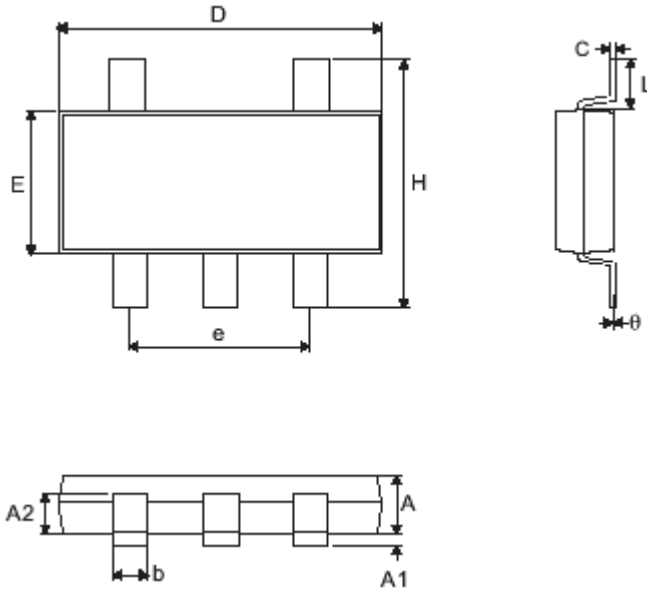


Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	—	181
B	64	—	72
C	90	—	102
D	35	—	47
E	155	—	167
F	14	—	19
G	17	—	22
H	—	59	—
I	55	—	63
J	14	—	17



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## 5-pin SOT-25 Outline Dimensions



Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	1.00	—	1.30
A1	—	—	0.10
A2	0.70	—	0.9
b	0.35	—	0.5
C	0.10	—	0.25
D	2.70	—	3.10
E	1.40	—	1.80
e	—	1.09	—
H	2.60	—	3
L	0.37	—	—
θ	1°	—	9