

## General Description

The LTP3636 series of CMOS low dropout regulators are designed specifically for portable battery-powered applications which require Ultra-low quiescent current. The Ultra-low consumption of typical 0.8  $\mu\text{A}$  ensures long battery life and dynamic transient boost feature improves device transient response for wireless communication applications.

The device is available in SOT23-3 and SOT23-5 packages.

## Features

- Operating Input Voltage Range: 2.0 V to 5.5 V
- Optional Output Voltages: 1.2 V, 1.5 V, 1.8 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V, and 3.6 V
- Ultra-Low Quiescent Current: 0.8  $\mu\text{A}$  Typically
- Low Dropout: 170mV Typically at 150 mA and  $V_{\text{OUT}} = 1.8 \text{ V}$
- High Output Voltage Accuracy:  $\pm 1.5\%$
- Stable with 1 $\mu\text{F}$  Ceramic Capacitors Over-Current Protection
- Thermal Shutdown Protection
- With auto discharge function at off state

## Applications

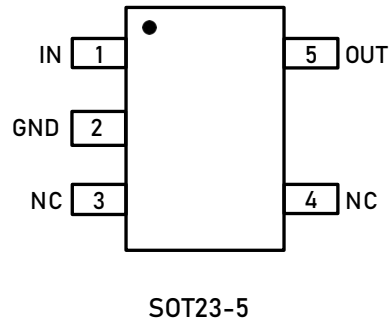
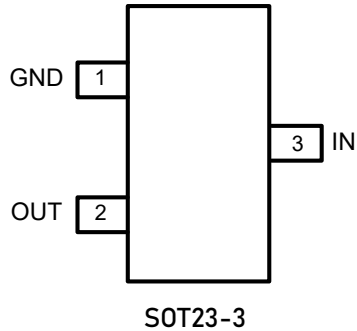
- Battery Powered Equipments
- Portable Communication Equipments
- Cameras, Image Sensors and Camcorders
- Label Information

## Ordering Information

Model	Package	Ordering Number <sup>Note1</sup>	Packing Option
LTP3637	SOT23-3	LTP3636-xxYT3	Tape and Reel, 3000
	SOT23-5	LTP3636-xxYT5	Tape and Reel, 3000

Note1: xx stands for output voltages, e.g. if xx = 18, the output voltage is 1.8 V; if xx = 30, the output voltage is 3.0 V.

## Pin Configurations (Top View)



## Pin Function

Package		Symbol	Function
SOT23-3	SOT23-5		
3	1	IN	Power Supply Input Voltage.
1	2	GND	Ground.
	3	NC	No Connection.
	4	NC	No Connection.
2	5	OUT	Output Pin

## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	
Input Voltage	$V_{IN}$	6.5	V	
Output Voltage	$V_{OUT}$	-0.3 to $V_{IN} + 0.3$	V	
Operating Junction Temperature	$T_J$	150	°C	
Storage Temperature	$T_{STG}$	-55 to 150	°C	
Thermal Characteristics, Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	SOT23-3	357	°C/W
		SOT23-5	250	
Human Body Model	ESD	6000	V	
ESD Capability		2000	V	
Current Maximum Rating	Latch up	200	mA	

NOTE: Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Input Voltage	$V_{IN}$	2.0 to 5.5	V
Output Current	$I_{OUT}$	0 to 300	mA
Operating Ambient Temperature	$T_A$	-40 to 85	°C
Effective Input Ceramic Capacitor Value	$C_{IN}$	0.47 to 4.7	$\mu F$
Effective Output Ceramic Capacitor Value	$C_{OUT}$	0.47 to 4.7	$\mu F$

## Caution

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. LINEARIN recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

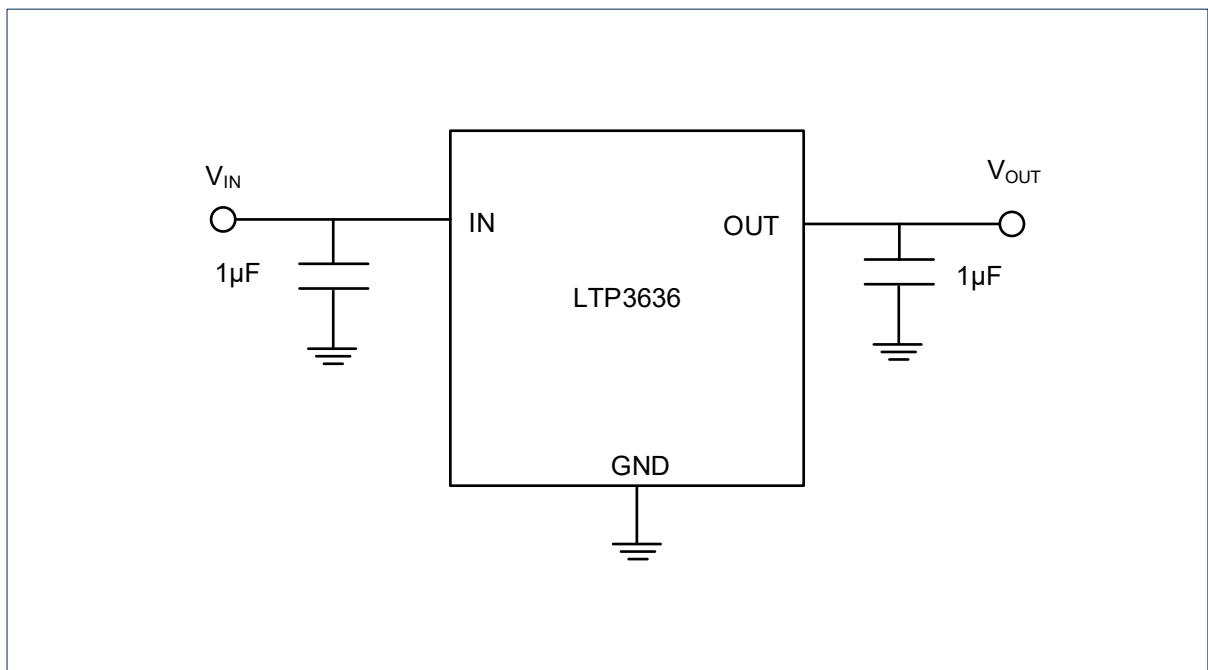
LINEARIN reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact LINEARIN sales office to get the latest datasheet.

## Electrical Characteristics

$V_{IN} = 2.5\text{ V}$ ,  $I_{OUT} = 1\text{ mA}$ ,  $C_{IN} = 1\text{ }\mu\text{F}$ ,  $C_{OUT} = 1\text{ }\mu\text{F}$ ,  $T_A = +25^\circ\text{C}$ , unless otherwise noted.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Input	$V_{IN}$		2.0		5.5	V
Output Voltage	$V_{OUT}$	$T_A = +25^\circ\text{C}$	-1.5		+1.5	%
		$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$	-2.5		+2.5	
Quiescent Current	$I_Q$	$I_{OUT} = 0\text{ mA}$		0.8	1.1	$\mu\text{A}$
Line Regulation	$\text{Reg}_{\text{LINE}}$	$2.5\text{ V} \leq V_{IN} \leq 5.5\text{ V}$ , $I_{OUT} = 1\text{ mA}$		0.1	0.2	%/V
Load Regulation	$\text{Reg}_{\text{LOAD}}$	$1\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$ , $V_{IN} = 2.5\text{ V}$		20		mV
Dropout Voltage	$V_{\text{DROP}}$	$I_{OUT} = 150\text{ mA}$		170		mV
Current Limit	$I_{\text{LMT}}$			300	550	mA
Short Circuit Current	$I_{\text{SHORT}}$	$V_{OUT} = 0\text{ V}$		90		mA
Power supply Rejection Ratio	PSRR	$I_{OUT} = 100\text{ mA}$	$f = 1\text{ kHz}$		-55	dB
			$f = 10\text{ kHz}$		-52	
Output Noise Voltage	$e_N$	$V_{IN} = 2.5\text{ V}$ , $I_{OUT} = 1\text{ mA}$ , $f = 10\text{ Hz to }100\text{ kHz}$ , $C_{OUT} = 1\text{ }\mu\text{F}$		100		$\mu\text{Vrms}$

## Application Circuits



## Applications Information

### General

The LTP3636 is a high performance 300 mA Linear Regulator with Ultra-Low  $I_Q$ . This device delivers low Noise and high Power Supply Rejection Ratio with excellent dynamic performance due to employing the Dynamic Quiescent Current adjustment which assure ultra low  $I_Q$  consumption at no-load state. These parameters make the device very suitable for various battery powered applications.

### Input Decoupling ( $C_{IN}$ )

It is recommended to connect at least a 1  $\mu$ F Ceramic X5R or X7R capacitor between IN and GND pins of the device. This capacitor will provide a low impedance path for any unwanted AC signals or Noise superimposed onto constant Input Voltage. The good input capacitor will limit the influence of input trace inductances and source resistance during sudden load current changes.

Higher capacitance and lower ESR Capacitors will improve the overall line transient response.

### Output Decoupling ( $C_{OUT}$ )

The LTP3637 does not require a minimum Equivalent Series Resistance (ESR) for the output capacitor. The X5R and X7R types have the lowest capacitance variations over temperature thus they are recommended. There is recommended connect the output capacitor as close as possible to the output pin of the regulator.

### Current Limit Protection

When output current at the OUT pin is higher than current limit threshold, the current limit protection will be triggered and clamp the output current to approximately 550 mA to prevent over-current and to protect the regulator from damage due to overheating.

### Thermal Shutdown

When the die temperature exceeds the Thermal Shutdown point ( $T_{SD}$  =160°C typically) the device goes to disabled state and the output voltage is not delivered until the die temperature decreases to 150°C. The Thermal Shutdown feature provides a protection from a catastrophic device failure at accidental overheating. This protection is not intended to be used as a substitute for proper heat sinking.

### Power Dissipation and Heat sinking

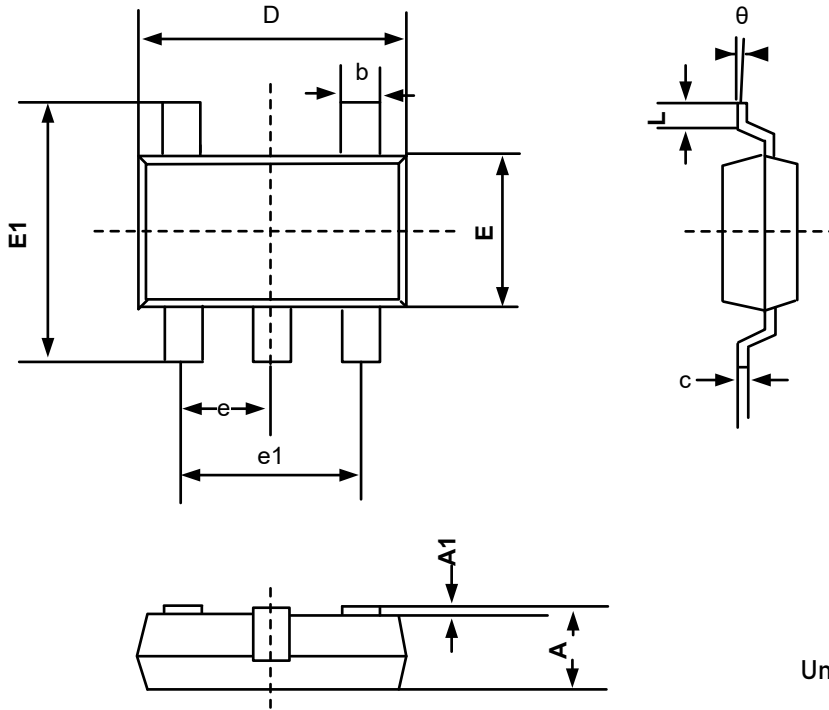
The maximum power dissipation supported by the device is dependent upon board design and layout. Mounting pad configuration on the PCB, the board material and the ambient temperature affect the rate of junction temperature rise for the part. The maximum power dissipation the LTP3636 device can handle is given by:

$$P_{D(MAX)} = \frac{[T_{J(MAX)} - T_A]}{P_{\theta JA}} \quad (\text{equation-1})$$



## Package Dimension

SOT23-5



Unit: mm

Symbol	Dimensions In Millimeters	
	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
b	0.350	0.500
c	0.080	0.200
D	2.820	3.020
E	2.600	3.000
E1	1.600	1.700
e	0.950BSC	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°