

## General Description

The LTP3454 series are low voltage 400 mA voltage regulators. The input voltage is as low as 1.2 V and the output voltage can set down to 0.5 V. The output voltage accuracy has been improved to  $\pm 1\%$  and due to a built-in transistor with low on resistance. Each of these devices consists of a voltage reference unit, an error amplifier, a resistor-net for voltage setting, and a current limit circuits for over-current which is for the destruction prevention by the over-current.

The LTP3454 devices use a type of outstanding CMOS process to minimize the supply current. A low on resistance P-MOS pass device is equipped for lower dropout voltage. LTP3454 also possess the EN function to save more energy and extend the battery life. The EN pin can switch the regulator to standby mode.

The LTP3454 series are available in the SOT23-5, DFN1×1-4 and SOT89-3 packages.

## Features and Benefits

- Wide Input Voltage Range: 1.2 V to 5.5 V
- Very Low  $I_Q$ : 48  $\mu$ A
- Maximum Output Current: 400 mA
- Output Voltage Range: 0.5 V to 3.8 V
- Output Voltage Accuracy:  $\pm 1\%$  ( $V_{OUT} \geq 1.0$  V,  $T_A = 25^\circ\text{C}$ )
- Dropout Voltage: Typical 0.22 V ( $V_{OUT} = 1.5$  V)
- Excellent Load/Line Transient Response, Line Regulation: 0.1%/V Typically
- Built-in Fold Back Protection Circuit
- Built-in Constant Slope Circuit
- Built-in Auto-Discharging Circuit
- Packages: SOT23-5, DFN1×1-4 and SOT89-3

## Applications

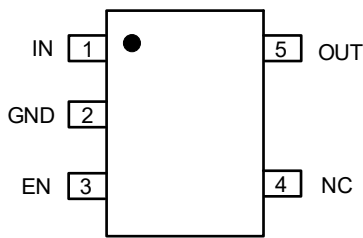
- Constant-voltage power supply for battery-powered devices
- Constant-voltage power supply for TVs, notebook PCs and home appliances
- Constant-voltage power supply for portable equipments

## Ordering Information

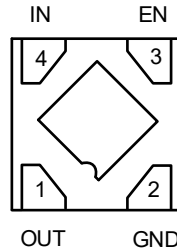
Model <sup>Note1</sup>	Package Name	Type Number <sup>Note1</sup>	Packing Quantity
LTP3454	SOT23-5	LTP3454-xxNXT5	Tape and Reel, 3000
	DFN1×1-4	LTP3454-xxNXF4	Tape and Reel, 10000
	SOT89-3	LTP3454-xxXT4	Tape and Reel, 1000

Note1: xx stands for output voltage, e.g. if xx = 18, the output voltage is 1.8V; if xx = 30, the output voltage is 3.0V. The device with suffix "N" is shutdown version with enable control input.

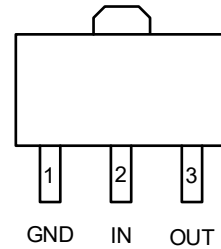
## Pin Configurations (Top View)



SOT23-5



DFN1×1-4

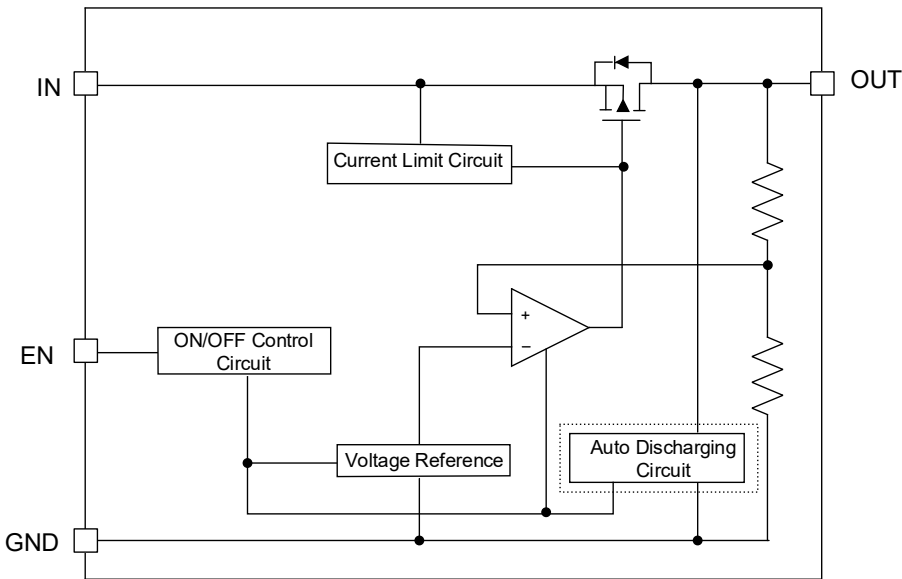


SOT89-3

## Pin Function

Pin Number			Pin Name	Pin Function
SOT23-5	DFN1×1-4	SOT89-3		
1	4	2	IN	Supply input pin.
2	2	1	GND	Ground.
3	3		EN	Enable control input, active high.
4			NC	No Connection.
5	1	3	OUT	Output pin.

## Block Diagram



\*Auto Discharging is an optional function

## Functional Description

### Input Capacitor

A 1 $\mu$ F ceramic capacitor is recommended to connect between  $V_{IN}$  and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both  $V_{IN}$  and GND.

### Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is 1 $\mu$ F, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to OUT and GND pins.

### EN Pin Operation

The LTP3454 is turned on by setting the EN pin to "H". Since the EN pin is neither pulled down nor pulled up internally, do not set it in floating status. When the EN pin is not used, connect the EN pin with  $V_{D0}$  to keep the LDO in operating mode.

### Current-Limit Protection

When output current of  $V_{OUT}$  pin is higher than current limit threshold or the OUT pin is direct short to GND, the current limit protection will be triggered and clamp the output current at a predesigned level to prevent over-current and thermal damage.

### Auto Discharging

When the EN pin set to "L", the output circuit will be disable immediately, and the Auto-Discharging circuit will be turned on to discharge the electric charge on output capacitor, and decrease the voltage of OUT in very short time. The Auto-Discharging function is optional.

## Absolute Maximum Ratings

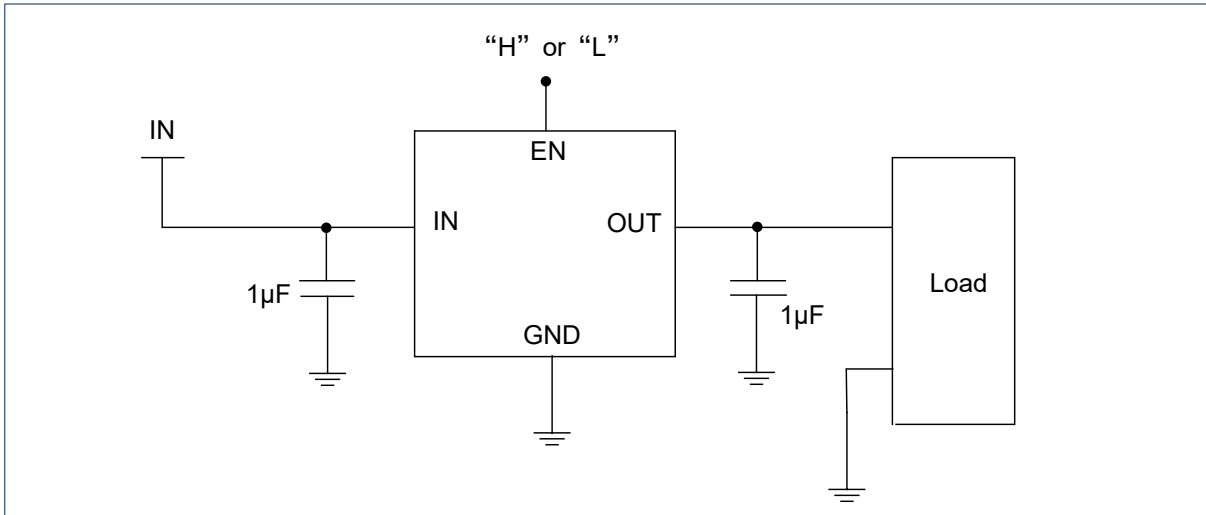
Parameter	Symbol	Rating	Unit
Input Voltage	$V_{IN}$	5.5	V
Input Voltage (EN Pin)	$V_{EN}$	-0.3 to 5.5	V
Output Voltage	$V_{OUT}$	-0.3 to $V_{IN}+0.3$	V
Package Thermal Resistance	$\theta_{JA}$	SOT23-5	260
		DFN1×1-4	180
		SOT-89	135
Operating Temperature Range	$T_A$	-40 to +85	°C
Maximum junction temperature	$T_{J(MAX)}$	150	°C
Storage Temperature Range	$T_{stg}$	-55 to +150	°C

## Electrical Characteristics

$V_{IN} = V_{OUT} + 1.0V$ ,  $I_{OUT} = 1mA$ ,  $C_{IN} = C_{OUT} = 1\mu F$ , unless otherwise noted.

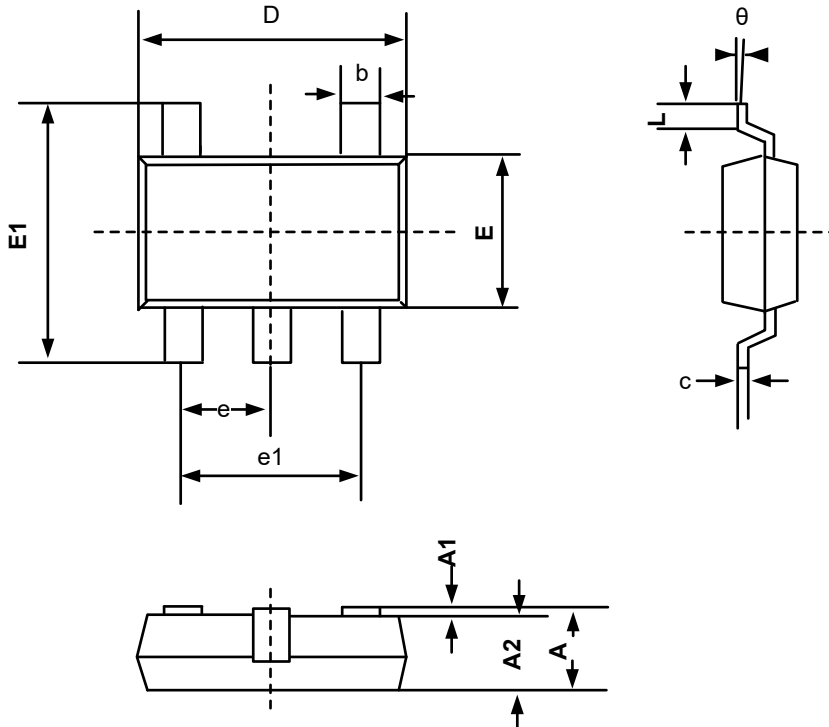
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_{OUT}$	$V_{OUT} \geq 1.0$ , $T_A = 25^\circ C$	$\times 0.99$		$\times 1.01$	V
		$V_{OUT} < 1.0$ , $T_A = 25^\circ C$	-10		+10	mV
		$V_{OUT} \geq 1.0$ , $-40^\circ C \leq T_A \leq 85^\circ C$	$\times 0.98$		$\times 1.02$	V
		$V_{OUT} < 1.0$ , $-40^\circ C \leq T_A \leq 85^\circ C$	-20		+20	mV
Output Current	$I_{OUT}$	$V_{IN} = V_{OUT} + 1V$			400	mA
Current Limit	$I_{LIM}$			500		mA
Load Regulation	$R_{egLOAD}$	$V_{IN} = V_{OUT} + 1V$ $1mA \leq I_{OUT} \leq 400mA$		25	45	mV
Dropout Voltage	$V_{DROP}$	$V_{OUT} = 1.5$ , $I_{OUT} = 400mA$ , $V_{OUT}$ drop to $0.98 \times V_{OUT}$		220		
		$0.5 \leq V_{OUT} < 0.8$ , $I_{OUT} = 400mA$		500	650	
		$0.8 \leq V_{OUT} < 0.9$ , $I_{OUT} = 400mA$		420	570	
		$0.9 \leq V_{OUT} < 1.0$ , $I_{OUT} = 400mA$		380	500	mV
		$1.0 \leq V_{OUT} < 1.2$ , $I_{OUT} = 400mA$		340	460	
		$1.2 \leq V_{OUT} < 1.5$ , $I_{OUT} = 400mA$		300	410	
Supply Current	$I_Q$	$I_{OUT} = 0mA$		48		$\mu A$
Line Regulation	$R_{egLINE}$	$V_{OUT} + 0.5V \leq V_{IN} \leq 3.6V$ ( $V_{IN} \geq 1.4V$ )		0.10	0.25	%/V
Power Supply Rejection Ratio	PSRR	$f = 1kHz$ , Ripple 0.2Vp-p $V_{IN} = V_{OUT} + 1V$ , $I_{OUT} = 30mA$		80		dB
Input Voltage	$V_{IN}$		1.2		5.5	V
Output Voltage Temperature	$\Delta V_{OUT} / \Delta T_A$	$-40^\circ C \leq T_A \leq 85^\circ C$		$\pm 90$		ppm/ $^\circ C$
Short Current Limit	$I_{SHORT}$	$V_{OUT} = 0V$		110		mA
Shutdown Supply Current	$I_{SD}$				1	$\mu A$
EN Input Voltage High	$V_{ENH}$		0.9			V
EN Input Voltage Low	$V_{ENL}$				0.4	V
Output Noise	$e_N$	BW = 10Hz to 100kHz $I_{OUT} = 30mA$ , $V_{OUT} = 0.5V$		40		$\mu V_{RMS}$
Low Output Nch Tr. ON Resistance	$R_{DIS}$	$V_{IN} = 2.0V$ , $V_{EN} = 0V$		40		$\Omega$

## Application Circuits



### Package Dimension

SOT23-5

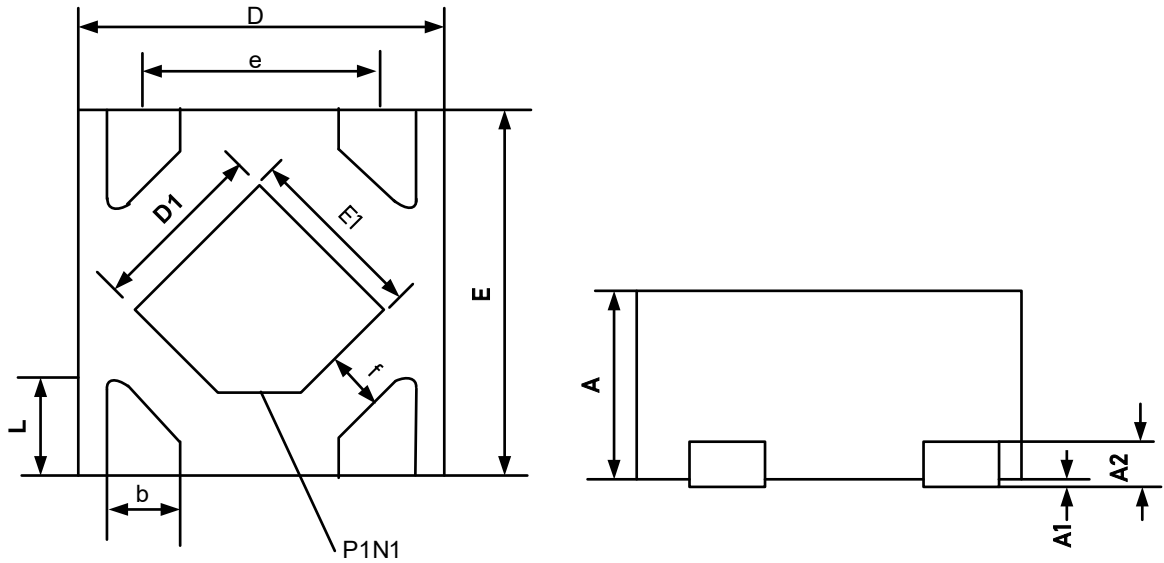


Unit: mm

Symbol	Dimensions In Millimeters	
	MIN	MAX
A	0.700	1.250
A1	0.000	0.100
A2	0.700	1.150
b	0.350	0.500
c	0.080	0.200
D	2.820	3.020
E	2.650	2.950
E1	1.600	1.700
e	0.950BSC	
E1	1.800	2.000
L	0.300	0.600
$\theta$	0°	8°

## Package Dimension

DFN1×1-4



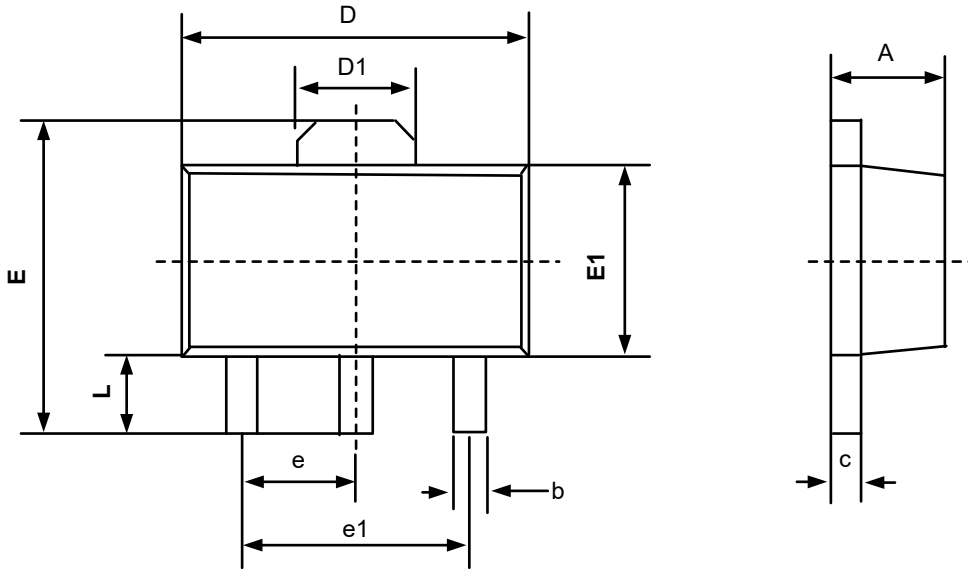
Unit: mm

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.450	0.500	0.550
A1	0.000	0.025	0.050
A2	0.125REF		
D	0.950	1.000	1.050
D1	0.380	0.480	0.580
E	0.950	1.000	1.050
E1	0.380	0.480	0.580
b	0.150	0.200	0.250
e	0.650BSC		
f	0.190	0.195	0.200
L	0.150	0.250	0.350



## Package Dimension

SOT89-3



Unit: mm

Symbol	Dimensions In Millimeters	
	MIN	MAX
A	1.400	1.600
b	0.320	0.520
c	0.350	0.440
D	4.400	4.600
D1	1.55REF	
E	3.940	4.250
E1	2.300	2.600
e	1.500BSC	
e1	3.000BSC	
L	0.900	1.200