

# Low Power, Low Dropout, 300-mA Low-Noise, Low-IQ LDO

## FEATURES

- Low Output Noise
- Low Dropout Voltage
- Thermal-Overload Protection
- 10nA Logic-Controlled Shutdown
- Available in Multiple Output Voltage Versions
- Fixed Outputs of 1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V

## APPLICATIONS

- Cellular Telephones
- Camera Modules
- Sensors
- HiFi Audio Radio Transceivers
- PLL/Synthesizer, Clocking
- Medium-Current, Noise-Sensitive Applications

## DESCRIPTION

The RS3219 series low-power, low-dropout, CMOS LDO operate from 1.7V to 7.5V input voltage that can supply up to 300 mA of output current. Designed to meet the requirements of RF and analog circuits, the RS3219 series device provides low noise, high PSRR, low quiescent current, and low line and load transient response.

The device is designed to work with a 1- $\mu$ F input and a 1- $\mu$ F output ceramic capacitor.

Other features include a 10nA logic-controlled shutdown mode and thermal shutdown protection.

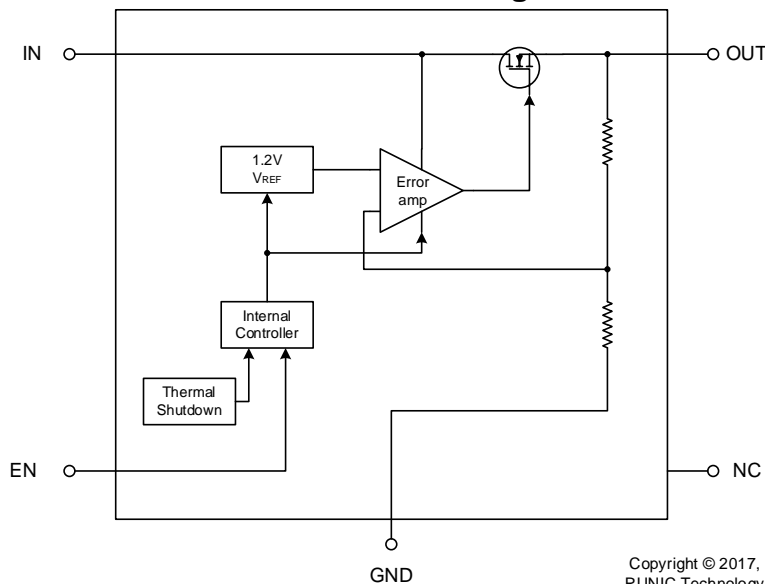
The RS3219 series is available in Green SOT23-3, SOT23-5 and UTDFN-1x1-4 packages. It operates over an ambient temperature range of -40°C to +85°C.

### Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS3219	UTDFN-1x1-4	1.00mmx1.00mm
	SOT23-3	1.60mmx2.92mm
	SOT23-5	1.60mmx2.92mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

## Functional Block Diagram

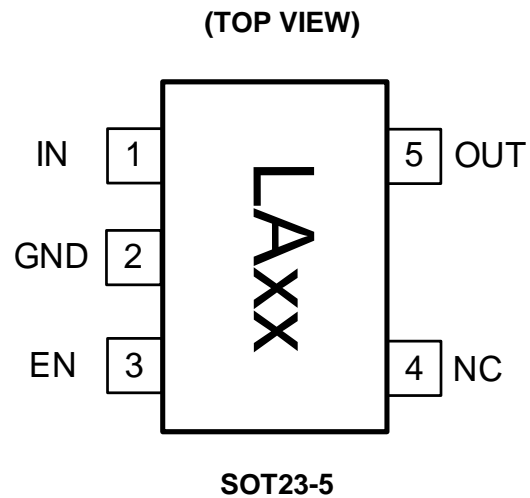
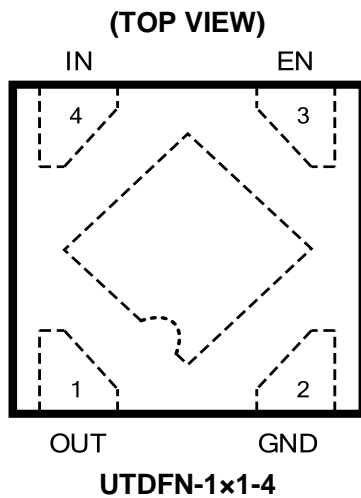


## Revision History

Note: Page numbers for previous revisions may differ from page numbers in the current version.

VERSION	Change Date	Change Item
B.0	2019/03/24	Initial version completed
B.1	2020/01/15	1) Added output voltage 2) Added SOT23-3 package
B.2	2021/11/18	Change SOT23-5 and SOT23-3 Thermal Information on Page 6 @B.1 Version.

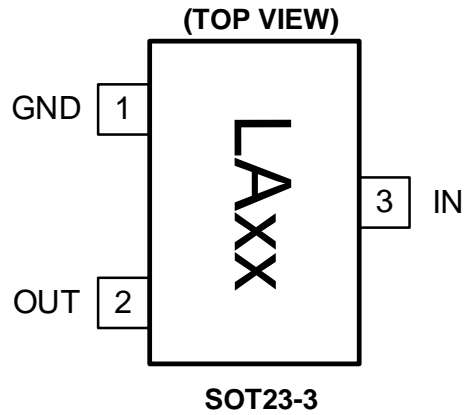
## Pin Configuration and Functions (Top View)



UTMDFN-1x1-4		I/O	DESCRIPTION
NUMBER	NAME		
1	OUT	O	Regulator Output.
2	GND	G	Ground.
3	EN	I	Enable Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.
4	IN	I	Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND.
Thermal Pad	-	-	Connect the thermal pad to a large-area ground plane. This pad is not an electrical connection to the device ground.

SOT23-5		I/O	DESCRIPTION
NUMBER	NAME		
1	IN	I	Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND.
2	GND	G	Ground.
3	EN	I	Enable Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.
4	NC	-	No internal connect.
5	OUT	O	Regulator Output.

### Pin Configuration and Functions (Top View)



SOT23-3		I/O	DESCRIPTION
NUMBER	NAME		
1	GND	G	Ground.
2	OUT	O	Regulator Output.
3	IN	I	Regulator Input. Supply voltage can range from 1.7V to 7.5V. Bypass with a 1 $\mu$ F capacitor to GND.

**PACKAGE/ORDERING INFORMATION**

MODEL	V <sub>OUT</sub> (V)	PIN- PACKAGE	ORDERING NUMBER	PACKAGE MARKING <sup>(1)</sup>	PACKAGE OPTION
RS3219-1.2	1.2V	UTDFN-1x1-4	RS3219-1.2YUTDN4	AC	Tape and Reel, 10000
RS3219-1.5	1.5V	UTDFN-1x1-4	RS3219-1.5YUTDN4	AD	Tape and Reel, 10000
RS3219-1.8	1.8V	UTDFN-1x1-4	RS3219-1.8YUTDN4	AE	Tape and Reel, 10000
RS3219-2.5	2.5V	UTDFN-1x1-4	RS3219-2.5YUTDN4	AG	Tape and Reel, 10000
RS3219-2.8	2.8V	UTDFN-1x1-4	RS3219-2.8YUTDN4	AH	Tape and Reel, 10000
RS3219-3.0	3.0V	UTDFN-1x1-4	RS3219-3.0YUTDN4	AI	Tape and Reel, 10000
RS3219-3.3	3.3V	UTDFN-1x1-4	RS3219-3.3YUTDN4	AJ	Tape and Reel, 10000
RS3219-1.2	1.2V	SOT23-5	RS3219-1.2YF5	LA12	Tape and Reel, 3000
RS3219-1.5	1.5V	SOT23-5	RS3219-1.5YF5	LA15	Tape and Reel, 3000
RS3219-1.8	1.8V	SOT23-5	RS3219-1.8YF5	LA18	Tape and Reel, 3000
RS3219-2.5	2.5V	SOT23-5	RS3219-2.5YF5	LA25	Tape and Reel, 3000
RS3219-2.8	2.8V	SOT23-5	RS3219-2.8YF5	LA28	Tape and Reel, 3000
RS3219-3.0	3.0V	SOT23-5	RS3219-3.0YF5	LA30	Tape and Reel, 3000
RS3219-3.3	3.3V	SOT23-5	RS3219-3.3YF5	LA33	Tape and Reel, 3000
RS3219-1.2	1.2V	SOT23-3	RS3219-1.2YF3	LA12	Tape and Reel, 3000
RS3219-1.5	1.5V	SOT23-3	RS3219-1.5YF3	LA15	Tape and Reel, 3000
RS3219-1.8	1.8V	SOT23-3	RS3219-1.8YF3	LA18	Tape and Reel, 3000
RS3219-2.5	2.5V	SOT23-3	RS3219-2.5YF3	LA25	Tape and Reel, 3000
RS3219-2.8	2.8V	SOT23-3	RS3219-2.8YF3	LA28	Tape and Reel, 3000
RS3219-3.0	3.0V	SOT23-3	RS3219-3.0YF3	LA30	Tape and Reel, 3000
RS3219-3.3	3.3V	SOT23-3	RS3219-3.3YF3	LA33	Tape and Reel, 3000

**NOTE:**

- (1) There may be additional marking, which relates to the lot trace code information (include data code and vendor code), the logo or the environmental category on the device.

## Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup> <sup>(2)</sup>

		MIN	MAX	UNIT
V <sub>IN</sub>	Input voltage	-0.3	8	V
V <sub>OUT</sub>	Output voltage	-0.3	V <sub>IN</sub> + 0.3	V
V <sub>EN</sub>	Enable input voltage	-0.3	V <sub>IN</sub>	V
T <sub>J</sub>	Junction temperature		150	°C
P <sub>D</sub>	Continuous power dissipation <sup>(3)</sup>	Internally Limited		W
T <sub>stg</sub>	Storage temperature	-65	150	°C

(1) 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 under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltages are with respect to the GND pin.

(3) Internal thermal shutdown circuitry protects the device from permanent damage.

## ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM)	±6000
		Machine model (MM)	±500

## Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>IN</sub>	Input supply voltage	1.7	7.5	V
V <sub>OUT</sub>	Output voltage	1.2	5	V
V <sub>EN</sub>	Enable input voltage	0	V <sub>IN</sub>	V
I <sub>OUT</sub>	Output current	0	300	mA
T <sub>J</sub>	Junction temperature	-40	85	°C

(1) All voltages are with respect to the GND pin.

## Thermal Information

THERMAL METRIC		RS3219			UNIT
		SOT23-5	SOT23-3	UTDFN-1x1-4	
		5 PINS	3 PINS	4 PINS	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	250	312.5	312.5	°C/W
R <sub>θJC(top)</sub>	Junction-to-case (top) thermal resistance	84.3	134.3	137.9	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	39.5	84.5	83.5	°C/W
ψ <sub>JT</sub>	Junction-to-top characterization parameter	2.86	4.8	5.3	°C/W
ψ <sub>JB</sub>	Junction-to-board characterization parameter	58.7	81.5	83.8	°C/W
R <sub>θJC(bot)</sub>	Junction-to-case (bottom) thermal resistance	N/A	N/A	71.8	°C/W
P <sub>d</sub>	Power Dissipation	0.5	0.4	0.4	W

## ELECTRICAL CHARACTERISTICS

( $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  <sup>(1)</sup>, Full = -40°C to +85°C, unless otherwise noted.)

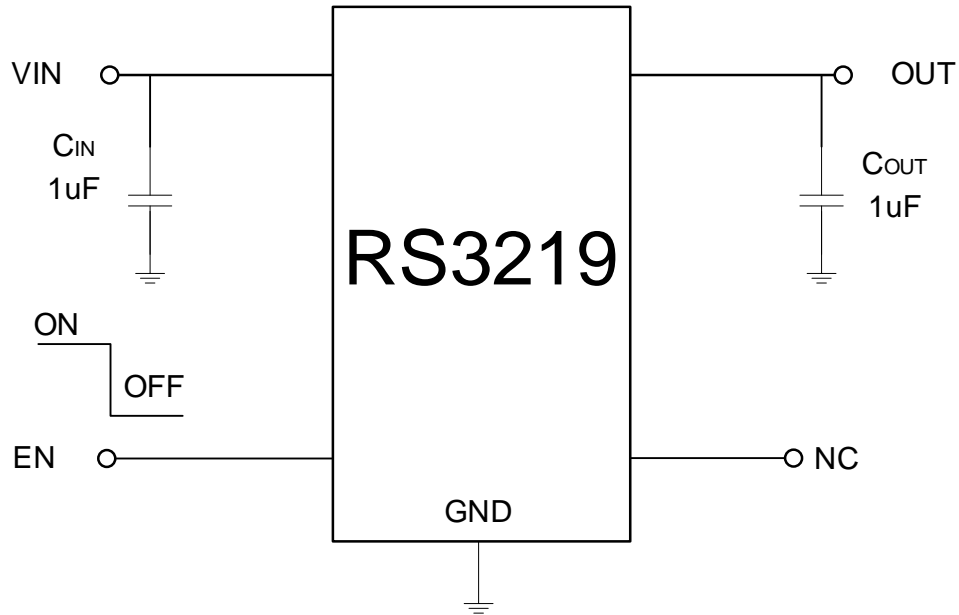
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS	
Input Voltage	$V_{IN}$		+25°C	1.7 <sup>(1)</sup>		7.5	V	
Output Voltage Accuracy <sup>(1)</sup>		$I_{OUT} = 0.1mA$	+25°C	-2.5		+2.5	%	
Maximum Output Current <sup>(1)</sup>			+25°C	300			mA	
Ground Pin Current	$I_Q$	No load, $EN = V_{IN}$	+25°C		120	200	μA	
Dropout Voltage <sup>(2)</sup>		$I_{OUT} = 1mA$ , $V_{OUT}=3.3V$	+25°C		0.95		mV	
		$I_{OUT} = 300mA$ , $V_{OUT}=3.3V$			280	400		
Line Regulation <sup>(1)</sup>	$\Delta V_{LNR}$	$V_{IN} = 1.7V$ or ( $V_{OUT} + 0.5V$ ) to 5.5V, $I_{OUT} = 1mA$	+25°C		0.03	0.09	%/V	
Load Regulation	$\Delta V_{LDR}$	$I_{OUT} = 0.1mA$ to 300mA, $C_{OUT} = 1\mu F$ ,	+25°C		0.002	0.005	%/mA	
Output Voltage Noise	$e_n$	$f = 0.1Hz$ to 10Hz, $C_{OUT} = 1\mu F$	+25°C		38		μVPP	
Power Supply Rejection Ratio	PSRR	$I_{LOAD} = 50mA$ , $C_{OUT} = 1\mu F$ , $V_{IN} = V_{OUT}+1V$	$f = 217Hz$	+25°C		56		dB
			$f = 1kHz$	+25°C		55		dB
<b>SHUTDOWN</b> <sup>(3)</sup>								
EN Input Threshold	$V_{IH}$	$V_{IN} = 1.7V$	Full	1.4			V	
	$V_{IL}$		Full			0.3		
	$V_{IH}$	$V_{IN} = 7.5V$	Full	2.0			V	
	$V_{IL}$		Full			0.3		
EN Input Bias Current	$I_{B(SHDN)}$	$EN = 0V$ or $EN = V_{IN}$	+25°C		0.01	1	μA	
			Full		0.01			
Shutdown Supply Current	$I_{Q(SHDN)}$	$EN = 0.4V$	Full		0.01		μA	
Shutdown Exit Delay <sup>(4)</sup>		$C_{OUT} = 1\mu F$ , No Load	+25°C		50		μs	
<b>THERMAL PROTECTION</b>								
Thermal Shutdown Temperature	$T_{SHDN}$				150		°C	
Thermal Shutdown Hysteresis	$\Delta T_{SHDN}$				15		°C	

NOTES:

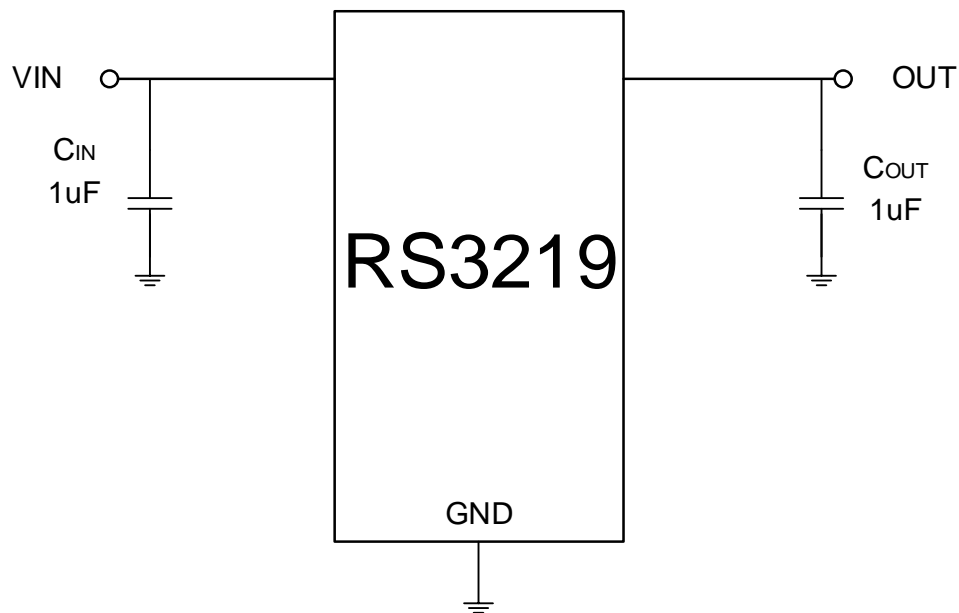
- $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or 1.7V, whichever is greater.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT} + 0.5V$ . (Only applicable for  $V_{OUT} = +1.2V$  to +5.0V.)
- $V_{EN} = -0.3V$  to  $V_{IN}$
- Time needed for  $V_{OUT}$  to reach 90% of final value.

## TYPICAL APPLICATION CIRCUIT

5Pin Typical Circuit



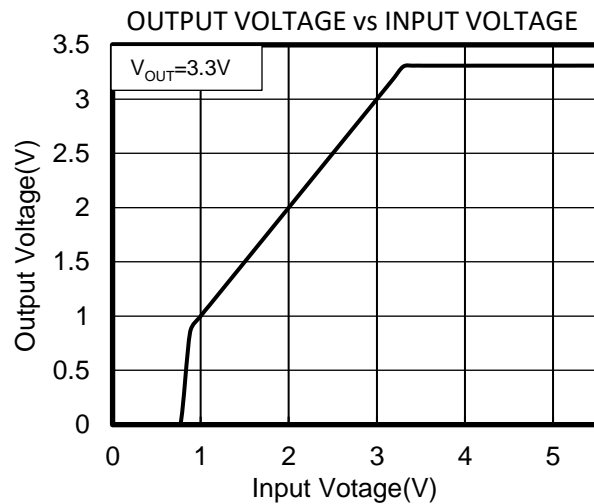
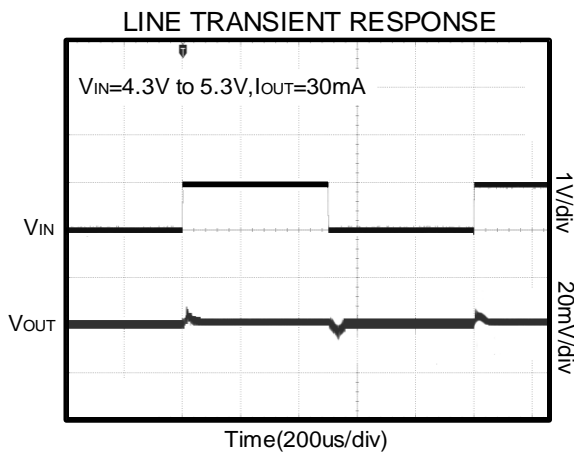
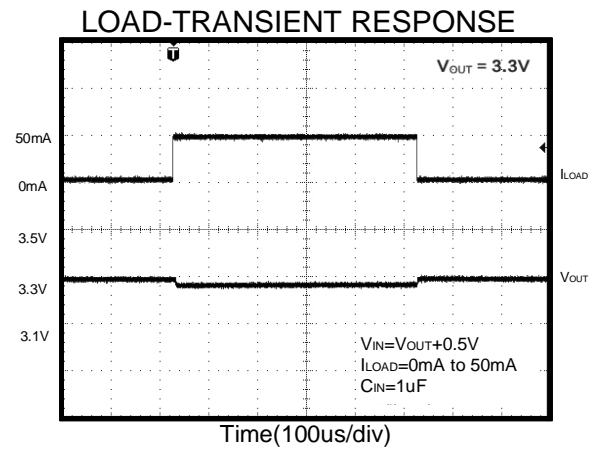
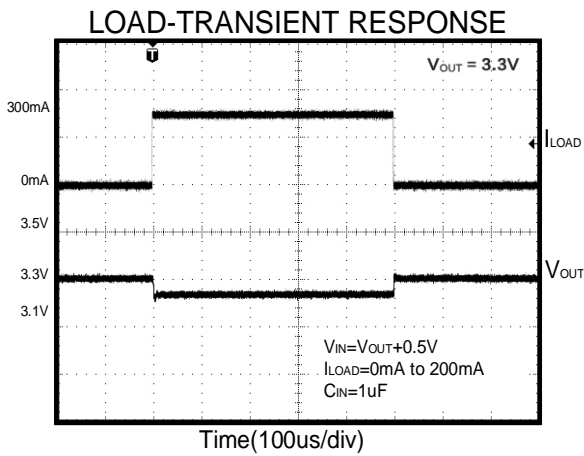
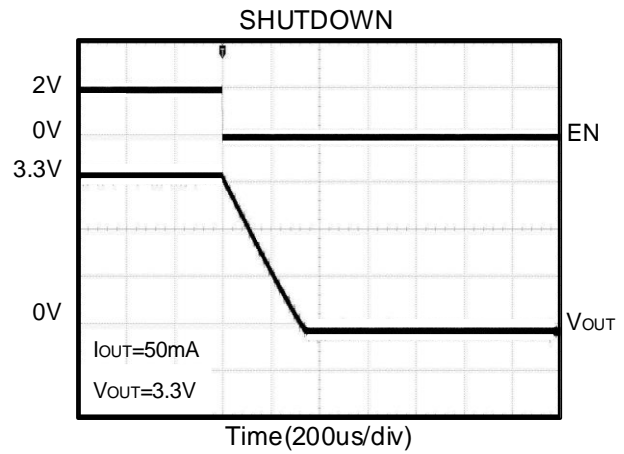
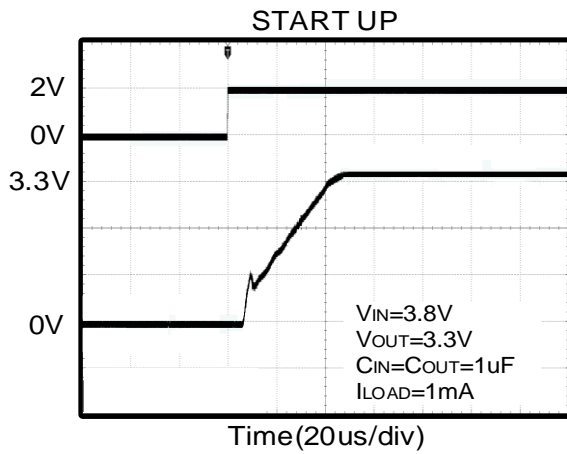
3Pin Typical Circuit





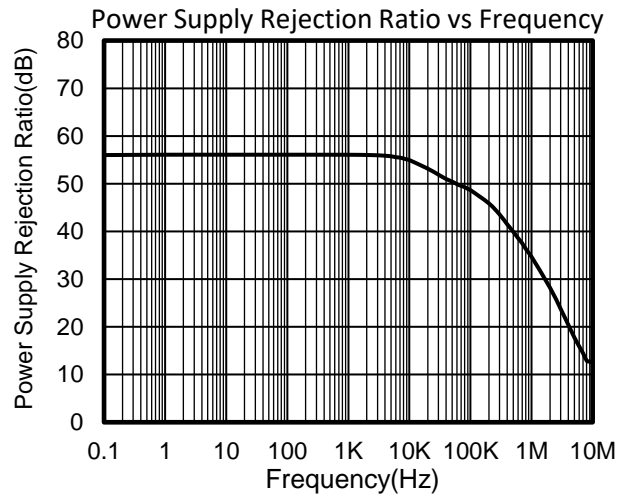
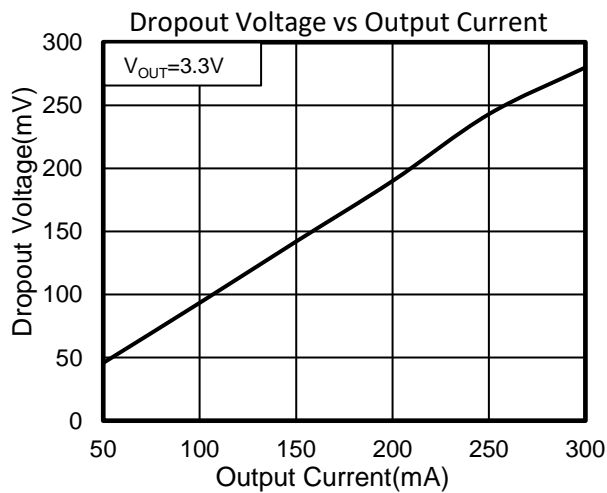
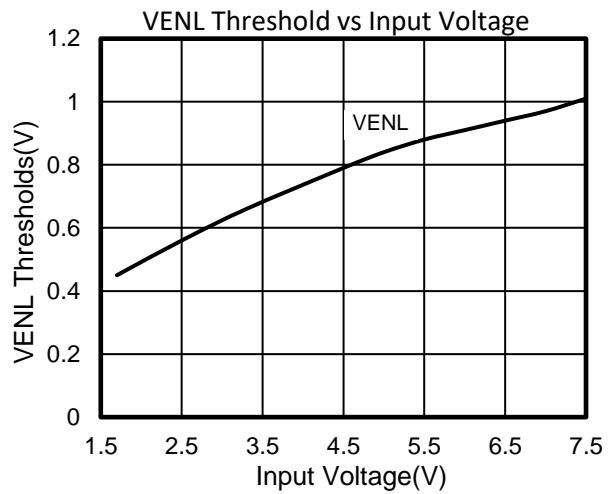
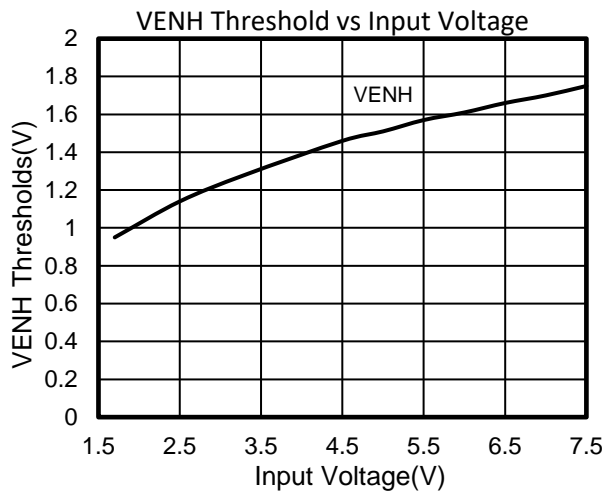
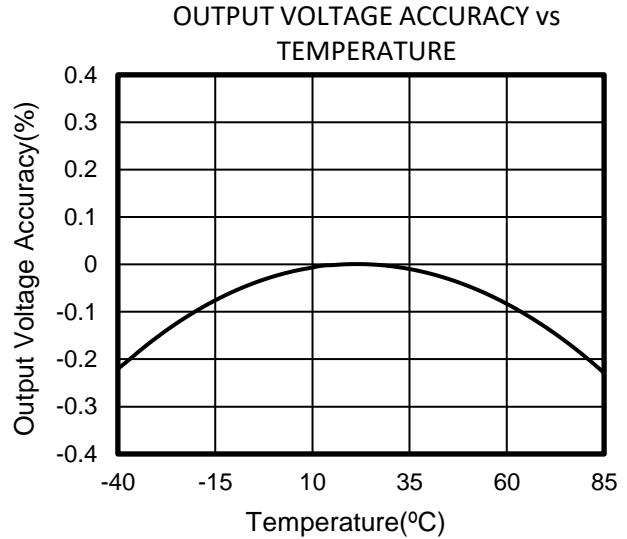
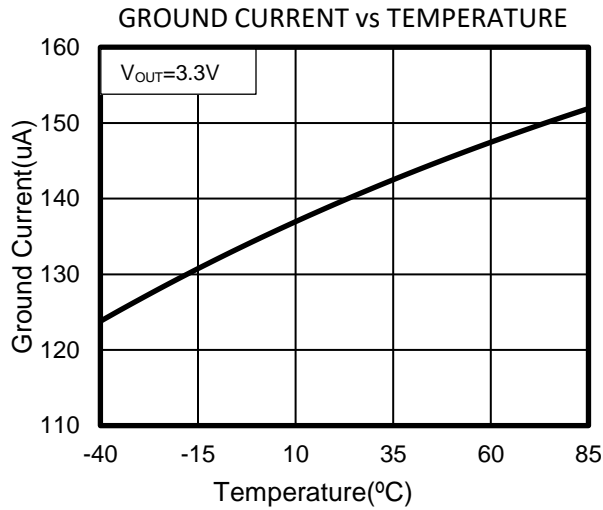
## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT} (\text{NOMINAL}) + 0.5V$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



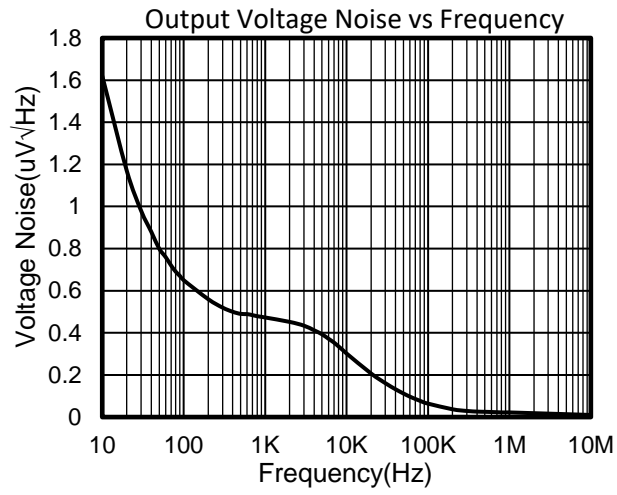
## TYPICAL PERFORMANCE CHARACTERISTICS

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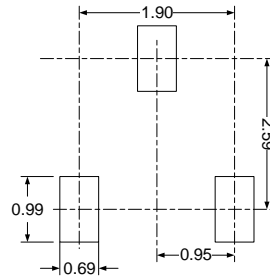
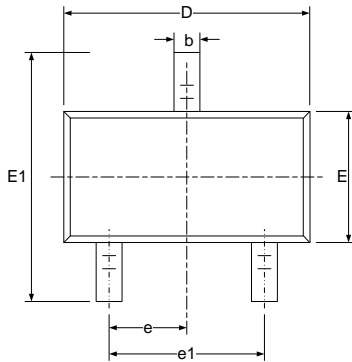
## TYPICAL PERFORMANCE CHARACTERISTICS

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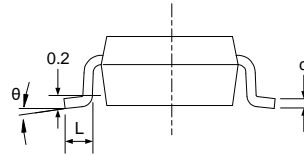
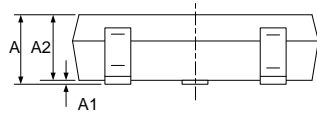


# PACKAGE OUTLINE DIMENSIONS

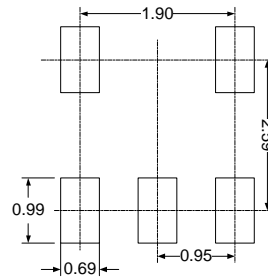
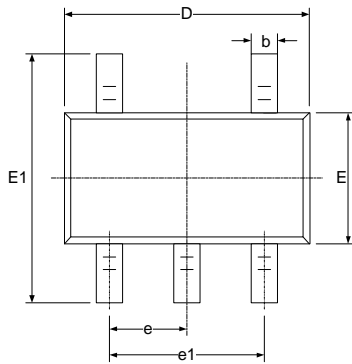
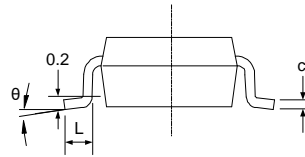
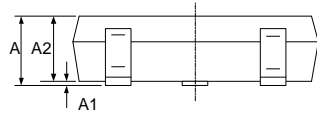
## SOT23-3



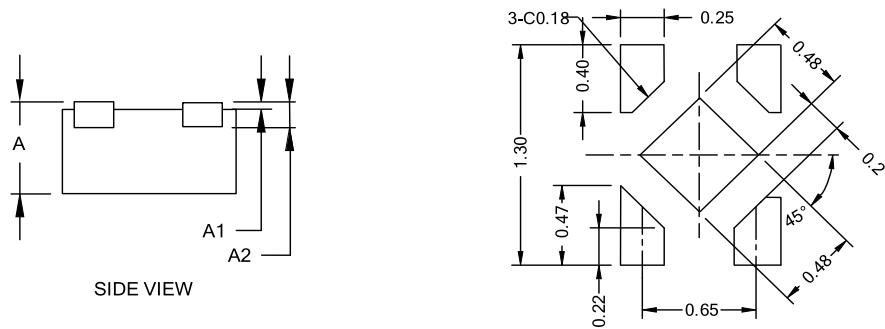
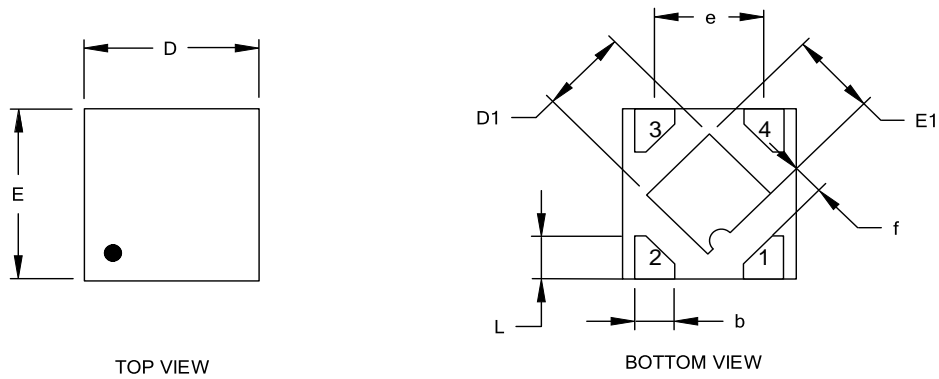
RECOMMENDED LAND PATTERN (Unit: mm)



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
$\theta$	0°	8°	0°	8°

**SOT23-5**

**RECOMMENDED LAND PATTERN (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
$\theta$	0°	8°	0°	8°

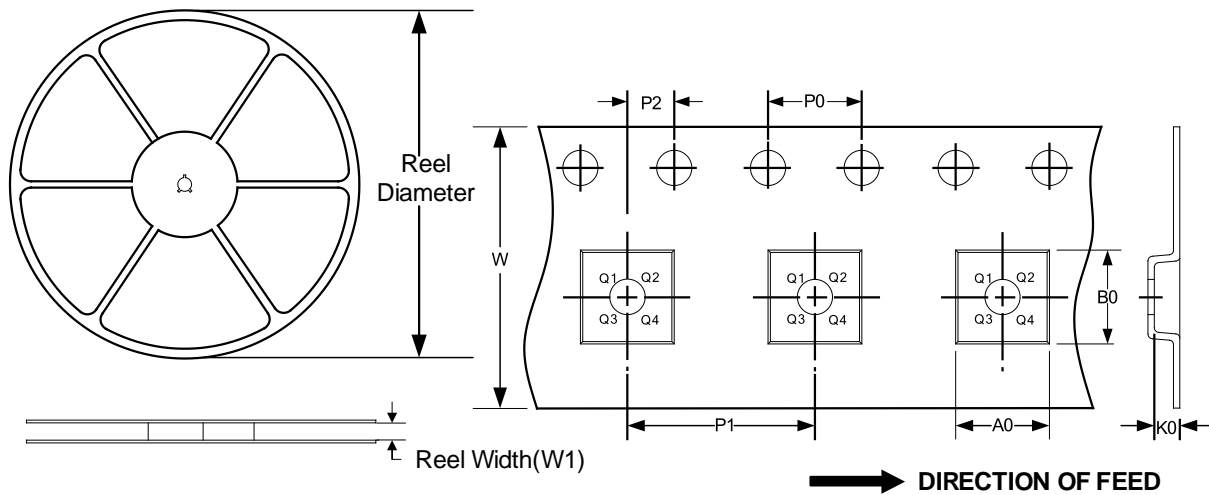
**UTDFN-1x1-4**

**RECOMMENDED LAND PATTERN (Unit: mm)**

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.340	0.370	0.400	0.013	0.015	0.016
A1	0.000	0.020	0.050	0.000	0.001	0.002
A2	0.100 REF			0.004 REF		
D	0.950	1.000	1.050	0.037	0.039	0.041
D1	0.430	0.480	0.530	0.017	0.019	0.021
E	0.950	1.000	1.050	0.037	0.039	0.041
E1	0.430	0.480	0.530	0.017	0.019	0.021
b	0.170	0.220	0.270	0.007	0.009	0.011
e	0.600	0.650	0.700	0.024	0.026	0.028
f	0.195 REF			0.008 REF		
L	0.200	0.250	0.300	0.008	0.010	0.012

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS

### TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
UTDFN-1x1-4	7"	9.5	1.16	1.16	0.5	4.0	4.0	2.0	8.0	Q1
SOT23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SOT23-3	7"	9.0	3.20	3.30	1.30	4.0	4.0	2.0	8.0	Q3