LTP3454

400mA, Down to 0.5V Output, Low Dropout, RF LDOs

General Description

The LTP3454 series are low voltage 400 mA voltage regulators. The input voltage is as low as V and the output voltage can set down to 0.5 V. The output voltage accuracy has been improved to ±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 CE function to save more energy and extend the battery life. The CE pin can switch the regulator to standby mode.

The LTP3454 series are available in the SOT23-5 , DFN1×1-4 and SOT-89 packages.

Features

- Wide Input Voltage Range: 1.2V to 5.5V
- Very Low Iα: 48μA
- Maximum Output Current: 400mA
- Output Voltage Range: 0.5V to 3.8V
- Output Voltage Accuracy: ±1% (V_{OUT} ≥ 1.0V, TA = 25°C)
- Dropout Voltage: Typical 0.22V (V_{OUT} =1.5V)
- 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: SOT23-5L, DFN1×1-4L and SOT-89

Applications

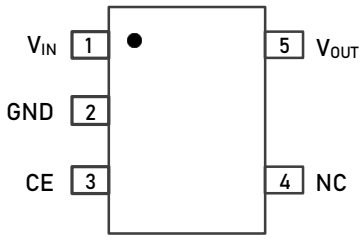
- Constant-voltage power supply for battery-powered devices
- Constant-voltage power supply for TVs, notebook PCs and home appliances
- Constant-voltage power supply for portable equipments

Order Information

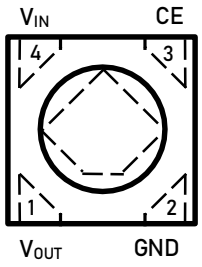
Model	Package	Ordering Number Note1	Packing Option
LTP3454	SOT23-5L	LTP3454-xxNXT5	Tape and Reel, 3000
	DFN1×1-4L	LTP3454-xxNXF4	Tape and Reel, 10000
	SOT-89	LTP3454-xxXT4	Tape and Reel ,1000

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.

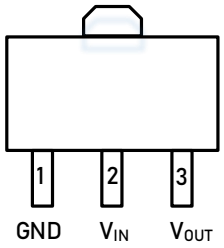
Pin Configuration (Top View)



SOT23-5L



DFN1×1-4L

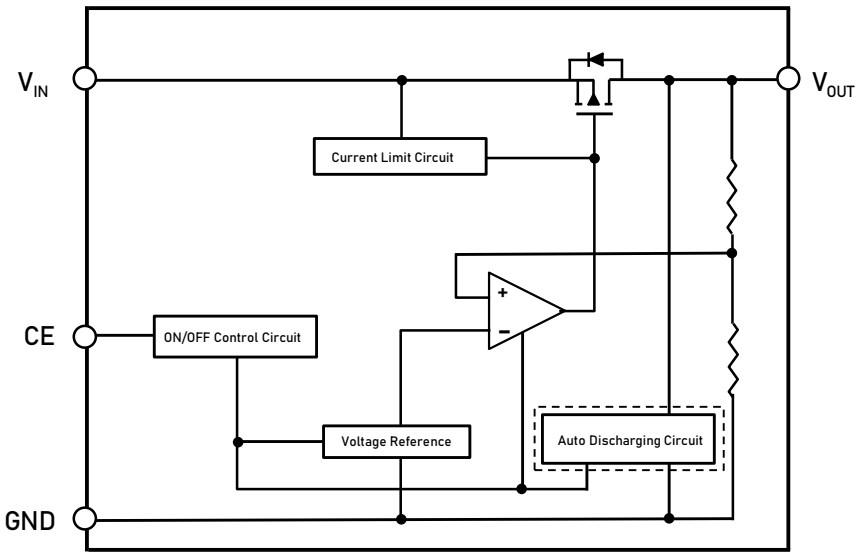


SOT-89

Pin Function

Pin			Symbol	Pin Description
DFN1×1-4L	DFN1×1-4L	SOT-89		
1	4	2	V_{IN}	Input Pin.
2	2	1	GND	Ground Pin.
3	3		CE	Chip Enable Pin, "H" Enable.
4			NC	No Connection.
5	1	3	V_{OUT}	Output Pin.

BLOCK DIAGRAM



*Auto Discharging is an optional function

Functional Description

Input Capacitor

A 1µF ceramic capacitor is recommended to connect between VDD 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 1µF, 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 V_{OUT} and GND pins.

CE Pin Operation

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

Current Limit Protection

When output current of VOUT pin is higher than current limit threshold or the VOUT 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 CE 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 VOUT in very short time. The Auto-Discharging function is optional.

Absolute Maximum Ratings

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

Electrical Characteristics

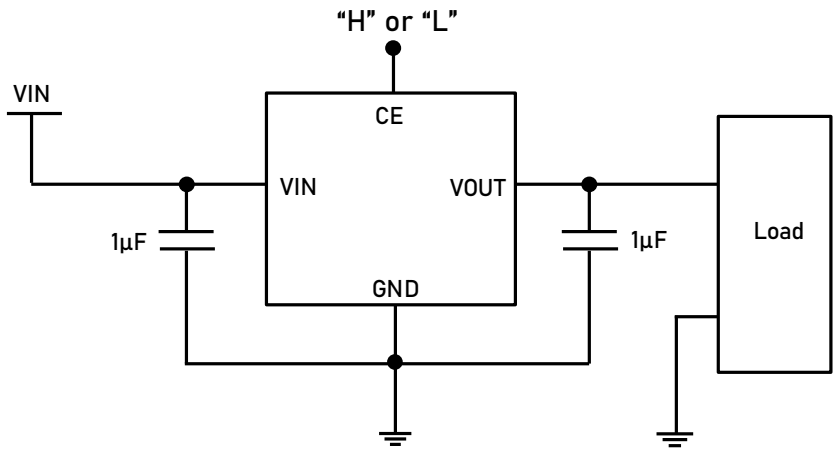
V_{IN} = V_{OUT} + 1.0V, I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1µF, unless otherwise noted.

	Item	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$V_{OUT} \geq 1.0$, $T_A = 25^\circ C$	×0.99		×1.01	V
		$V_{OUT} < 1.0$, $T_A = 25^\circ C$	–10		+10	mV
		$V_{OUT} \geq 1.0$, $-40^\circ C \leq T_A \leq 85^\circ C$	×0.98		×1.02	V
		$V_{OUT} < 1.0$, $-40^\circ C \leq T_A \leq 85^\circ C$	– 20		+20	mV
I_{OUT}	Output Current	$V_{IN} = V_{OUT} + 1V$			400	mA
I_{LIM}	Current Limit			500		mA
ΔV_{OUT} /ΔI_{OUT}	Load Regulation	$V_{IN} = V_{OUT} + 1V$ 1mA ≤ I_{OUT} ≤ 400mA		25	45	mV
V_{DROP}	Dropout Voltage	V_{OUT} = 1.5, I_{OUT} = 400mA, V_{OUT} drop to 0.98 × V_{OUT}		220		mV
		Details refer to the followingtable				
I_Q	Supply Current	I_{OUT} = 0mA		48		µA
ΔV_{OUT} /ΔV_{IN}	Line Regulation	V_{OUT} + 0.5V ≤ V_{IN} ≤ 3.6V (V_{IN}≥1.4V)		0.10	0.25	%/V
PSRR	Power Supply Rejection Ratio	f =1kHz, Ripple 0.2Vp-p V_{IN} = V_{OUT} +1V, I_{OUT} =30mA		80		dB
V_{IN}	Input Voltage		1.2		5.5	V
ΔV_{OUT} /ΔTa	Output Voltage Temperature	–40 °C ≤ T_A ≤ 85 °C		±90		ppm/° C
ISHORT	Short Current Limit	V_{OUT} = 0V		110		mA
I_{SD}	Shutdown Supply Current				1	µA
V_{CEH}	CE Input Voltage High		0.9			V
V_{CEL}	CE Input Voltage Low				0.4	V
en	Output Noise	BW = 10Hz to 100kHz I_{OUT} = 30mA, V_{OUT} = 0.5V		40		µVrms
R_{DIS}	Low Output Nch Tr. ON Resistance	V_{IN} =2.0V, V_{CE} =0V		40		Ω

Dropout Voltage by Output Voltage

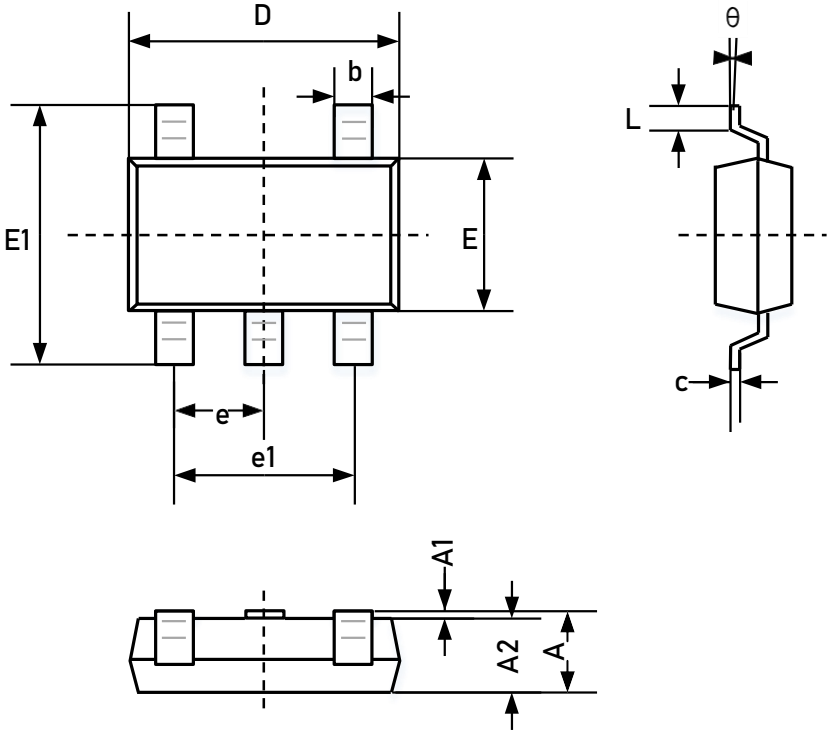
Output Voltage V_{OUT} (V)	Dropout Voltage, V_{DROP} (V)		
	Condition	Typ.	Max.
$0.5 \le V_{OUT} < 0.8$	I_{OUT} = 400mA	0.50	0.65
$0.8 \le V_{OUT} < 0.9$		0.42	0.57
$0.9 \le V_{OUT} < 1.0$		0.38	0.50
$1.0 \le V_{OUT} < 1.2$		0.34	0.46
$1.2 \le V_{OUT} < 1.5$		0.30	0.41
$1.5 \le V_{OUT}$		0.24	0.34

Application Circuits



PACKAGE OUTLINE DIMENSIONS

SOT23-5L

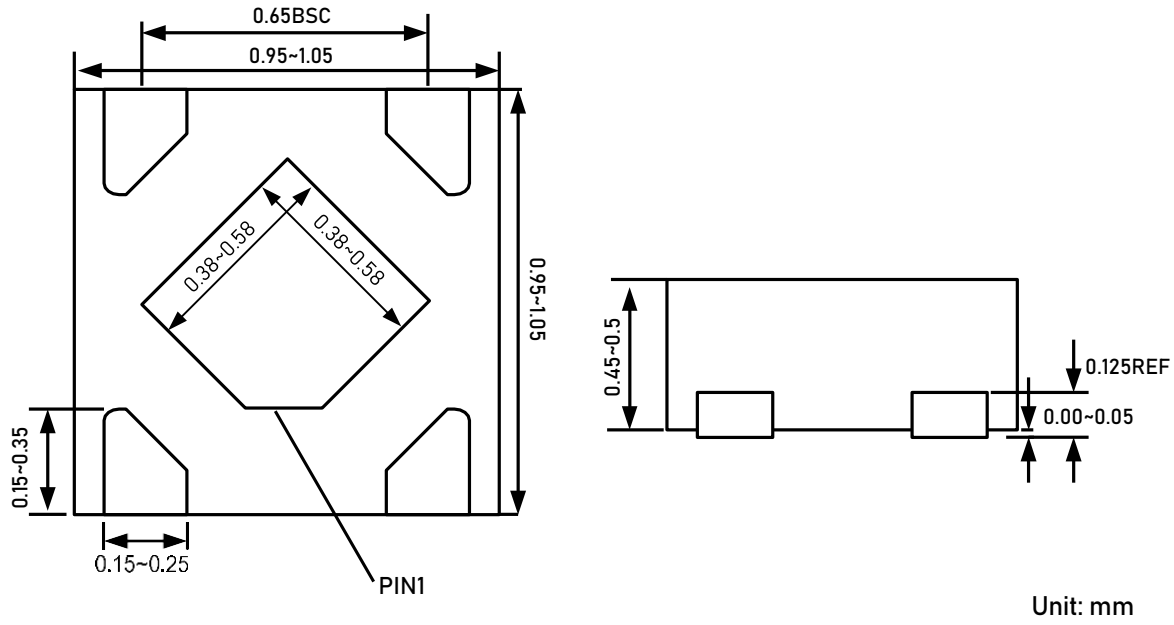


Unit: mm

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

DFN1×1-4



PACKAGE OUTLINE DIMENSIONS

SOT-89