

# BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5, SBAS21DW5

## High Voltage Switching Diode

### Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant
- S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Continuous Reverse Voltage BAS19, NSVBAS19 BAS20, SBAS20 BAS21, SBAS21	$V_R$	120 200 250	Vdc
Repetitive Peak Reverse Voltage BAS19, NSVBAS19 BAS20, SBAS20 BAS21, SBAS21	$V_{RRM}$	120 200 250	Vdc
Continuous Forward Current	$I_F$	200	mAdc
Peak Forward Surge Current	$I_{FM(surge)}$	625	mAdc
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	°C
Power Dissipation (Note 1)	$P_D$	385	mW
Electrostatic Discharge	ESD	HM < 500 MM < 400	V V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

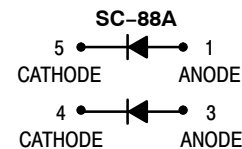
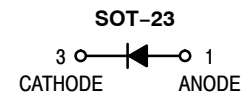
1. Mounted on FR-5 Board = 1.0 x 0.75 x 0.062 in.



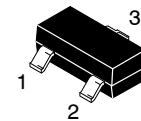
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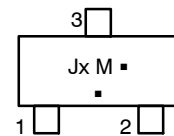
## HIGH VOLTAGE SWITCHING DIODE



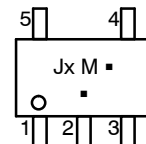
### MARKING DIAGRAMS



SOT-23 (TO-236)  
CASE 318  
STYLE 8



SC-88A (SOT-353)  
CASE 419A



- x = P, R, or S
- P = BAS19L, NSVBAS19L
- R = BAS20L, SBAS20L
- S = BAS21L, SBAS21L or BAS21DW5, SBAS21DW5
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon the manufacturing location.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

**BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5,  
SBAS21DW5**

**THERMAL CHARACTERISTICS (SOT-23)**

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction-to-Ambient (SOT-23)	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate (Note 3) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

**THERMAL CHARACTERISTICS (SC-88A)**

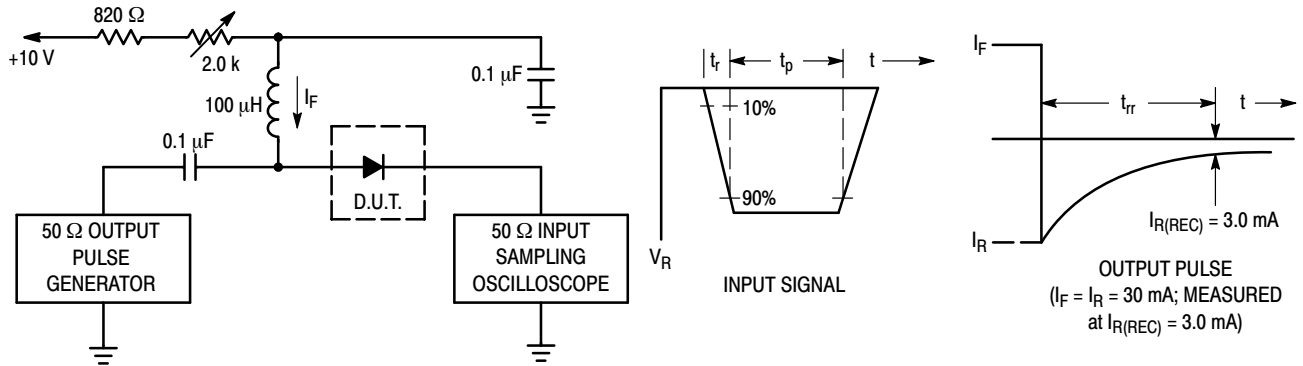
Characteristic	Symbol	Max	Unit
Power Dissipation (Note 4)	$P_D$	385	mW
Thermal Resistance - Junction-to-Ambient Derate Above $25^\circ\text{C}$	$R_{\theta JA}$	328 3.0	$^\circ\text{C}/\text{W}$ mW/ $^\circ\text{C}$
Maximum Junction Temperature	$T_{Jmax}$	150	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

2. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
3. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.
4. Mounted on FR-5 Board =  $1.0 \times 0.75 \times 0.062$  in.

**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

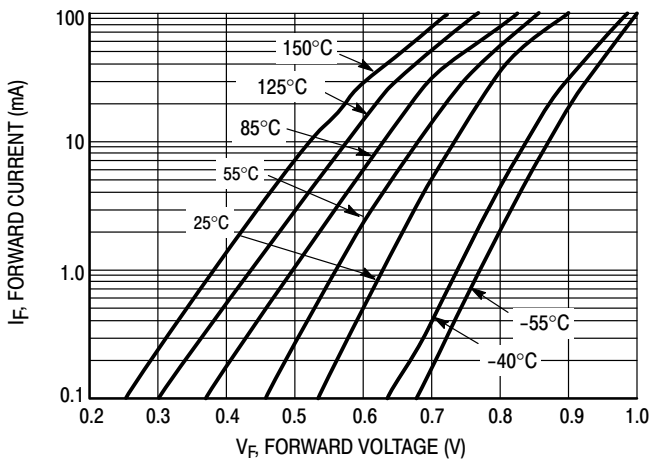
Characteristic	Symbol	Min	Max	Unit
Reverse Voltage Leakage Current ( $V_R = 100$ Vdc)      BAS19, NSVBAS19 ( $V_R = 150$ Vdc)      BAS20, SBAS20 ( $V_R = 200$ Vdc)      BAS21, SBAS21 ( $V_R = 100$ Vdc, $T_J = 150^\circ\text{C}$ )      BAS19 ( $V_R = 150$ Vdc, $T_J = 150^\circ\text{C}$ )      BAS20, SBAS20 ( $V_R = 200$ Vdc, $T_J = 150^\circ\text{C}$ )      BAS21, SBAS21	$I_R$	- - - - - -	0.1 0.1 0.1 100 100 100	$\mu\text{A}dc$
Reverse Breakdown Voltage ( $I_{BR} = 100$ $\mu\text{A}dc$ )      BAS19, NSVBAS19 ( $I_{BR} = 100$ $\mu\text{A}dc$ )      BAS20, SBAS20 ( $I_{BR} = 100$ $\mu\text{A}dc$ )      BAS21, SBAS21	$V_{(BR)}$	120 200 250	- - -	Vdc
Forward Voltage ( $I_F = 100$ mA)dc ( $I_F = 200$ mA)dc	$V_F$	- -	1.0 1.25	Vdc
Diode Capacitance ( $V_R = 0$ , $f = 1.0$ MHz)	$C_D$	-	5.0	pF
Reverse Recovery Time ( $I_F = I_R = 30$ mA)dc, $I_{R(REC)} = 3.0$ mA)dc, $R_L = 100$ )	$t_{rr}$	-	50	ns

**BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5, SBAS21DW5**

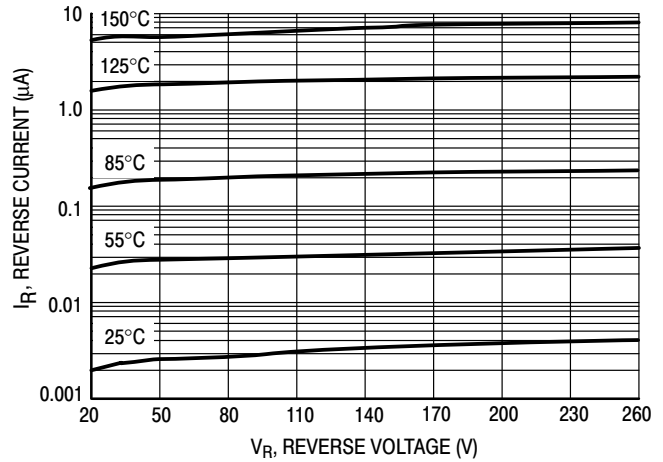


- Notes: 1. A 2.0 kΩ variable resistor adjusted for a Forward Current ( $I_F$ ) of 30 mA.  
 2. Input pulse is adjusted so  $I_{R(\text{peak})}$  is equal to 30 mA.  
 3.  $t_p \gg t_{rr}$

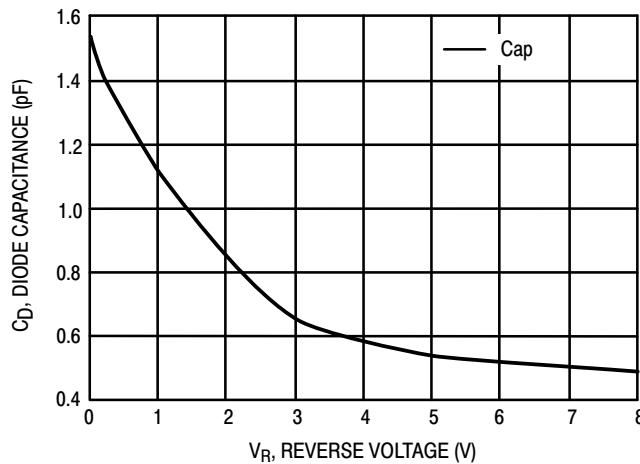
**Figure 1. Recovery Time Equivalent Test Circuit**



**Figure 2.  $V_F$  vs.  $I_F$**



**Figure 3.  $I_R$  vs.  $V_R$**



**Figure 4. Capacitance**

**BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5,  
SBAS21DW5**

**ORDERING INFORMATION**

<b>Device</b>	<b>Package</b>	<b>Shipping†</b>
BAS19LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
BAS19LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
NSVBAS19LT1G*	SOT-23 (Pb-Free)	3000 / Tape & Reel
BAS20LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
BAS20LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
SBAS20LT1G*	SOT-23 (Pb-Free)	3000 / Tape & Reel
BAS21LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
SBAS21LT1G*	SOT-23 (Pb-Free)	3000 / Tape & Reel
BAS21LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
SBAS21LT3G*	SOT-23 (Pb-Free)	10000 / Tape & Reel
BAS21DW5T1G	SC-88A (Pb-Free)	3000 / Tape & Reel
SBAS21DW5T1G*	SC-88A (Pb-Free)	3000 / Tape & Reel
SBAS21DW5T3G*	SC-88A (Pb-Free)	10000 / Tape & Reel

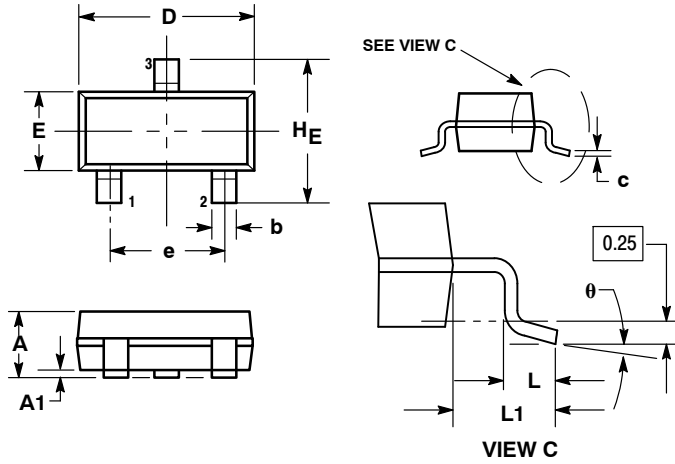
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

# BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5, SBAS21DW5

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AP

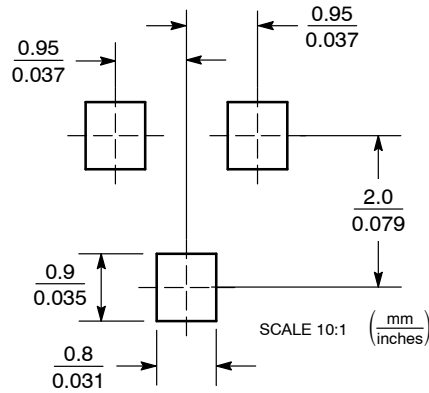


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE

### SOLDERING FOOTPRINT\*

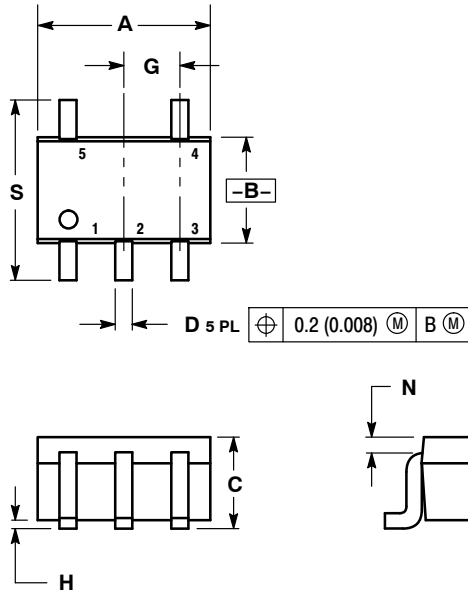


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# BAS19L, NSVBAS19L, BAS20L, SBAS20L, BAS21L, SBAS21L, BAS21DW5, SBAS21DW5

## PACKAGE DIMENSIONS

SC-88A (SC-70-5/SOT-353)  
CASE 419A-02  
ISSUE K

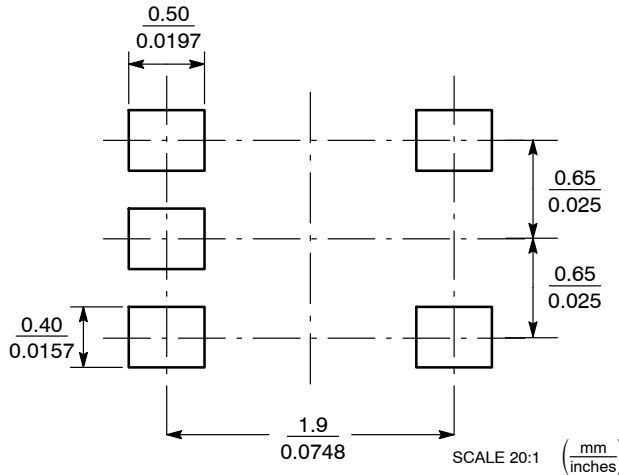


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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