LTP3559

350 mA, 45 V, Ultra-Low I_Q, Low Dropout LDOs

General Description

The LTP3559 is a high voltage, low power consumption and high performance LDO. The family uses an advanced CMOS process and a P-MOSFET pass device to achieve fast start-up, with high output voltage accuracy. The LTP3559 is stable with a 1.0 µF to 10 µF ceramic output capacitor, and uses a precision voltage reference and feedback loop to achieve a worst-case accuracy of 2% over all load, line, process, and temperature variations.

Features and Benefits

- Wide Input Voltage Range: up to 45 V
- Output Current: 350 mA
- Standard Fixed Output Voltage Options: 1.8 V, 2.5 V, 3.0 V, 3.3 V, 3.6 V and 5.0 V
- More Output Voltage Options Available on Request
- Low I_Q: 2.6 µA Typically
- Low Dropout Voltage
- Excellent Load and Line Transient Response
- Line Regulation: 0.01%/V Typically
- Normal Version Available in SOT23-3L, SOT23-5L and SOT89-3L Packages
- Shutdown Version Available in SOT23-5L, Tiny DFN1×1-4L and DFN2×2-6L Packages

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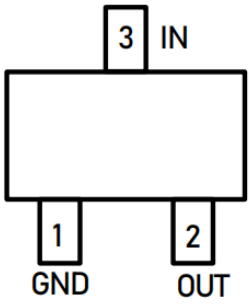
Ordering Information

Model	Package	Ordering Number Note1	Packing Option
LTP3559	SOT23-3L	LTP3559-xxXT3	Tape and Reel, 3 000
	SOT23-5L	LTP3559-xxNXT5	Tape and Reel, 3 000
	SOT23-5L	LTP3559-xxXT5	Tape and Reel, 3 000
	SOT23-5R	LTP3559-xxRXT5	Tape and Reel, 3 000
	SOT89-3L	LTP3559-xxXT4	Tape and Reel, 1 000
	SOT89-3R	LTP3559-xxRXT4	Tape and Reel, 1 000
	DFN1×1-4L	LTP3559-xxNXF4	Tape and Reel, 10 000
	DFN2×2-6L	LTP3559-xxNXF6	Tape and Reel, 3 000

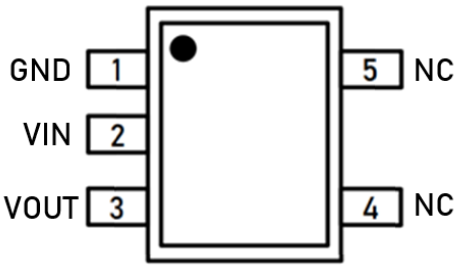
Note1: xx stands for output voltages, e.g. if xx = 18, the output voltage is 1.8 V; if xx = 30, the output voltage is 3.0 V. The device with suffix "N" is shutdown version with enable control input.

Pin Description

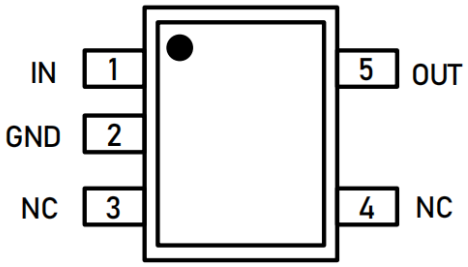
Normal Version Without Enable (Top View)



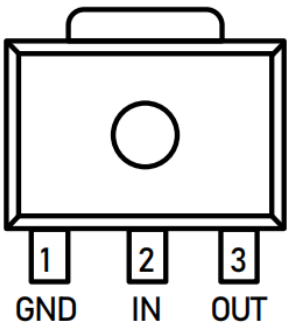
SOT23-3L



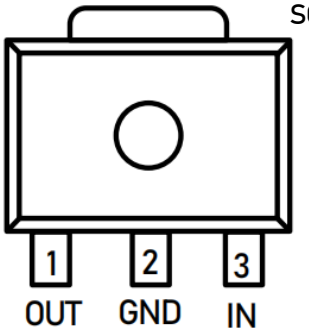
SOT23-5R



SOT23-5L

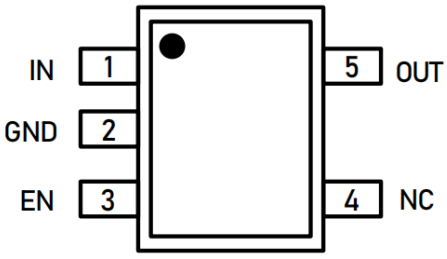


SOT89-3L

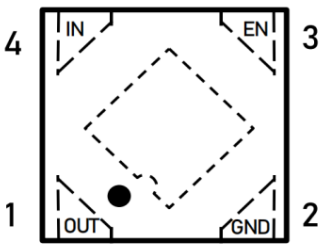


SOT89-3R

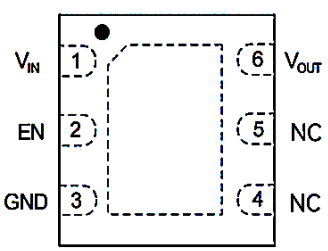
Shutdown Version With Enable (Top View)



SOT23-5L



DFN1x1-4L



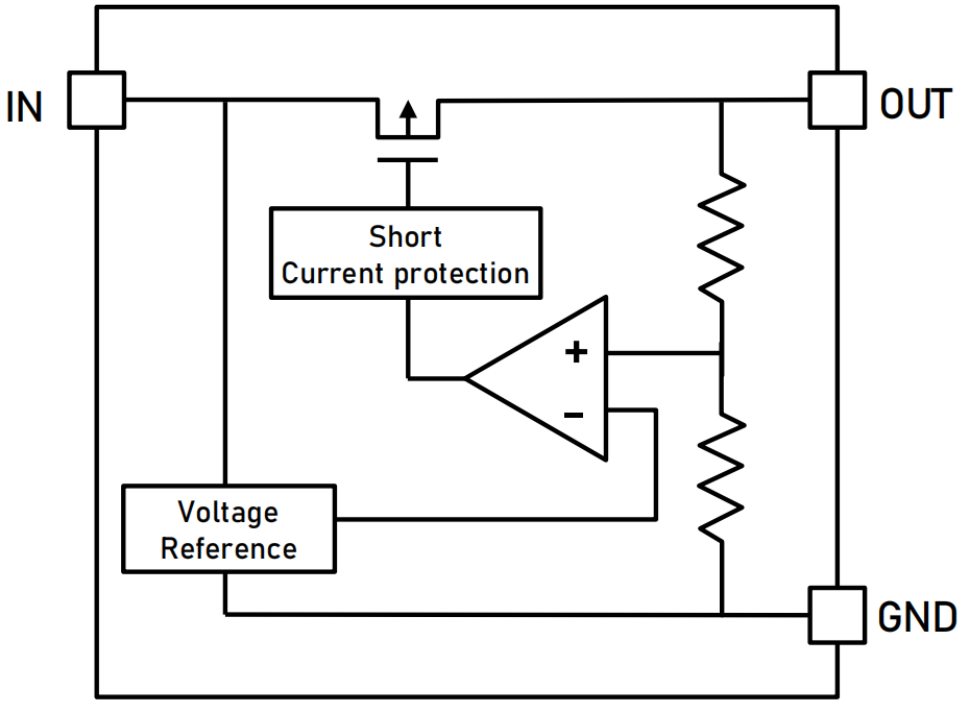
DFN2x2-6L

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Pin Function

Package							Symbol	Function
SOT23-3L	SOT23-5L	SOT23-5R	SOT89-3L	SOT89-3R	DFN1x1-4L	DFN2x2-6L		
1	2	1	1	2	2	3	GND	Ground.
3	1	2	2	3	4	1	IN	Supply input pin.
2	5	3	3	1	1	6	OUT	Output pin.
	3				3	2	EN	Enable control input, active high
	4	4/5				4,5	NC	No Connection.

Block Diagram



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Functional Description

Input Capacitor

A 1 µF-10 µF 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 from 1 µF to 10 µF, Equivalent Series Resistance (ESR) is from 5mΩ to 100mΩ, 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.

Low Quiescent Current

The LTP3559, consuming only around 2.6 µA for all input range and output loading, provides great power saving in portable and low power applications.

Short Current Limit Protection

When output current at the OUT pin is higher than current limit threshold or the OUT pin is short-circuit to GND, the short current limit protection will be triggered and clamp the output current to approximately 100 mA to prevent over-current and to protect the regulator from damage due to overheating.

Absolute Maximum Ratings

Parameter	Rating		Unit
IN pin to GND pin	-0.3 to 48		V
OUT pin to GND pin	-0.3 to 6		V
Thermal Resistance (Junction to Ambient)	SOT23-3L	360	℃ /W
	SOT23-5L	250	
	DFN1X1-4L	250	
	SOT89-3L	135	
	DFN2X2-6L	75	
Operating Junction Temperature	-40 to 125		℃
Storage Temperature	-65 to 150		℃
Lead Temperature (Soldering, 10sec)	260		℃
ESD (HBM mode)	ANSI/ESDA/JEDECJS-001	±2000	V

NOTE：Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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Electrical Characteristics

(V_{IN} = V_{OUT} + 2V, I_{OUT} = 10mA, C_{IN} = C_{OUT} = 1.0µF, unless otherwise noted. Typical values are at T_A = +25°C.)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Operating Input Voltage	V_{IN}				45	V
Line Regulation	R_{egLINE}	2.5 V≤V_{IN}≤36 V, I_{OUT} = 10 mA		0.01	0.04	%/V
Dropout Voltage	V_{DROP}	V_{OUT}= 3.0 V, I_{OUT} = 100 mA		330		mV
		V_{OUT}= 3.0 V, I_{OUT} = 200 mA		690		
		V_{OUT}= 5.0 V, I_{OUT} = 100 mA		286		
		V_{OUT}= 5.0 V, I_{OUT} = 200 mA		581		
Load Regulation	R_{egLOAD}	1 mA≤I_{OUT}≤300 mA, V_{IN} = V_{OUT} + 2 V			40	mV
Maximum Output Current	I_{OUT}	V_{IN} = V_{OUT} +2 V	350			mA
Quiescent Current	I_Q	I_{OUT} = 0 mA		2.6	4	µA
Standby Current	I_{Q_OFF}	V_{EN} = 0 V, TA = 25°C		0.1	1	µA
EN Pin Threshold Voltage	V_{ENH}	EN Input Voltage “H”	1.2			V
EN Pin Threshold Voltage	V_{ENL}	EN Input Voltage “L”			0.4	V
EN Pin Current	I_{EN}	V_{EN} = 0 to 36V		1		µA
Power Supply Rejection Ratio	PSRR	V_{IN} = V_{OUT} + 1 V I_{OUT} = 20 mA f = 1 kHz		60		dB
Output Noise Voltage	e_N	V_{IN} = V_{OUT} + 2 V, I_{OUT} = 1 mA, f = 10 Hz to 100 KHz, (V_{OUT} = 3 V) C_{OUT} = 1 µF		100		µVrms
Thermal Shutdown Temperature	T_{SD}	Temperature Increasing from T_A=+25°C		155		°C
Thermal Shutdown Hysteresis	T_{SDH}	Temperature Falling From TSD		20		°C

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Typical Performance Characteristics

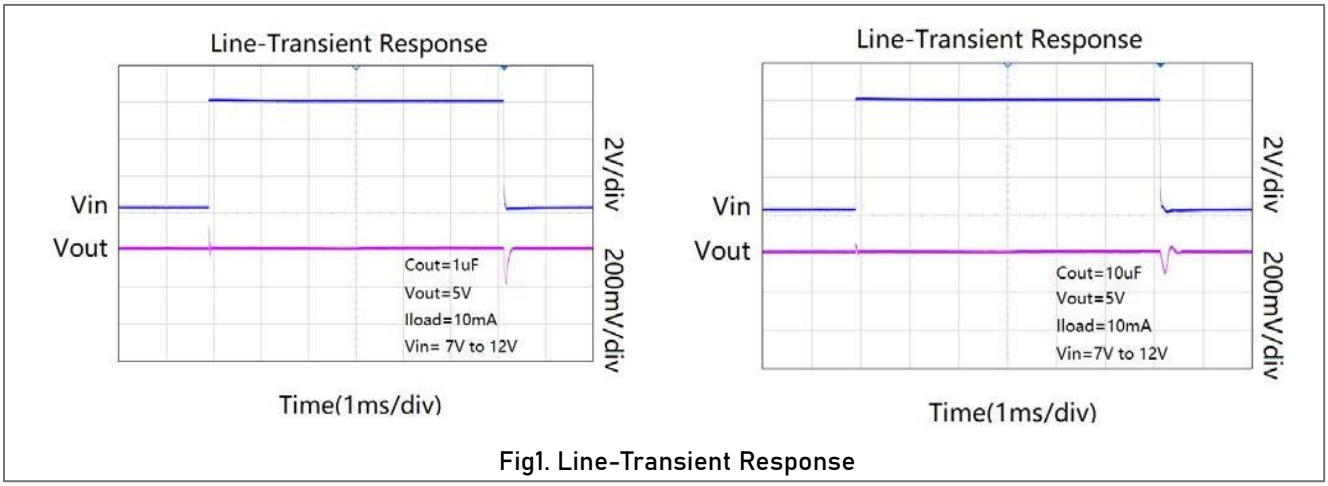


Fig1. Line-Transient Response

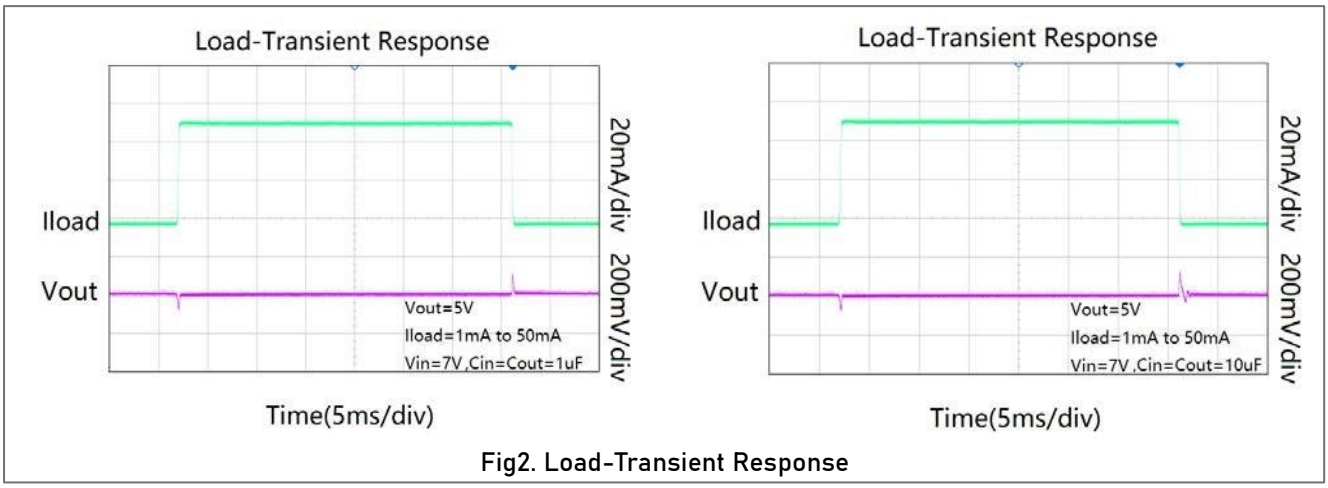


Fig2. Load-Transient Response

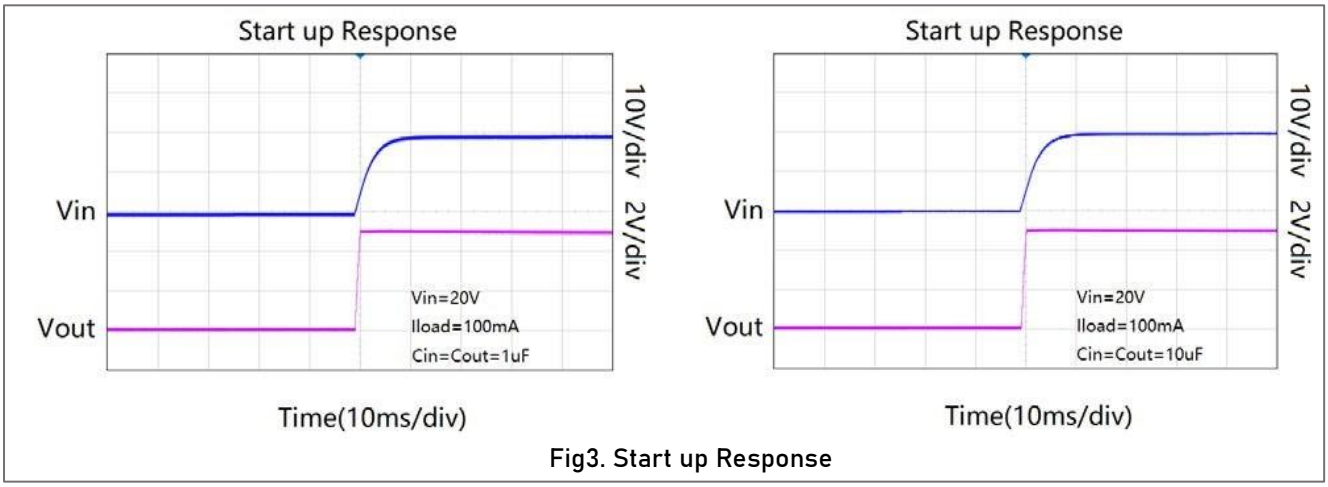


Fig3. Start up Response

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Typical Performance Characteristics (Cont.)

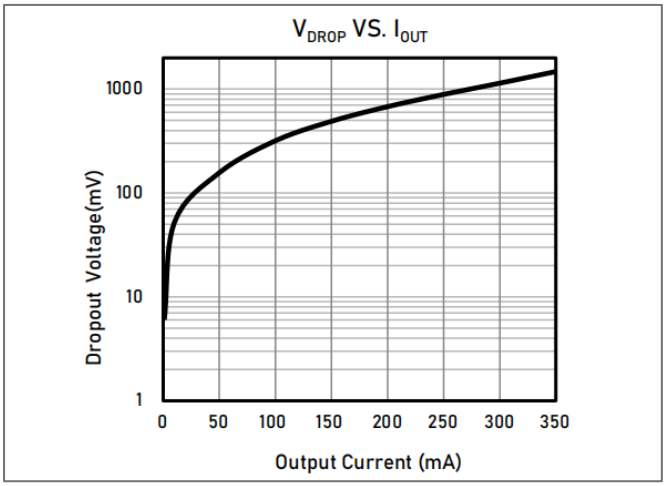


Fig4. Dropout Voltage VS Output Current

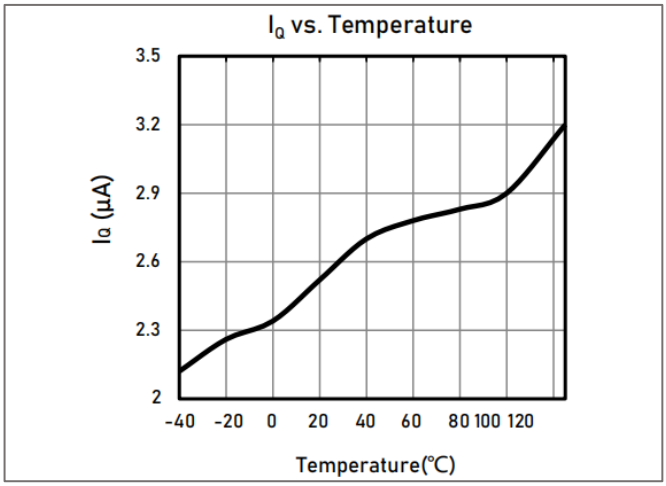
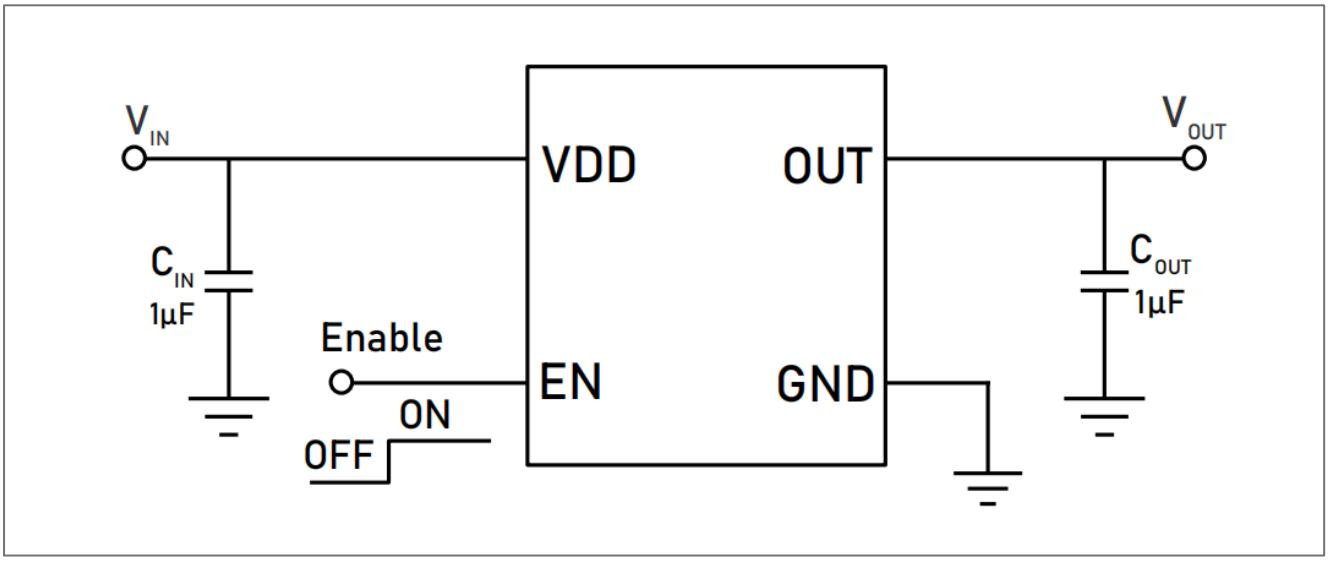


Fig5. I_Q VS Temperature

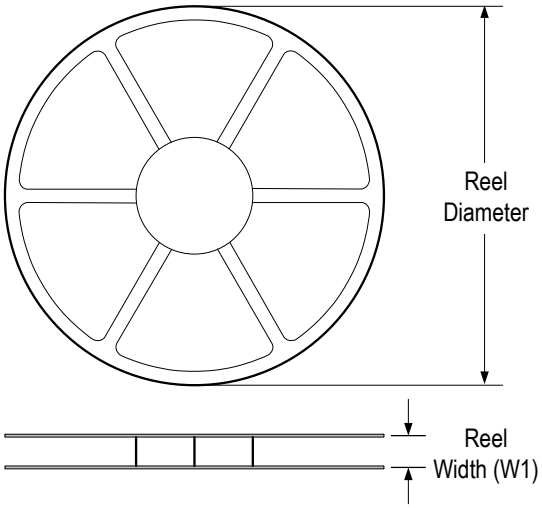
Application Circuits



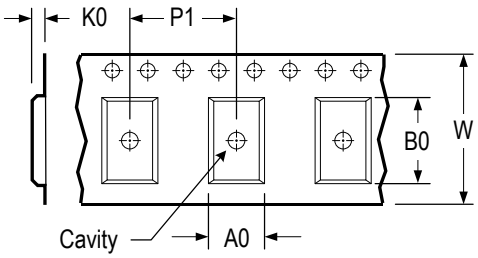
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Tape and Reel Information

REEL DIMENSIONS

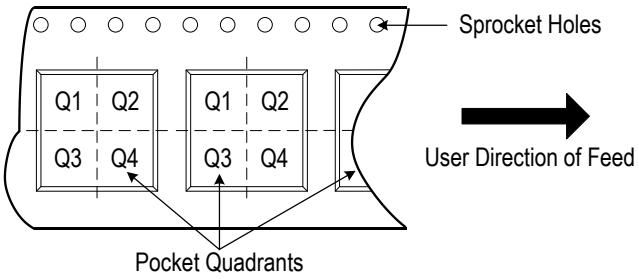


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIETATION IN TAPE



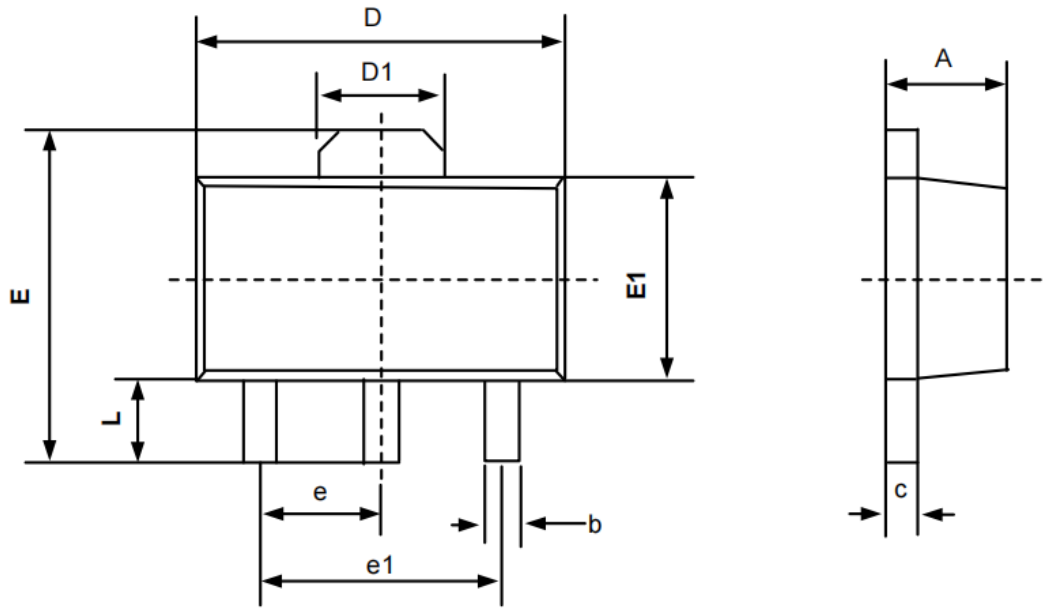
* All dimensions are nominal

Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin 1 Quadrant
LTP3559-xxXT3	SOT23	3	3 000	178	9.5	3.2	3.2	1.4	4.0	8.0	Q3
LTP3559-xxNXT5	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3
LTP3559-xxXT5	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3
LTP3559-xxRXT5	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3
LTP3559-xxXT4	SOT89	3	1 000	178	12.5	4.9	4.5	1.85	8.0	12.0	Q3
LTP3559-xxRXT4	SOT89	3	1 000	178	12.5	4.9	4.5	1.85	8.0	12.0	Q3
LTP3559-xxNXF4	DFN1X1	4	10 000	178	9.5	1.1	1.1	0.5	2.0	8.0	Q1
LTP3559-xxNXF6	DFN2X2	6	3 000	178	9.5	2.2	2.2	1.0	4.0	8.0	Q1

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Package Dimension

SOT89-3L



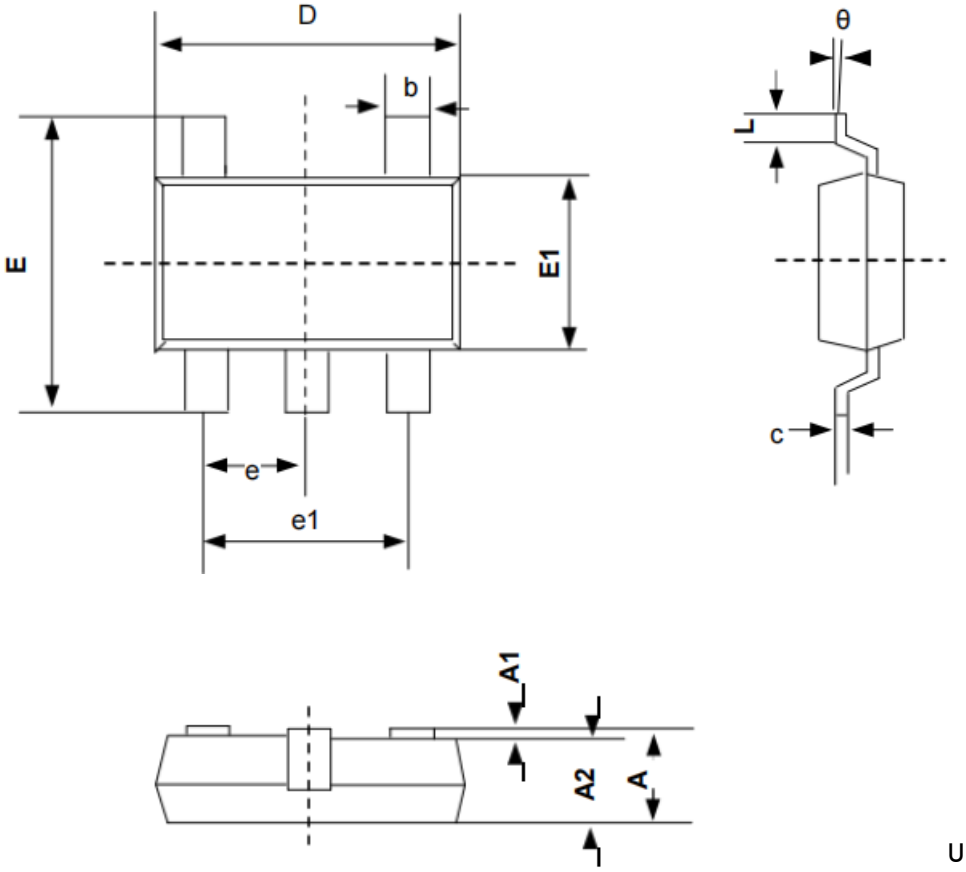
Unit: mm

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	1.550REF	
E	3.940	4.250
E1	2.300	2.600
e	1.500BSC	
e1	3.000BSC	
L	0.900	1.200

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Package Dimension (Cont.)

SOT23-5L



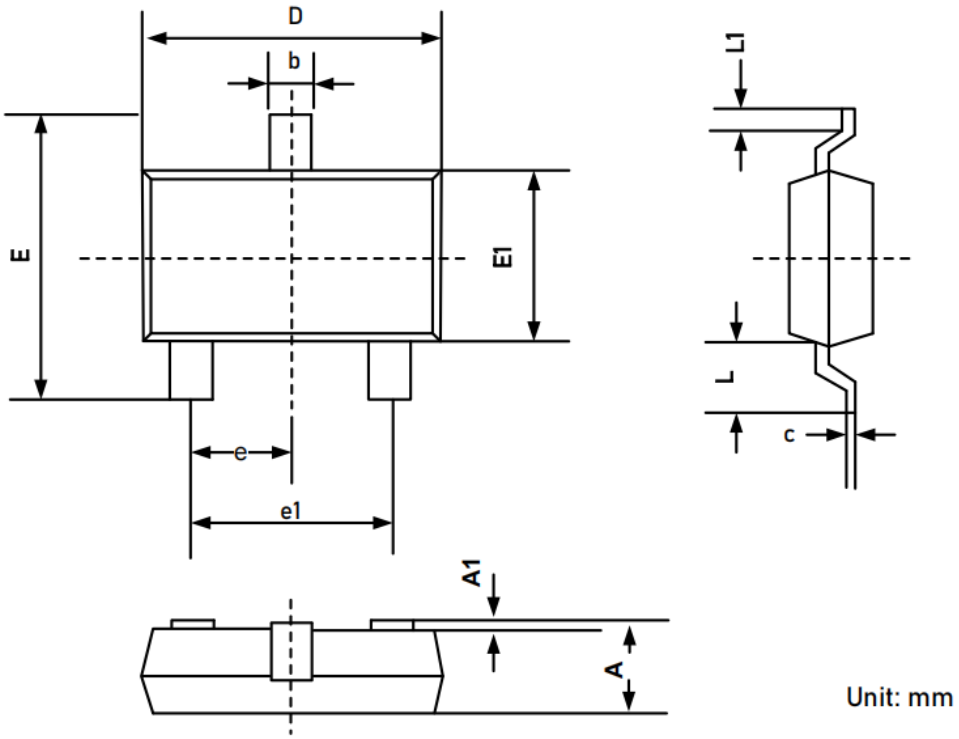
Unit: mm

Symbol	Dimensions In Millimeters	
	MIN	MAX
A	0.700	1.250
A1	0.000	0.100
A2	1.050	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
Θ	0°	8°

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Package Dimension (Cont.)

SOT23-3L



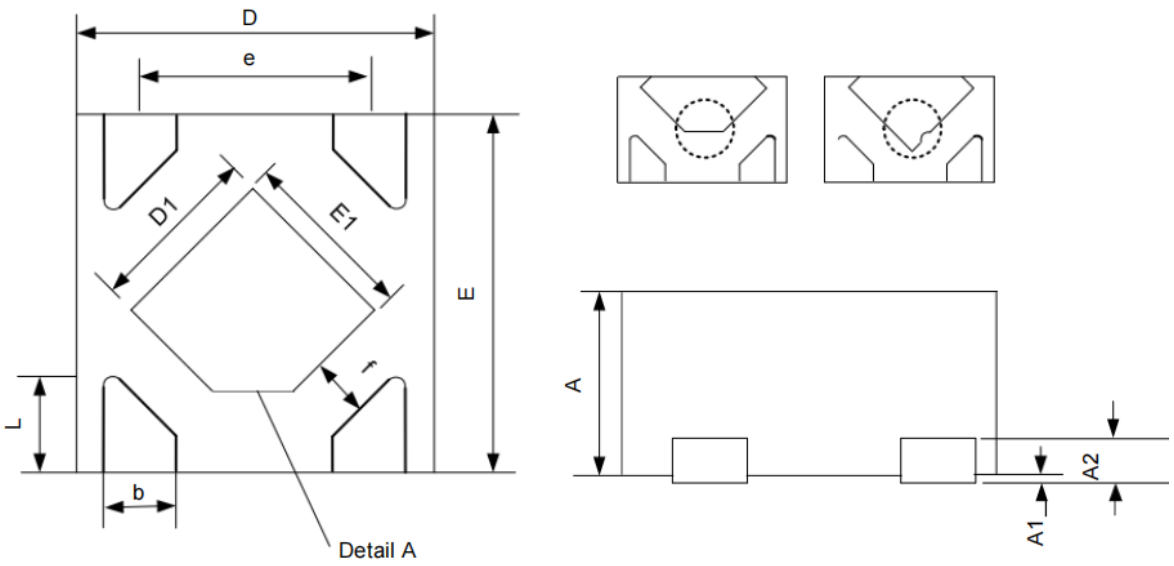
Unit: mm

Symbol	Dimensions In Millimeters	
	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
b	0.300	0.400
c	0.100	0.200
D	2.820	3.020
E	2.600	3.000
E1	1.500	1.700
e	0.950BSC	
e1	1.800	2.000
L1	0.300	0.600
L	/	0.700

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Package Dimension (Cont.)

DFN1x1-4L



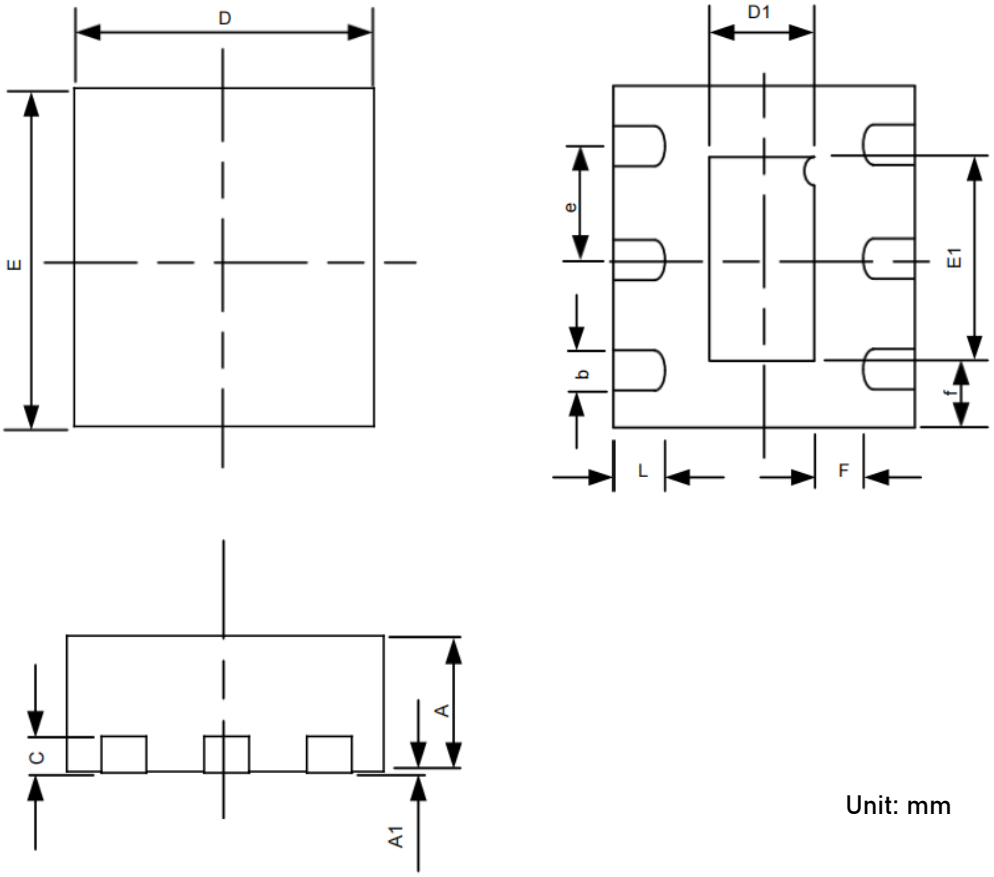
Unit: mm

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.340	0.370	0.400
A1	0.000	0.020	0.050
A2		0.100REF	
D	0.950	1.000	1.050
D1	0.430	0.480	0.530
E	0.950	1.000	1.050
E1	0.430	0.480	0.530
b	0.170	0.220	0.270
e		0.650BSC	
f	0.190	0.195	0.200
L	0.200	0.250	0.300

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Package Dimension (Cont.)

DFN2x2-6L



Unit: mm

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.700	0.750	0.800
A1	0.000	0.020	0.050
b	0.225	0.250	0.275
c	0.190	0.210	0.230
D	1.900	2.000	2.100
E	1.900	2.000	2.100
E1	1.150	1.200	1.250
D1	0.650	0.700	0.750
e	0.625	0.650	0.675
L	0.300	0.350	0.400
R		0.100	
F	0.280	0.300	0.320
f	0.380	0.400	0.420

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For additional product information, or full data sheet, please contact with the Linearin's Sales Department or Representatives.

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