

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.

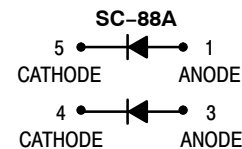
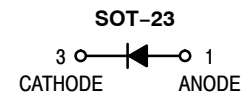
1. Mounted on FR-5 Board = 1.0 x 0.75 x 0.062 in.



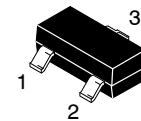
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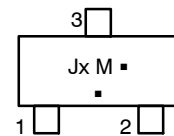
HIGH VOLTAGE SWITCHING DIODE



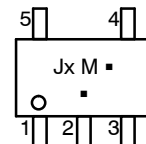
MARKING DIAGRAMS



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

THEMAL CHARACTERISTICS (SOT-23)

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225	mW
		1.8	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°C	P_D	300	mW
		2.4	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	$^\circ\text{C}$

THEMAL CHARACTERISTICS (SC-88A)

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 4)	P_D	385	mW
Thermal Resistance - Junction-to-Ambient Derate Above 25°C	$R_{\theta JA}$	328	$^\circ\text{C}/\text{W}$
		3.0	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.

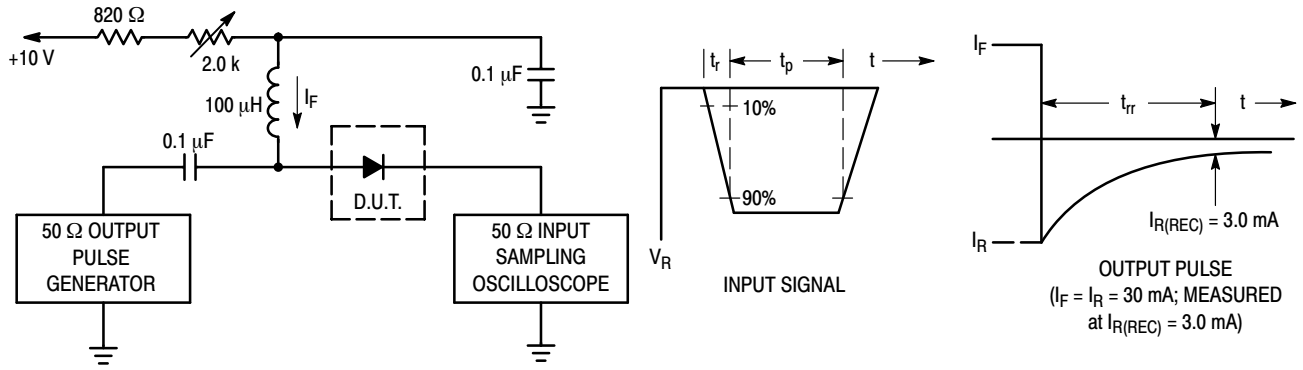
3. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.

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) ($V_R = 150$ Vdc) ($V_R = 200$ Vdc) ($V_R = 100$ Vdc, $T_J = 150^\circ\text{C}$) ($V_R = 150$ Vdc, $T_J = 150^\circ\text{C}$) ($V_R = 200$ Vdc, $T_J = 150^\circ\text{C}$)	I_R	BAS19, NSVBAS19	-	0.1	μA
		BAS20, SBAS20	-	0.1	
		BAS21, SBAS21	-	0.1	
		BAS19	-	100	
		BAS20, SBAS20	-	100	
		BAS21, SBAS21	-	100	
Reverse Breakdown Voltage ($I_{BR} = 100$ μA) ($I_{BR} = 100$ μA) ($I_{BR} = 100$ μA)	$V_{(BR)}$	BAS19, NSVBAS19	120	-	Vdc
		BAS20, SBAS20	200	-	
		BAS21, SBAS21	250	-	
Forward Voltage ($I_F = 100$ mA) ($I_F = 200$ mA)	V_F	-	1.0	Vdc	
		-	1.25		
Diode Capacitance ($V_R = 0$, $f = 1.0$ MHz)	C_D	-	5.0	pF	
Reverse Recovery Time ($I_F = I_R = 30$ mA, $I_{R(REC)} = 3.0$ mA, $R_L = 100$)	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

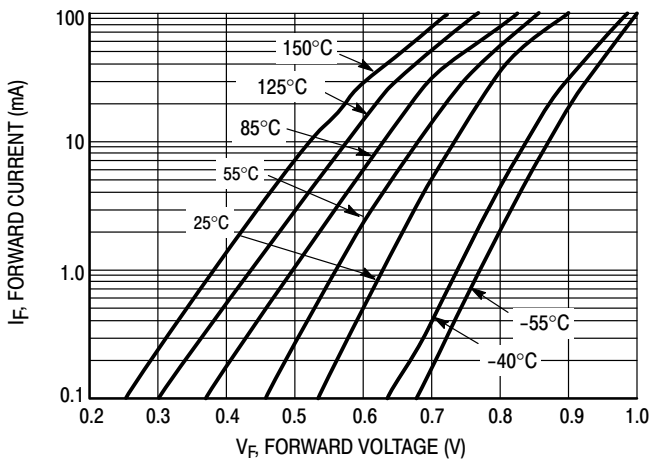


Figure 2. V_F vs. I_F

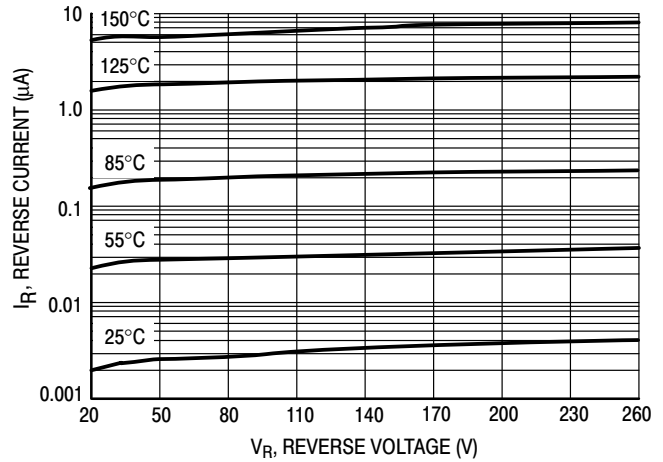


Figure 3. I_R vs. V_R

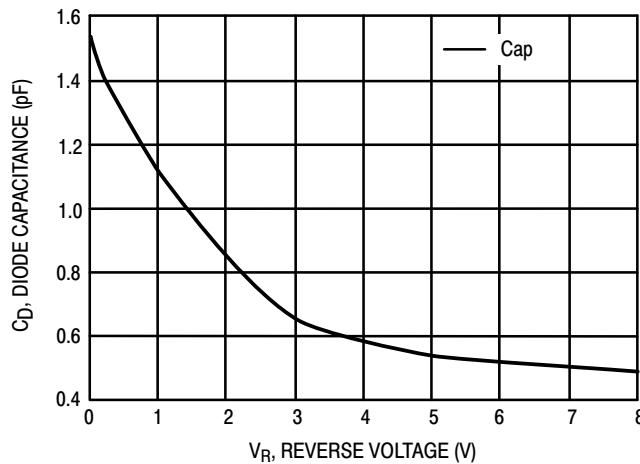


Figure 4. Capacitance

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

ORDERING INFORMATION

Device	Package	Shipping†
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

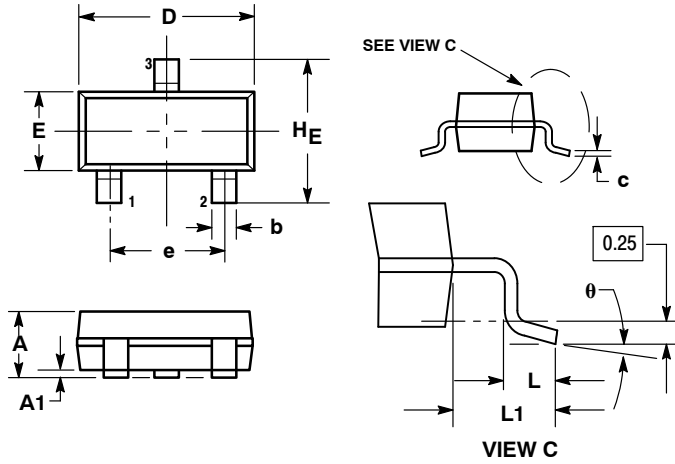
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*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

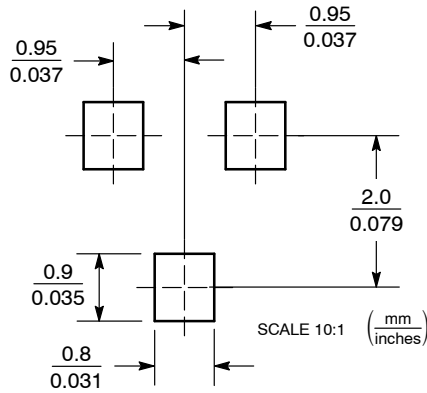


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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*

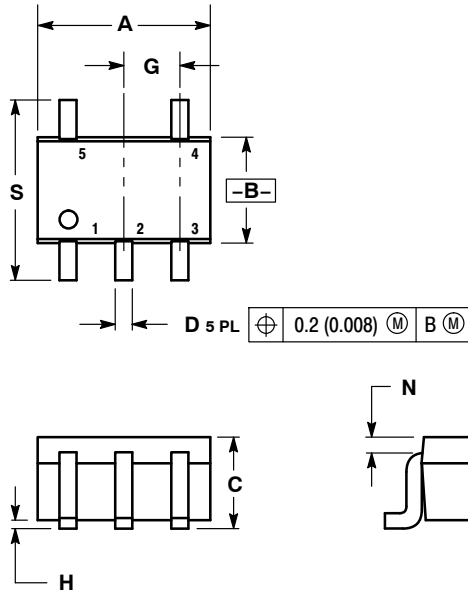


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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

PACKAGE DIMENSIONS

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

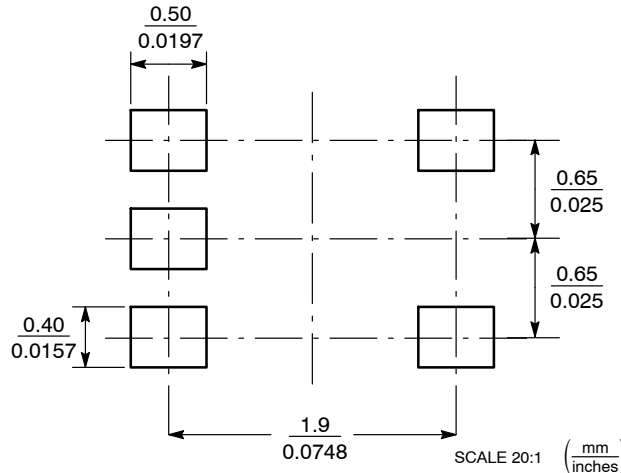


NOTES:

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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