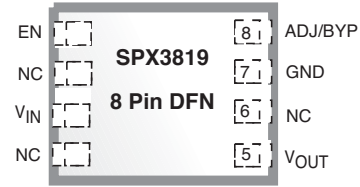


**FEATURES**

- Low Noise: 40µV Possible
- High Accuracy: 1%
- Reverse Battery Protection
- Low Dropout: 340mV at Full Load
- Low Quiescent Current: 90µA
- Zero Off-Mode Current
- Fixed Output: 1.2V, 1.5V, 1.8V, 2.5V, 3.0V, 3.1V, 3.3V, 5.0V. Adj. Output also available.
- Available in RoHS Compliant, Lead Free Packages: 5 Pin SOT-23, 8 Pin Narrow SOIC and 8 pin 2X3 DFN



**APPLICATIONS**

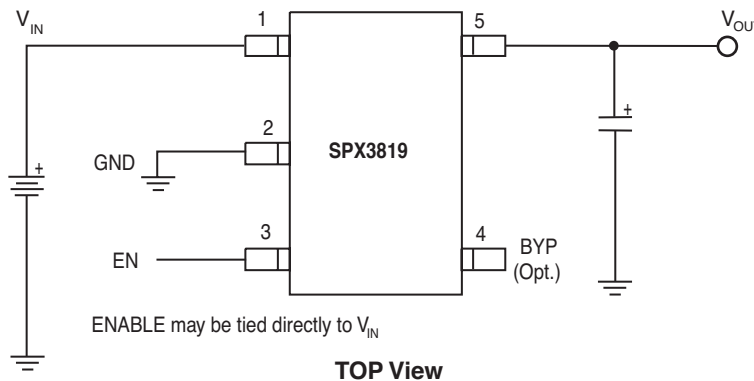
- Battery Powered Systems
- Cordless Phones
- Radio Control Systems
- Portable/Palm Top/Notebook Computers
- Portable Consumer Equipment
- Portable Instrumentation
- Bar Code Scanners
- SMPS Post Regulators

**DESCRIPTION**

The SPX3819 is a positive voltage regulator with a low dropout voltage and low noise output. In addition, this device offers a very low ground current of 800µA at 100mA output. The SPX3819 has an initial tolerance of less than 1% max and a logic compatible ON/OFF switched input. When disabled, power consumption drops to nearly zero. Other key features include reverse battery protection, current limit, and thermal shutdown. The SPX3819 includes a reference bypass pin for optimal low noise output performance. With its very low output temperature coefficient, this device also makes a superior low power voltage reference.

The SPX3819 is an excellent choice for use in battery-powered applications such as cordless telephones, radio control systems, and portable computers. It is available in several fixed voltages -- 1.2V, 1.5V, 1.8V, 2.5V, 3.0V, 3.1V, 3.3V, 5.0V -- or with an adjustable output. This device is offered in 8 pin NSOIC, 8 pin DFN and 5-pin SOT-23 packages.

**TYPICAL APPLICATION CIRCUIT**



## ABSOLUTE MAXIMUM RATINGS

Power Dissipation .....	Internally Limited
Lead Temp. (Soldering, 5 Seconds) .....	260°C
Operating Junction Temperature Range .....	-40°C to +125°C
Input Supply Voltage .....	-20V to +20V
Enable Input Voltage .....	-20V to +20V

## RECOMMENDED OPERATING CONDITIONS

Input Voltage .....	+2.5V to +16V
Operating Junction Temperature Range .....	-40°C to +125°C
Enable Input Voltage .....	0.0V to $V_{IN}$

## ELECTRICAL CHARACTERISTICS

$T_J=25^\circ\text{C}$ ,  $V_{OUT} + 1\text{V}$ , for 1.2V Option  $V_{IN}=V_{OUT} + 1.2\text{V}$   $I_L=100\mu\text{A}$ ,  $C_L=1\mu\text{F}$ , and  $V_{ENABLE} \geq 2.4\text{V}$ . The  $\blacklozenge$  denotes the specifications which apply over full operating temperature range  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ , unless otherwise specified.

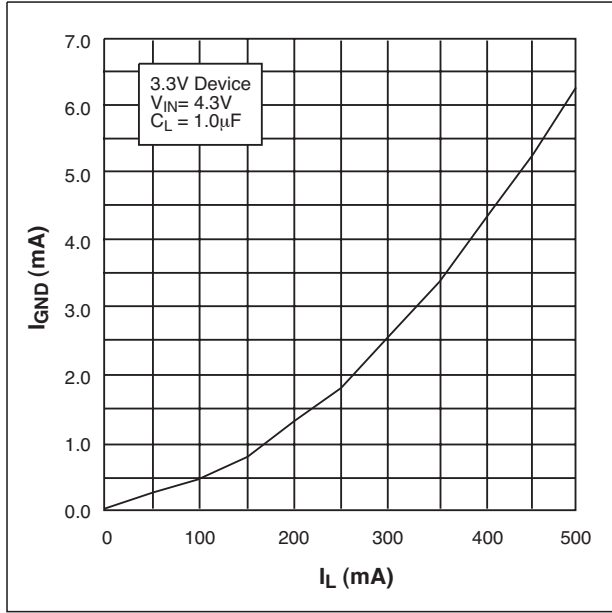
PARAMETER	MIN	TYP	MAX	UNITS	$\blacklozenge$	CONDITIONS
Output Voltage Tolerance	-1 -2		+1 +2	%	$\blacklozenge$	
Output Voltage Temperature Coef.		57		ppm/°C		
Line Regulation		0.04	0.1 0.2	%/V	$\blacklozenge$	
Load Regulation		0.05	0.4	%		$I_L = 0.1\text{mA}$ to $500\text{mA}$
Dropout Voltage ( $V_{IN}-V_O$ )(Note 2)		10	60 80	mV	$\blacklozenge$	$I_L = 100\mu\text{A}$
		125	175 250	mV	$\blacklozenge$	$I_L = 50\text{mA}$
		180	350 450	mV	$\blacklozenge$	$I_L = 150\text{mA}$
		340	550 700	mV	$\blacklozenge$	$I_L = 500\text{mA}$
Quiescent Current ( $I_{GND}$ )		0.05	3 8	$\mu\text{A}$	$\blacklozenge$	$V_{ENABLE} \leq 0.4\text{V}$ $V_{ENABLE} \leq 0.25\text{V}$
Ground Pin Current ( $I_{GND}$ )		90	150 190	$\mu\text{A}$	$\blacklozenge$	$I_L = 100\mu\text{A}$
		250	650 900	$\mu\text{A}$	$\blacklozenge$	$I_L = 50\text{mA}$
		1.0	2.0 2.5	mA	$\blacklozenge$	$I_L = 150\text{mA}$
		6.5	25.0 30.0	mA	$\blacklozenge$	$I_L = 500\text{mA}$
Ripple Rejection (PSRR)		70		dB		
Current Limit ( $I_{LIMIT}$ )		800	950	mA	$\blacklozenge$	$V_{OUT} = 0.0\text{V}$
Output Noise ( $e_{NO}$ )		300		$\mu\text{V}_{RMS}$		$I_L=10\text{mA}$ , $C_L=1.0\mu\text{F}$ , $C_{IN}=1\mu\text{F}$ , (10Hz-100kHz)
		40		$\mu\text{V}_{RMS}$		$I_L=10\text{mA}$ , $C_L=10\mu\text{F}$ , $C_{BYP}=1\mu\text{F}$ , $C_{IN}=1\mu\text{F}$ , (10Hz-100kHz)
Input Voltage Level Logic Low ( $V_{IL}$ )			0.4	V		OFF
Input Voltage Level Logic High ( $V_{IH}$ )	2			V		ON
ENABLE Input Current		0.01 3	2 20	$\mu\text{A}$		$V_{IL} \leq 0.4\text{V}$ $V_{IH} \geq 2.0\text{V}$
Thermal Resistance (Note 1)		191		°C/W	$\blacklozenge$	SOT-23-5 / Junction to Ambient
		128.4		°C/W	$\blacklozenge$	NSOIC-8 / Junction to Ambient
		59		°C/W	$\blacklozenge$	DFN-8 / Junction to Ambient

### NOTES

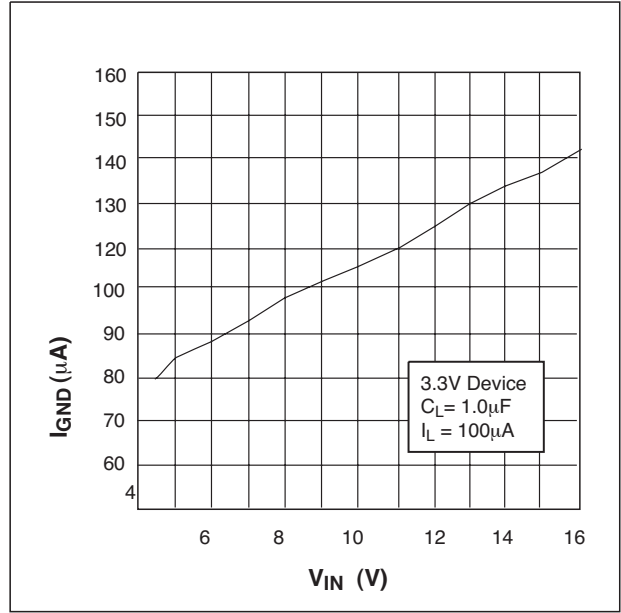
**Note 1:** The maximum allowable power dissipation is a function of maximum operating junction temperature,  $T_{J(max)}$  the junction to ambient thermal resistance, and the ambient  $\theta_{JA}$ , and the ambient temperature  $T_A$ . The maximum allowable power dissipation at any ambient temperature is given:  $P_{D(max)} = (T_{J(max)} - T_A) / \theta_{JA}$ , exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The  $\theta_{JA}$  of the SPX3819 is  $220^\circ\text{C/W}$  mounted on a PC board.

**Note 2:** Not applicable to output voltage 2V or less.

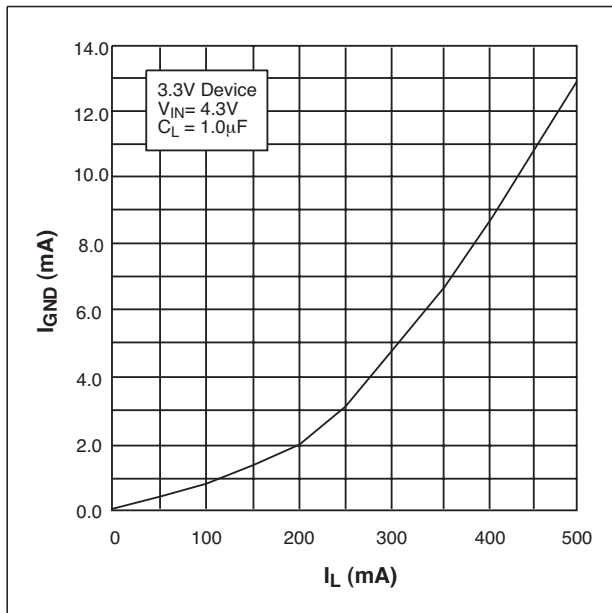
# TYPICAL PERFORMANCE CHARACTERISTICS



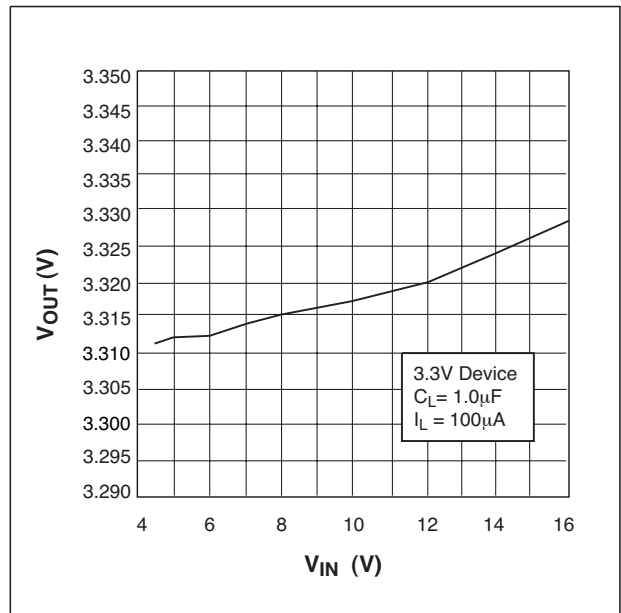
Ground Current vs Load Current



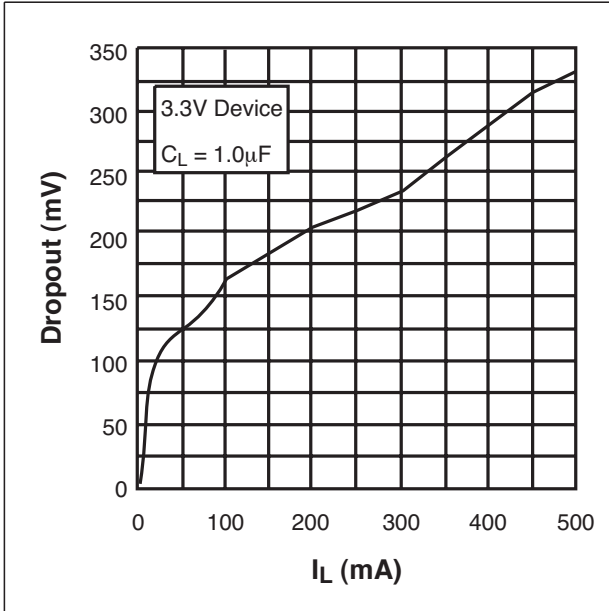
Ground Current vs Input Voltage



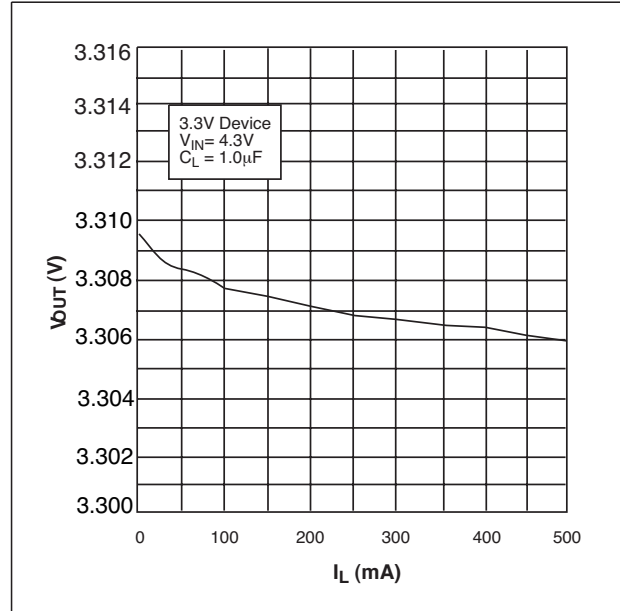
Ground Current vs Load Current in Dropout



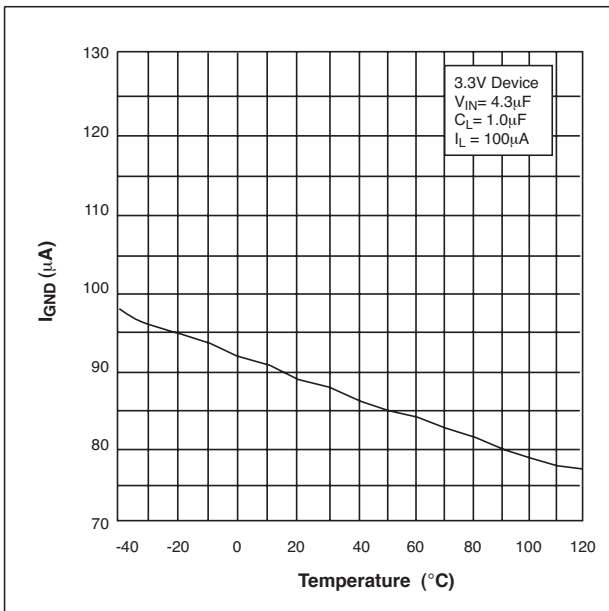
Output Voltage vs Input Voltage



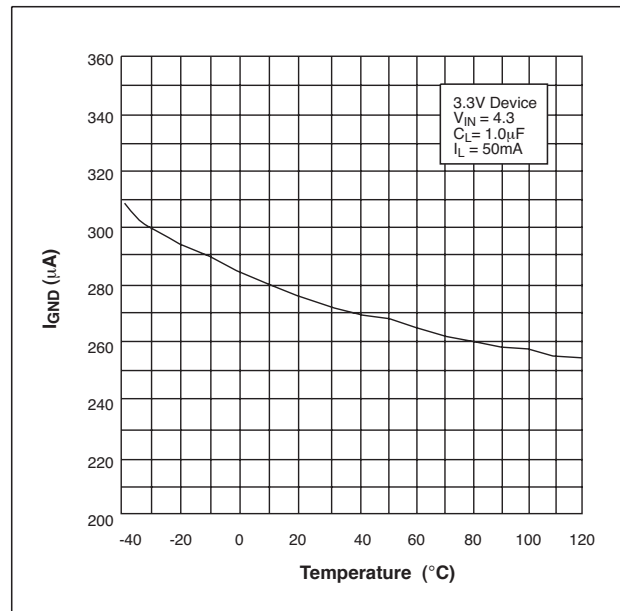
Dropout Voltage vs Load Current



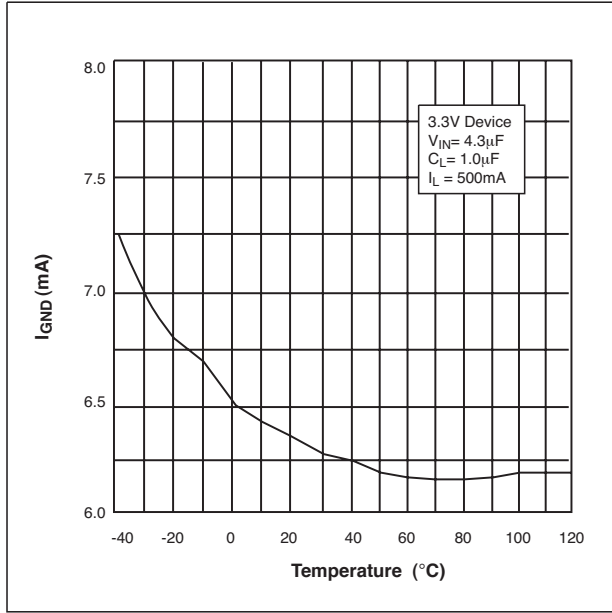
Output Voltage vs Load Current



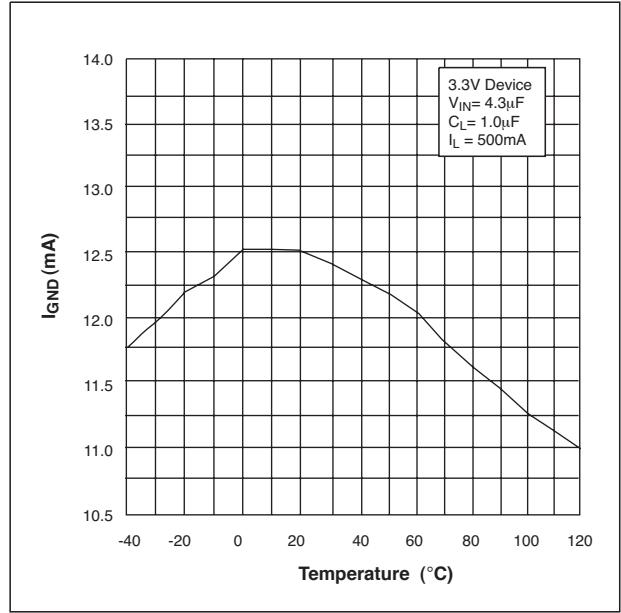
Ground Current vs Temperature with 100µA Load



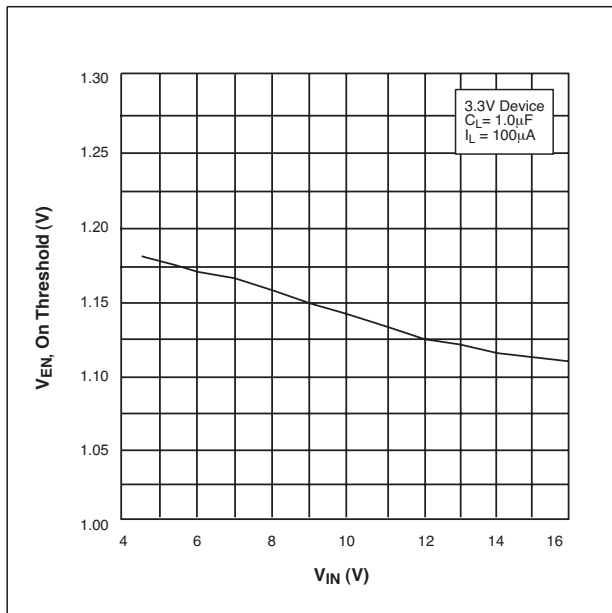
Ground Current vs Temperature with 50mA Load



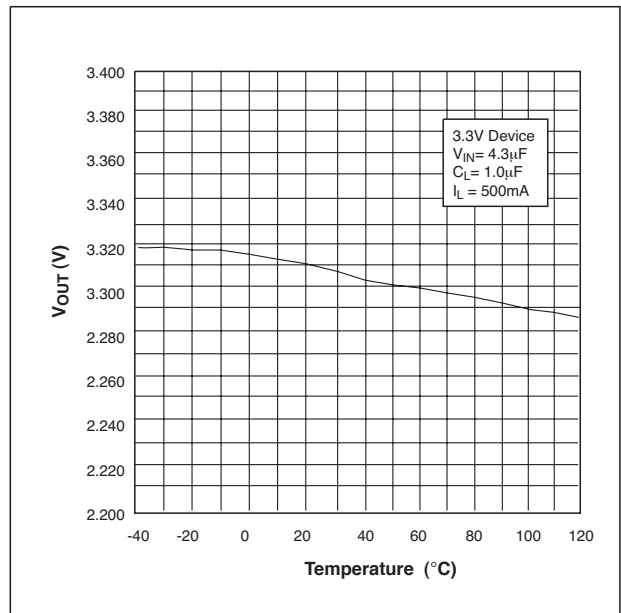
Ground Current vs Temperature with 500mA Load



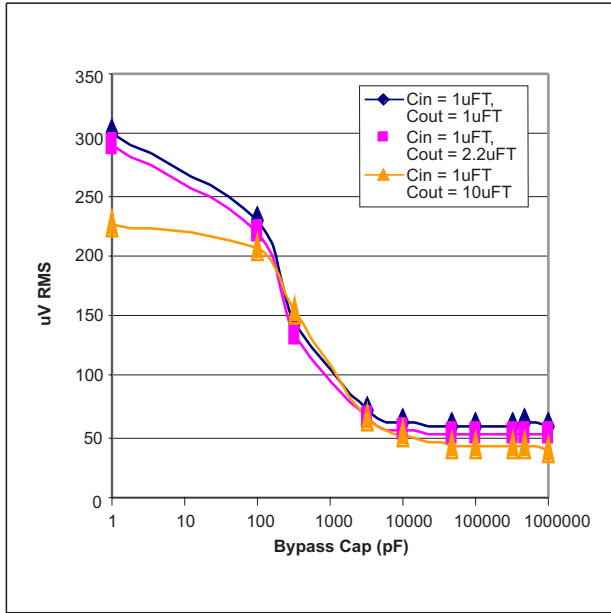
Ground Current vs Temperature in Dropout



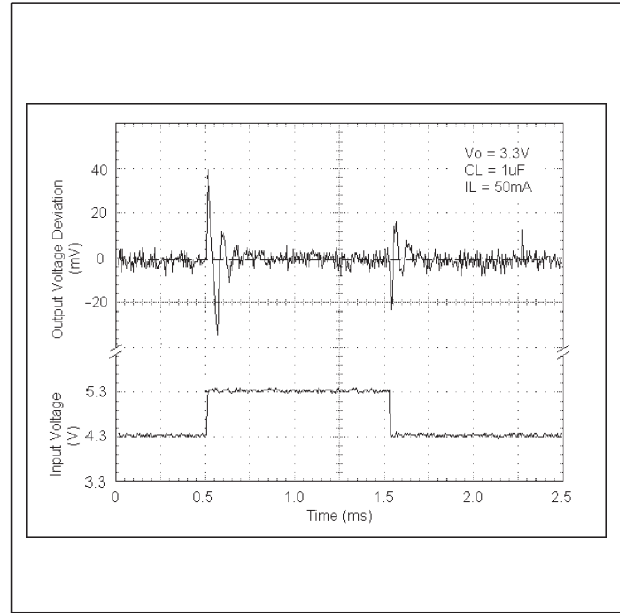
ENABLE Voltage, ON threshold, vs Input Voltage



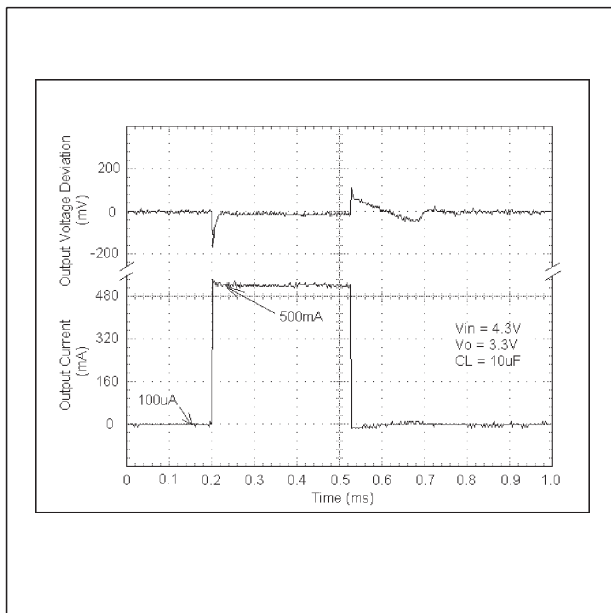
Output Voltage vs Temperature



Output Noise vs Bypass Capacitor Value  $I_L = 10mA$ , 10Hz - 100kHz



Line Transient Response for 3.3V Device



Load Transient Response for 3.3V Device

The SPX3819 requires an output capacitor for device stability. Its value depends upon the application circuit. In general, linear regulator stability decreases with higher output currents. In applications where the SPX3819 is sourcing less current, a lower output capacitance may be sufficient. For example, a regulator outputting only 10mA, requires approximately half the capacitance as the same regulator sourcing 150mA.

Bench testing is the best method for determining the proper type and value of the capacitor since the high frequency characteristics of electrolytic capacitors vary widely, depending on type and manufacturer. A high quality 2.2µF aluminum electrolytic capacitor works in most application circuits, but the same stability often can be obtained with a 1µF tantalum electrolytic.

With the SPX3819 adjustable version, the minimum value of output capacitance is a function of the output voltage. The value decreases with higher output voltages, since closed loop gain is increased.

**Typical Applications Circuits**

A 10nF capacitor on the BYP pin will significantly reduce output noise, but it may be left unconnected if the output noise is not a major

concern. The SPX3819 start-up speed is inversely proportional to the size of the BYP capacitor. Applications requiring a slow ramp-up of the output voltage should use a larger C<sub>BYP</sub>. However, if a rapid turn-on is necessary, the BYP capacitor can be omitted.

The SPX3819’s internal reference is available through the BYP pin.

Figure 1 represents a SPX3819 standard application circuit. The EN (enable) pin is pulled high (>2.0V) to enable the regulator.

To disable the regulator, EN < 0.4V.

The SPX3819 in Figure 2 illustrates a typical adjustable output voltage configuration. Two resistors (R<sub>1</sub> and R<sub>2</sub>) set the output voltage. The output voltage is calculated using the formula:

$$V_{OUT} = 1.235V \times [ 1 + R_1/R_2 ]$$

R<sub>2</sub> must be > 10 kΩ and for best results, R<sub>2</sub> should be between 22 kΩ and 47kΩ.

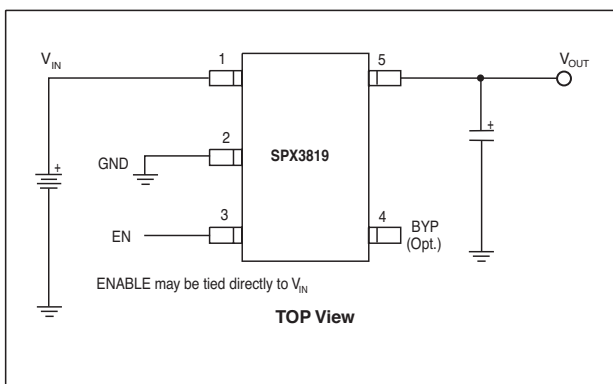


Figure 1. Standard Application Circuit

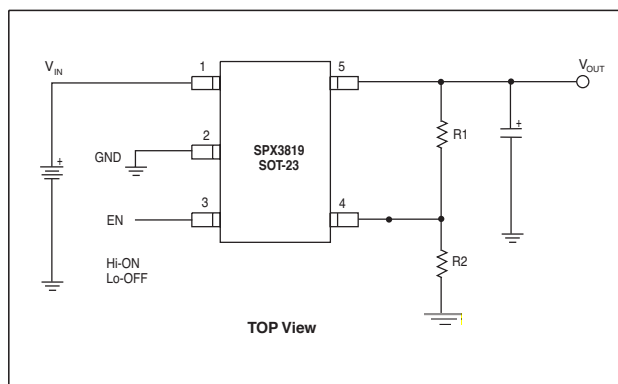
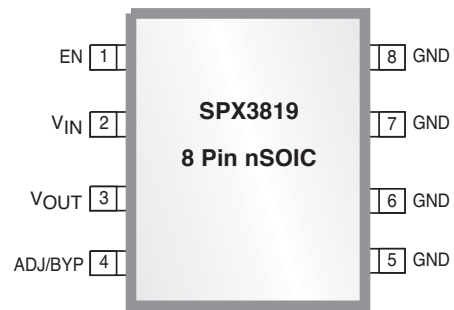
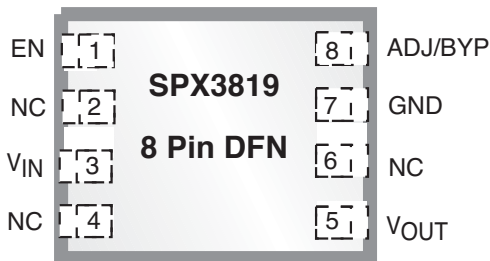


Figure 2. Typical Adjustable Output Voltage Configuration

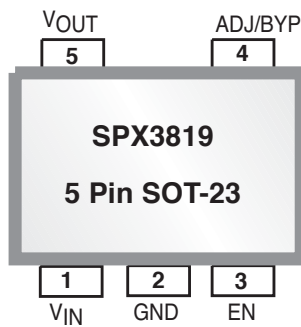
## PACKAGE: PIN DESCRIPTION

Pin # nSOIC	Pin # DFN	Pin # SOT-3	Pin Name	Description
2	3	1	V <sub>IN</sub>	Supply Input
5-8	7	2	GND	Ground
3	5	5	V <sub>OUT</sub>	Regulator Output
1	1	3	EN	Enable(input). CMOS compatible control input. Logic high = enable; logic low or open = shutdown
4	8	4	ADJ/BYP	Adjust(input). Feedback input. Connect to resistive voltage-divider network
-	4, 6	-	NC	No Connect

## PACKAGE: PINOUTS

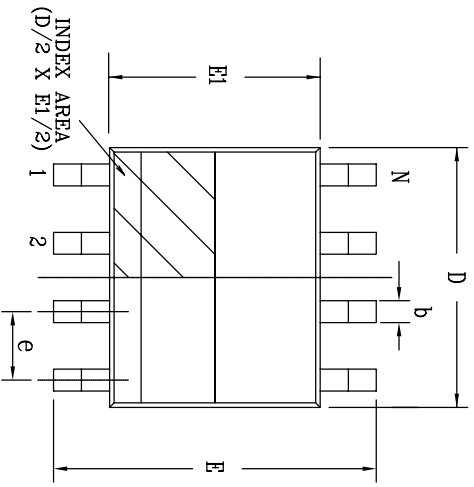


Note: The bottom exposed pad for the SPX3819 DFN package is connected to GND.

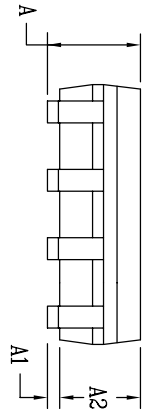




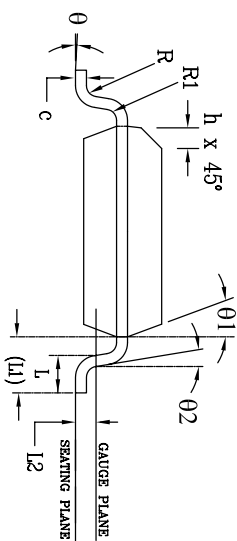
REVISION HISTORY			
REV.	DESCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/16/05	JL
B	DRAWING FORMAT MODIFICATION	07/19/06	JL
C	CHANGE DRAWING LOGO ADN COMPANY NAME	11/16/07	JL



Top View




Side View

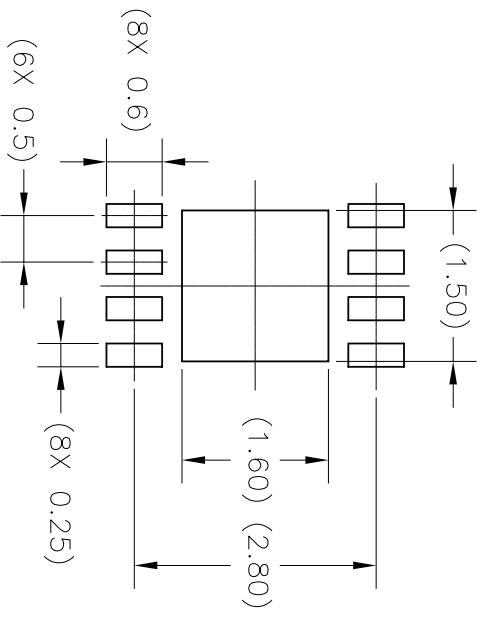
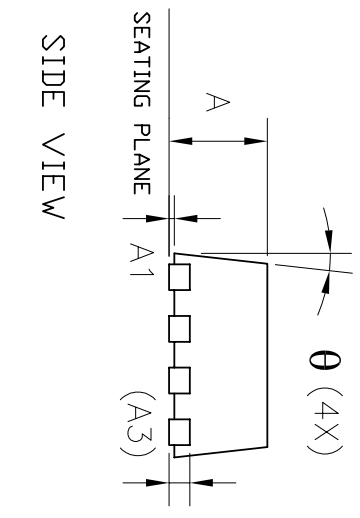
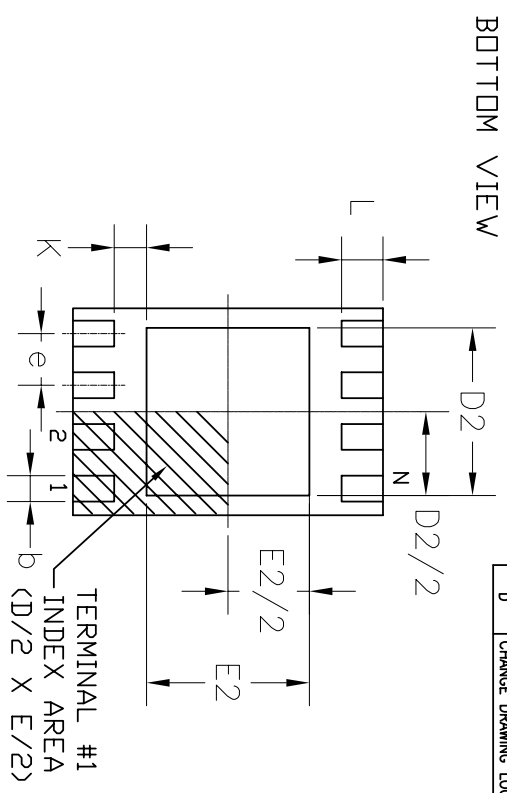
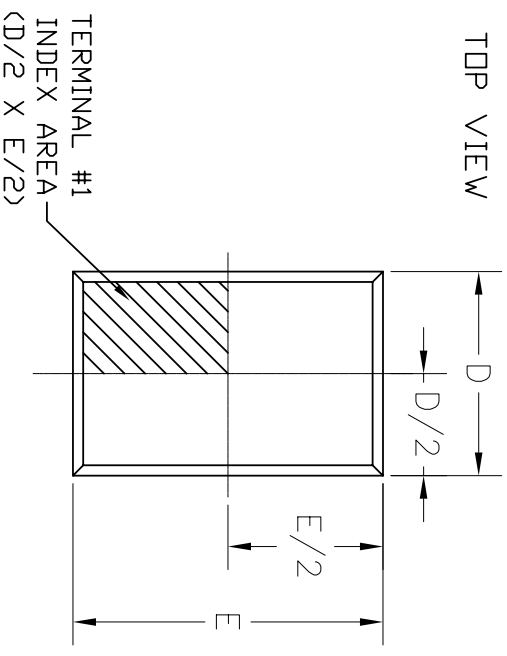


Front View

SYMBOLS	DIMENSIONS IN MM (Control Unit)			DIMENSIONS IN INCH (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	—	1.75	0.053	—	0.069
A1	0.10	—	0.25	0.004	—	0.010
A2	1.25	—	1.65	0.049	—	0.065
b	0.31	—	0.51	0.012	—	0.020
c	0.17	—	0.25	0.007	—	0.010
E	6.00	BSC	—	0.236	BSC	—
E1	3.90	BSC	—	0.154	BSC	—
e	—	1.27	BSC	—	0.050	BSC
h	0.25	—	0.50	0.010	—	0.020
L	0.40	—	1.27	0.016	—	0.050
L1	—	1.04	REF	—	0.041	REF
L2	—	0.25	BSC	—	0.010	BSC
R	0.07	—	—	0.003	—	—
R1	0.07	—	—	0.003	—	—
θ	0°	—	8°	0°	—	8°
θ1	5°	—	15°	5°	—	15°
θ2	0°	—	—	0°	—	—
D	—	4.90	BSC	—	0.193	BSC
N	—	8	—	—	8	—

		<b>EXAR CORPORATION</b>	
Packaging Approval:		8 PIN SOICN PACKAGE OUTLINE	
By: JL	Date: 11/16/07	Drawing No: 8-PIN SOICN	Revision: C
		Sheet: 1 OF 1	

REVISION HISTORY				
REV	DISCRIPTION	DATE	APP'D	
A	DRAWING ORIGINATION	08/18/05	JL	
B	MODIFY DRAWING FORMAT	07/17/06	JL	
C	ADD LAND PATTERN RECOMMENDATION	12/07/06	JL	
D	CHANGE DRAWING LOGO AND COMPANY NAME	11/21/07	JL	



8LD 2x3 DFN JEDEC MO-229 Variation VCED-2

SYMBOLS	DIMENSIONS IN MM (Control Unit)			DIMENSIONS IN INCH (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.036	0.039
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.20 REF			0.008 REF		
b	0.18	0.25	0.30	0.007	0.010	0.012
D	2.00 BSC			0.079 BSC		
D2	1.50	1.75		0.059	0.069	
E	3.00 BSC			0.118 BSC		
E2	1.60	1.90		0.063	0.075	
e	0.50 BSC			0.020 BSC		
L	0.30	0.40	0.50	0.012	0.016	0.020
K	0.20	—		0.008	—	
theta	0°		14°	0°		14°
N	8			8		
ND	4			4		

LAND PATTERN RECOMMENDATION

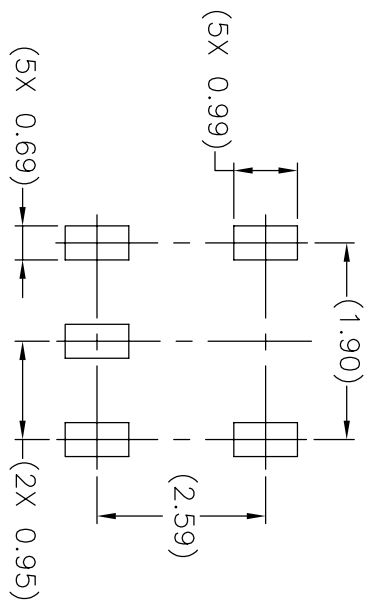
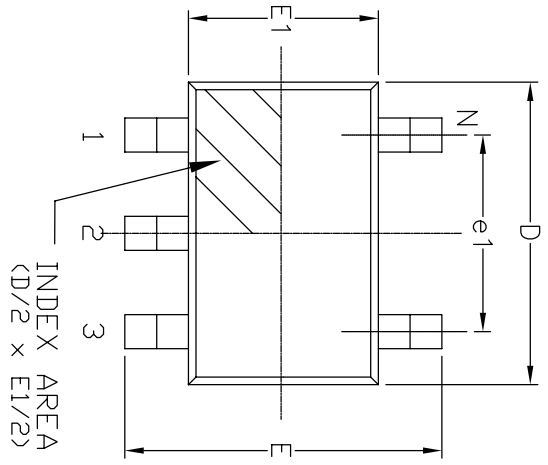
**EXAR CORPORATION**

Packaging Approval: **8 PIN 2x3 DFN PACKAGE OUTLINE**

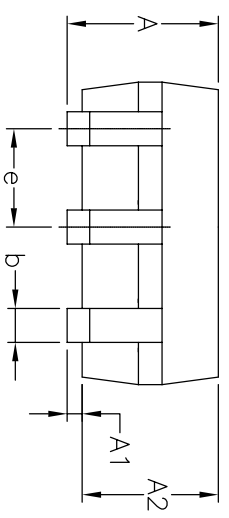
By: JL Date: 11/21/07 Drawing No.: 8-PIN 2x3 DFN Revision: D Sheet: 1 OF 1

REVISION HISTORY			
REV.	DESCRIPTION	DATE	APP'D
A	DRAWING ORIGINATOR	10/3/05	JL
B	DRAWING FORMAT MODIFICATION	07/25/06	JL
C	ADD LAND PATTERN RECOMMENDATION	11/02/06	JL
D	CHANGE DRAWING LOGO AND COMPANY NAME	11/21/07	JL

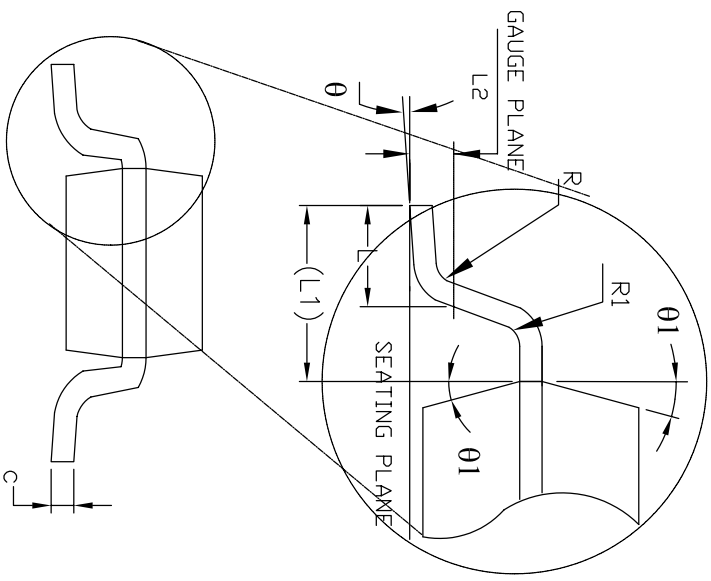
Top View



LAND PATTERN RECOMMENDATION



Side View



Front View

5 Pin SOT-23 JEDEC MO-178 Variation AA									
SYMBOLS	DIMENSIONS IN MM (Control Unit)				DIMENSIONS IN INCH (Reference Unit)				
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	MAX	
A	—	—	1.45	—	—	—	0.057	—	—
A1	0.00	—	0.15	0.000	—	—	0.006	—	—
A2	0.90	1.15	1.30	0.036	0.045	0.051	—	—	—
b	0.30	—	0.50	0.012	—	0.020	—	—	—
c	0.08	—	0.22	0.003	—	0.009	—	—	—
D	—	2.90	BSC	—	0.115	BSC	—	—	—
E	—	2.80	BSC	—	0.111	BSC	—	—	—
E1	—	1.60	BSC	—	0.063	BSC	—	—	—
e	—	0.95	BSC	—	0.038	BSC	—	—	—
e1	—	1.90	BSC	—	0.075	BSC	—	—	—
L	0.30	0.45	0.60	0.012	0.018	0.024	—	—	—
L1	—	0.60	REF	—	0.024	REF	—	—	—
L2	—	0.25	BSC	—	0.010	BSC	—	—	—
R	0.10	—	—	0.004	—	—	—	—	—
R1	0.10	—	0.25	0.004	—	0.010	—	—	—
theta	0°	4°	8°	0°	4°	8°	—	—	—
theta1	5°	10°	15°	5°	10°	15°	—	—	—
N	—	—	—	5	—	—	—	—	5

		<b>EXAR CORPORATION</b>			
				5 PIN SOT-23 PACKAGE OUTLINE	
Packaging Approval:	By: JL	Date: 11/21/07	Drawing No: 5-PIN SOT-23	Revision: D	Sheet: 1 OF 1

## ORDERING INFORMATION

Part Number	Accuracy	MSL Level	Status	Package	Pack Type	Quantity	RoHS
SPX3819S-L/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-1-8/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-2-5/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-3-0/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-3-1/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-3-3/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L-5-0/TR	0.01	L1 @ 260°C	Active	NSOIC8	Tape & Reel	2500	Yes
SPX3819S-L	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-1-8	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-2-5	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-3-0	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-3-1	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-3-3	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819S-L-5-0	0.01	L1 @ 260°C	Active	NSOIC8	TUBE	98	Yes
SPX3819M5-L	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-1-2	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-1-5	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-1-8	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-2-5	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-3-0	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-3-1	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-3-3	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L-5-0	0.01	L1 @ 260°C	Active	SOT-23-5	Not in Bulk	2500	Yes
SPX3819M5-L/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-1-2/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-1-5/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-1-8/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-2-5/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-3-0/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-3-1/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-3-3/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819M5-L-5-0/TR	0.01	L1 @ 260°C	Active	SOT-23-5	Tape & Reel	2500	Yes
SPX3819R2-L-1-2	0.01	L1 @ 250°C	CF	DFN8	Not in Bulk	3000	Yes
SPX3819R2-L-1-2/TR	0.01	L1 @ 250°C	CF	DFN8	Tape & Reel	3000	Yes
SPX3819S-L-1-2/TR	0.01	L1 @ 260°C	CF	SOIC-8	Tape & Reel	2500	Yes
SPX3819S-L-1-5/TR	0.01	L1 @ 260°C	CF	SOIC-8	Tape & Reel	2500	Yes
SPX3819S-L-1-2	0.01	L1 @ 260°C	CF	SOIC-8	TUBE	98	Yes
SPX3819S-L-1-5	0.01	L1 @ 260°C	CF	SOIC-8	TUBE	98	Yes

For further assistance:

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