Low Power, Low Dropout, 300-mA Low-Noise, Low-I_Q 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

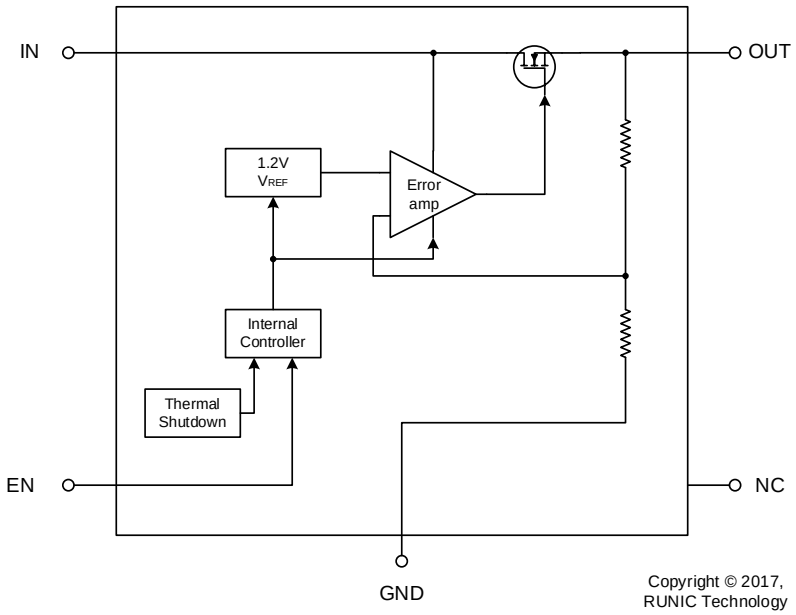
The RS3219 series low-power, low-dropout, CMOS LDO operate from 1.7V to 7.5V input voltage that can supply up to 300 mA of output current. Designed to meet the requirements of RF and analog circuits, the RS3219 series device provides low noise, high PSRR, low quiescent current, and low line and load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

The device is designed to work with a 1-µF input and a 1-µF 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.

Functional Block Diagram



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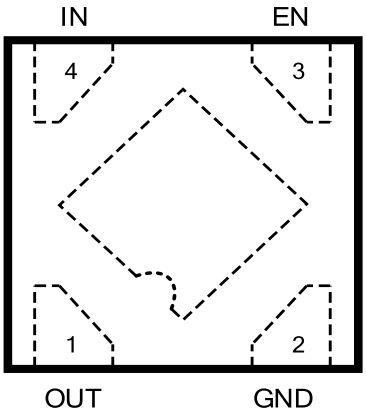
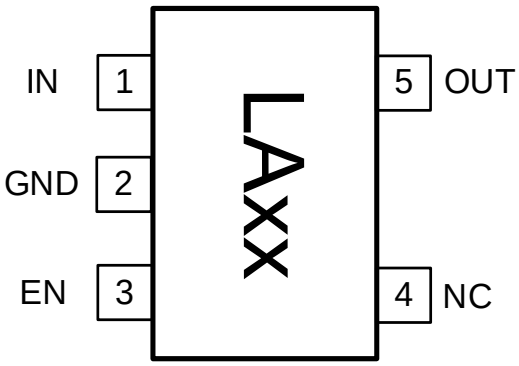
Pin Configuration and Functions (Top View)

(TOP VIEW)



UTDFN-1×1-4

(TOP VIEW)

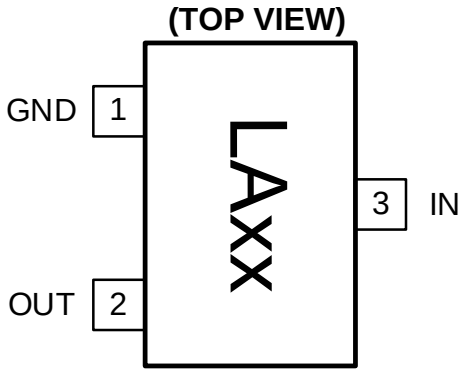


SOT23-5

UTDFN-1×1-4		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 1μF 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 1μF 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

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 1μF capacitor to GND.

PACKAGE/ORDERING INFORMATION

MODEL	V_{OUT} (V)	PIN- PACKAGE	ORDERING NUMBER	PACKAGE MARKING(1)	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)(1)(2)

		MIN	MAX	UNIT
V_{IN}	Input voltage	-0.3	8	V
V_{OUT}	Output voltage	-0.3	V_{IN} + 0.3	V
V_{EN}	Enable input voltage	-0.3	V_{IN}	V
T_J	Junction temperature		150	°C
P_D	Continuous power dissipation (3)	Internally Limited		W
T_{stg}	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
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±6000	V
		Machine model (MM)	±500	V

Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
V_{IN}	Input supply voltage	1.7	7.5	V
V_{OUT}	Output voltage	1.2	5	V
V_{EN}	Enable input voltage	0	V_{IN}	V
I_{OUT}	Output current	0	300	mA
T_J	Junction temperature	–40	85	°C

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

Thermal Information

	THERMAL METRIC	RS3219 SOT23-5 5 PINS	RS3219 SOT23-3 3 PINS	RS3219 UTDFN-1x1-4 4 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	230	230	312.5	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	150	150	137.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	55	55	83.5	°C/W
ψ_{JT}	Junction-to-top characterization parameter	30	30	5.3	°C/W
ψ_{JB}	Junction-to-board characterization parameter	55	55	83.8	°C/W
$R_{JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	N/A	71.8	°C/W

ELECTRICAL CHARACTERISTICS

(V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V [1], Full = -40℃ to +85℃, unless otherwise noted.)

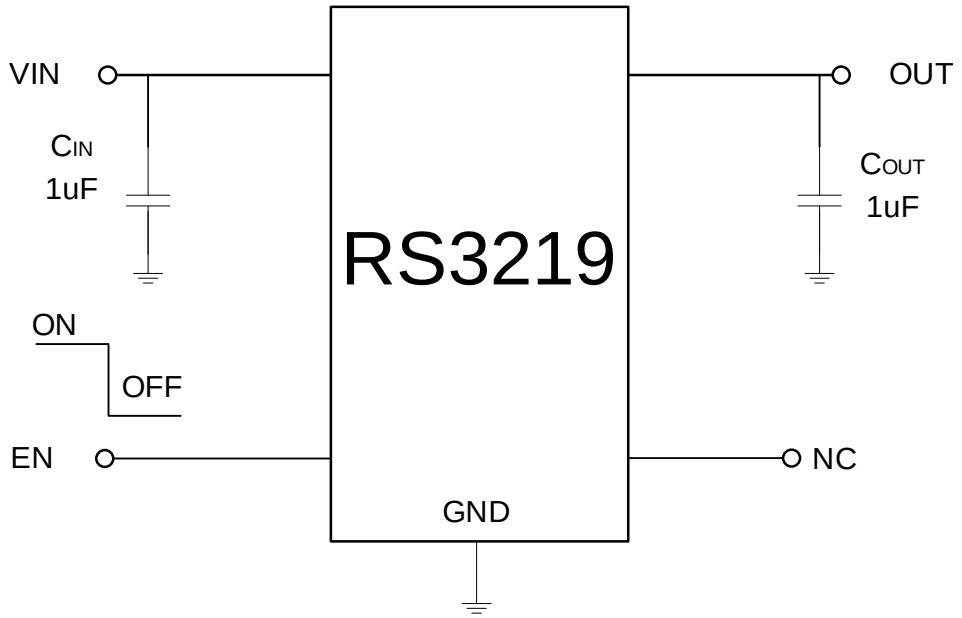
PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}			+25℃	1.7[1]		7.5	V
Output Voltage Accuracy [1]		I_{OUT} = 0.1mA		+25℃	-2.5		+2.5	%
Maximum Output Current [1]				+25℃	300			mA
Ground Pin Current	I_Q	No load, EN = V_{IN}		+25℃		120	200	μA
Dropout Voltage [2]		I_{OUT} = 1mA， V_{OUT}=3.3V		+25℃		0.95		mV
		I_{OUT} = 300mA， V_{OUT}=3.3V				280	400	
Line Regulation [1]	ΔV_{LNR}	V_{IN} = 1.7V or (V_{OUT} + 0.5V) to 5.5V, I_{OUT} = 1mA		+25℃		0.03	0.09	%/V
Load Regulation	ΔV_{LDR}	I_{OUT} =0.1mA to 300mA, C_{OUT} = 1μF,		+25℃		0.002	0.005	%/mA
Output Voltage Noise	e_n	f = 0.1Hz to 10Hz, C_{OUT} = 1μF		+25℃		38		μV_{PP}
Power Supply Rejection Ratio	PSRR	I_{LOAD} = 50mA, C_{OUT} = 1μF, V_{IN} = V_{OUT}+1V	f = 217Hz	+25℃		56		dB
			f = 1kHz	+25℃		55		dB
SHUTDOWN [3]								
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℃		0.01	1	μA
				Full		0.01		
Shutdown Supply Current	$I_{Q(SHDN)}$	EN = 0.4V		Full		0.01		μA
Shutdown Exit Delay [4]		C_{OUT} = 1μF, No Load		+25℃		50		μs
THERMAL PROTECTION								
Thermal Shutdown Temperature	T_{SHDN}					150		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}					15		℃

NOTES:

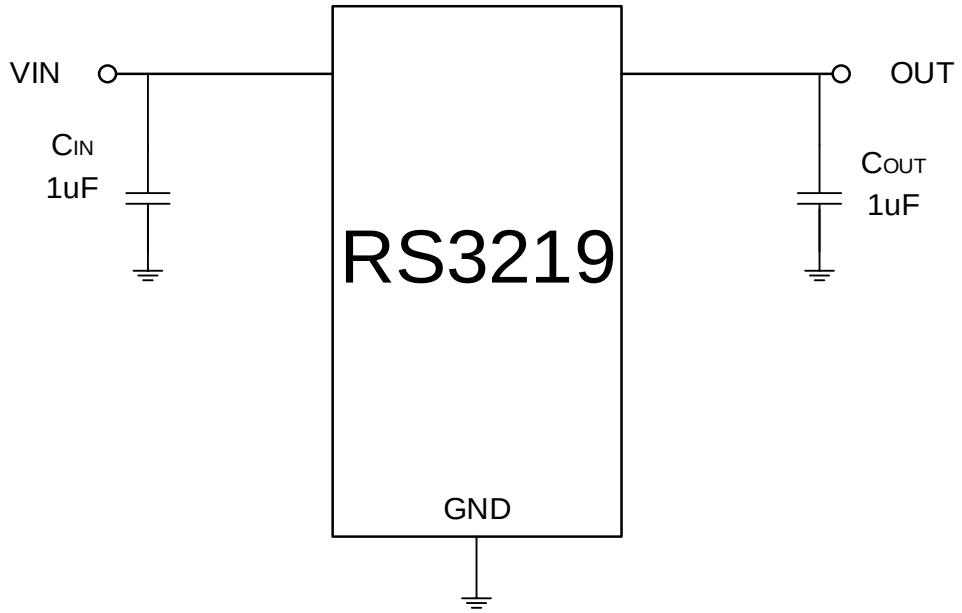
1. V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 1.7V, whichever is greater.
2. The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} is 100mV below the value of V_{OUT} for V_{IN} = V_{OUT} + 0.5V. (Only applicable for V_{OUT} = +1.2V to +5.0V.)
3. V_{EN} = -0.3V to V_{IN}
4. Time needed for V_{OUT}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

TYPICAL APPLICATION CIRCUIT

5Pin Typical Circuit



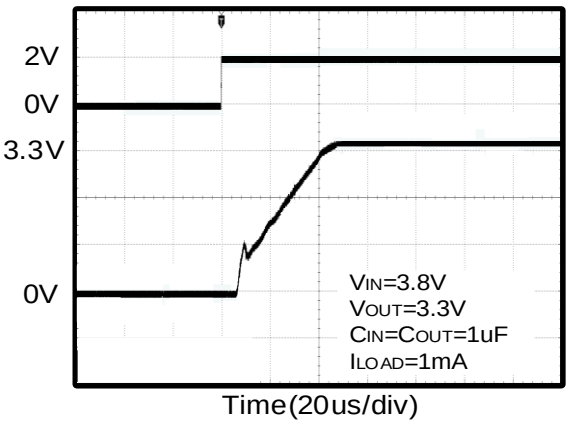
3Pin Typical Circuit



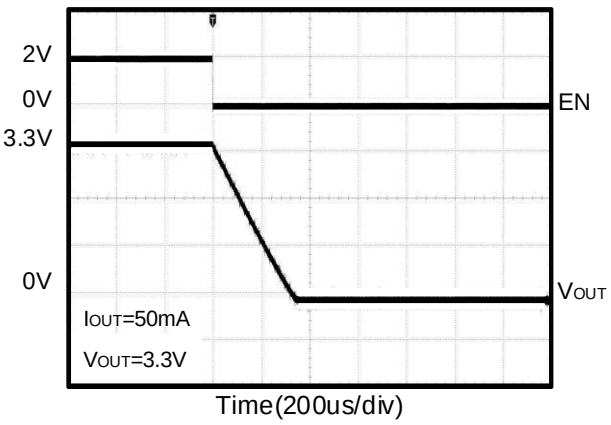
TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = V_{OUT} (NOMINAL) + 0.5V, C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.

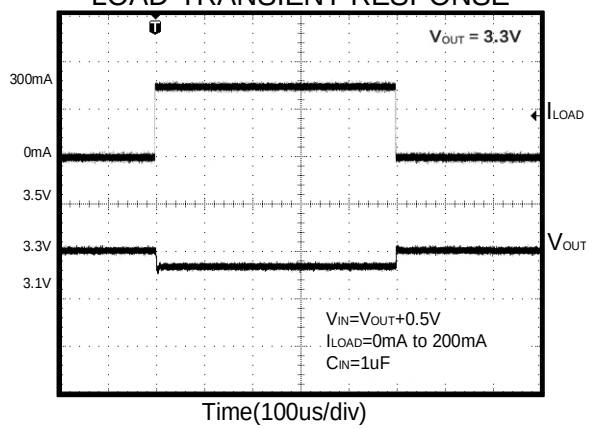
START UP



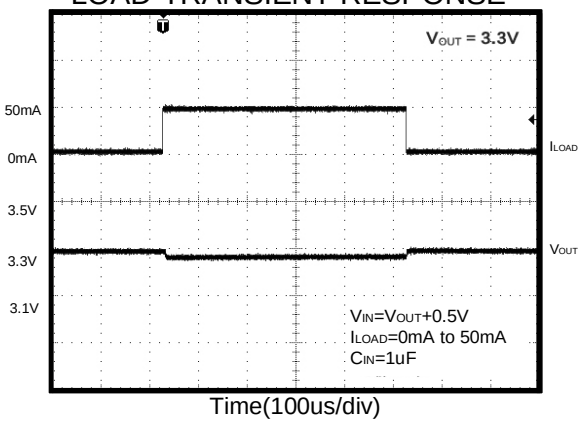
SHUTDOWN



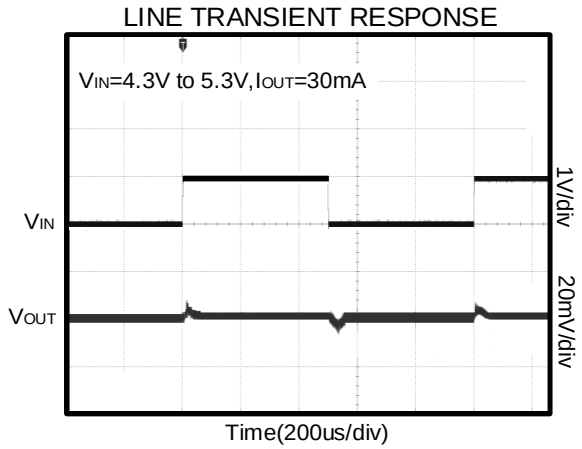
LOAD-TRANSIENT RESPONSE



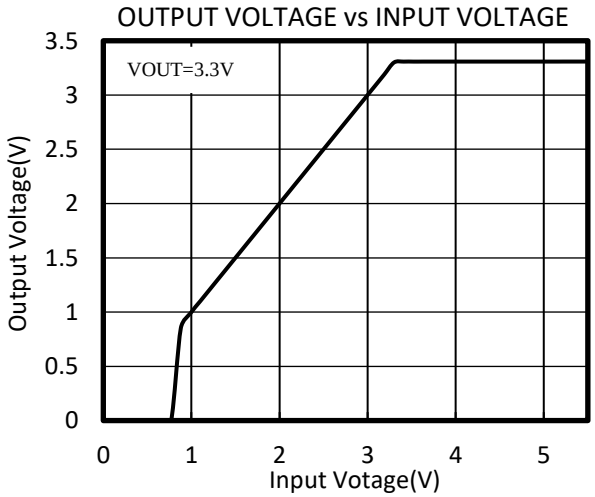
LOAD-TRANSIENT RESPONSE



LINE TRANSIENT RESPONSE



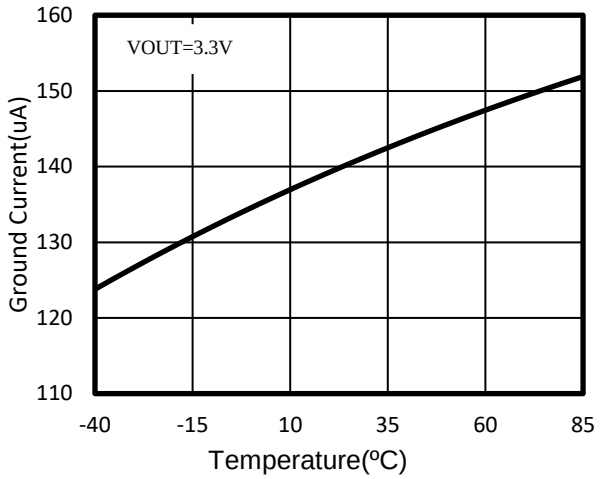
OUTPUT VOLTAGE vs INPUT VOLTAGE



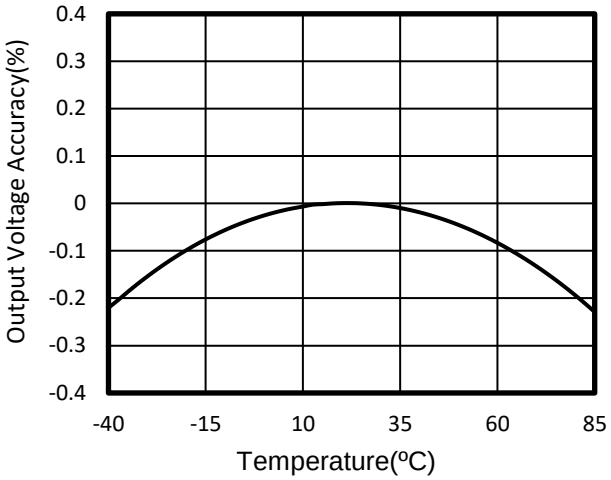
TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = V_{OUT} (NOMINAL) + 0.5V, C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.

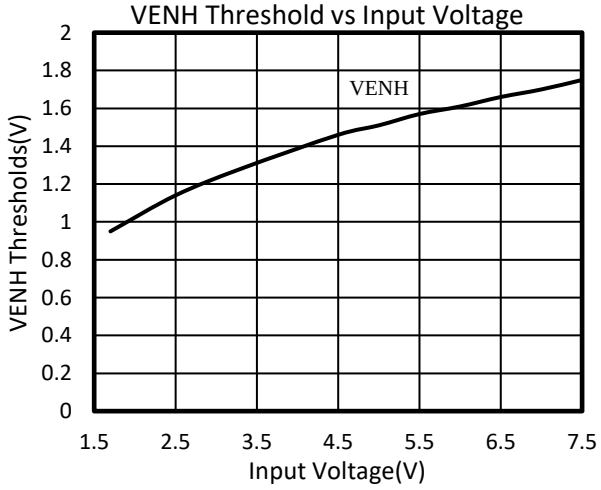
GROUND CURRENT vs TEMPERATURE



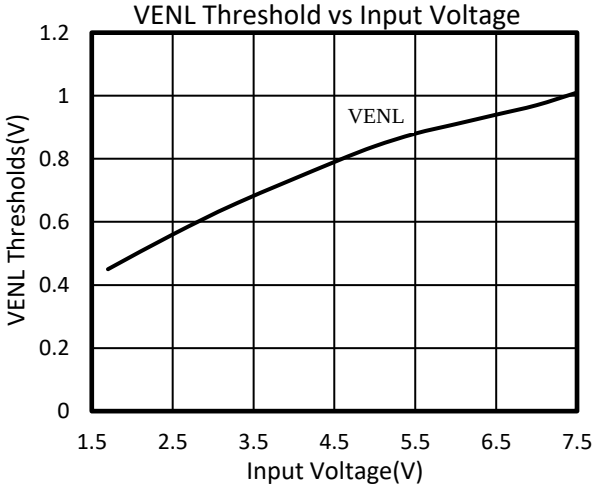
OUTPUT VOLTAGE ACCACURACY vs TEMPERATURE



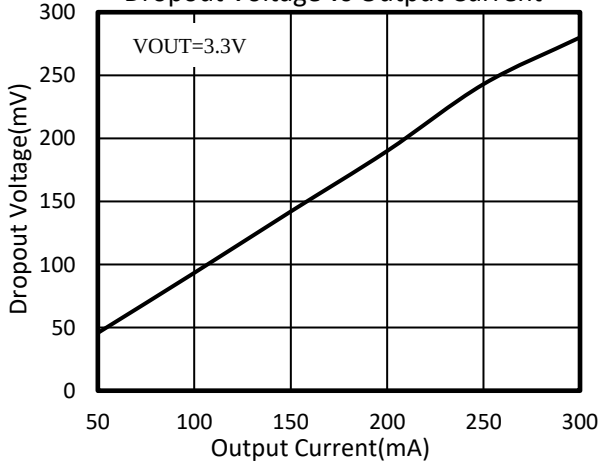
VENH Threshold vs Input Voltage



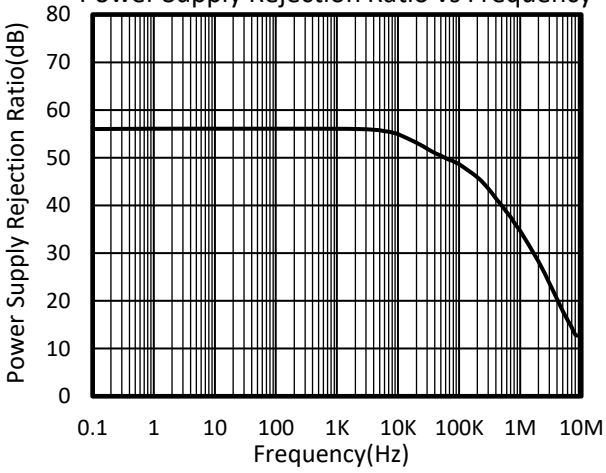
VENL Threshold vs Input Voltage



Dropout Voltage vs Output Current

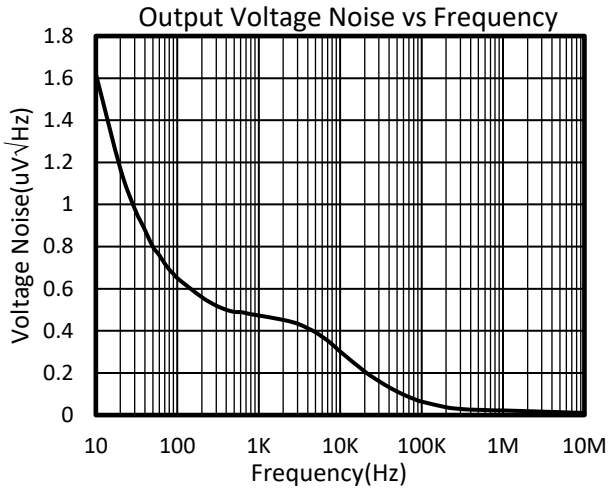


Power Supply Rejection Ratio vs Frequency



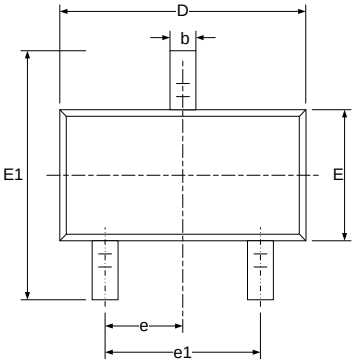
TYPICAL PERFORMANCE CHARACTERISTICS

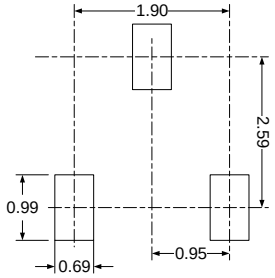
V_{IN} = V_{OUT} (NOMINAL) + 0.5V, C_{IN} = 1μF, C_{OUT} = 1μF, T_A = +25℃, unless otherwise noted.



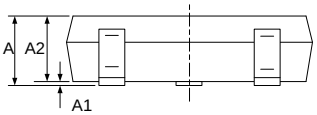
PACKAGE OUTLINE DIMENSIONS

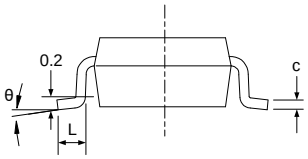
SOT23-3





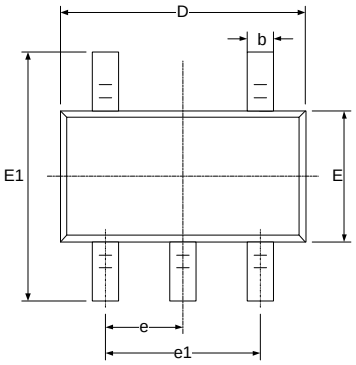
RECOMMENDED LAND PATTERN (Unit: mm)

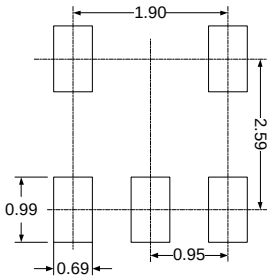




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

SOT23-5





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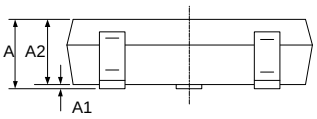

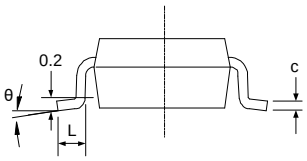

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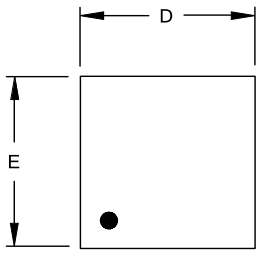
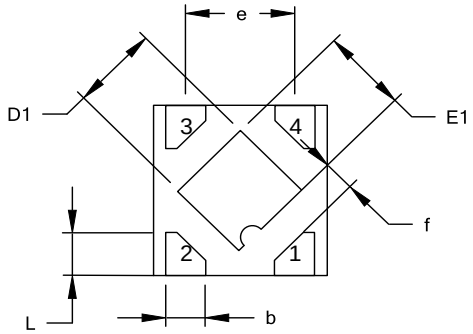
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

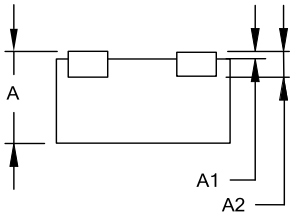
UTDFN-1x1-4



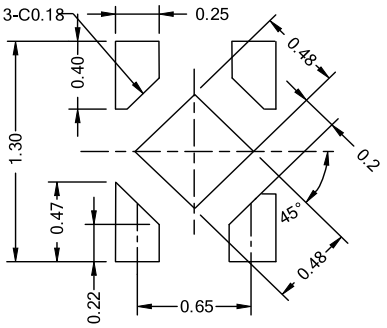
TOP VIEW



BOTTOM VIEW



SIDE VIEW



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

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