

# BAS19L, BAS20L, BAS21L, BAS21DW5

## 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  | $V_R$          | 120<br>200<br>250    | Vdc    |
| Repetitive Peak Reverse Voltage   | $V_{RRM}$      | 120<br>200<br>250    | Vdc    |
| Continuous Forward Current  | $I_F$          | 200                  | mAdc   |
| Peak Forward Surge Current<br>(1/2 Cycle, Sine Wave, 60 Hz)                         | $I_{FSM}$      | 2                    | A      |
| Repetitive Peak Forward Current<br>(Pulse Train: $T_{ON} = 1$ s, $T_{OFF} = 0.5$ s) | $I_{FRM}$      | 0.6                  | A      |
| 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<br>MM < 400 | V<br>V |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

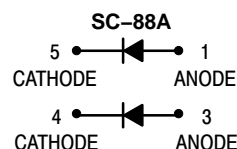
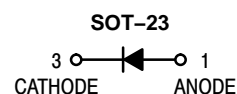
1. Mounted on FR-5 Board = 1.0 x 0.75 x 0.062 in.



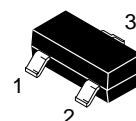
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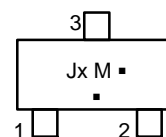
## HIGH VOLTAGE SWITCHING DIODE



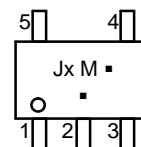
### MARKING DIAGRAMS



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



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



x = P, R, or S  
P = BAS19L  
R = BAS20L  
S = BAS21L or BAS21DW5  
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, BAS20L, BAS21L, BAS21DW5

## Thermal Characteristics (SOT-23)

| Characteristic  | Symbol          | Max         | Unit                 |
|---|-----------------|-------------|----------------------|
| Total Device Dissipation FR-5 Board<br>(Note 2)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$        | $P_D$           | 225         | mW                   |
|   |                 | 1.8         | mW/ $^\circ\text{C}$ |
| Thermal Resistance<br>Junction-to-Ambient (SOT-23)  | $R_{\theta JA}$ | 556         | $^\circ\text{C/W}$   |
| Total Device Dissipation Alumina Substrate<br>(Note 3)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 300         | mW                   |
|   |                 | 2.4         | mW/ $^\circ\text{C}$ |
| Thermal Resistance Junction-to-Ambient  | $R_{\theta JA}$ | 417         | $^\circ\text{C/W}$   |
| Junction and Storage<br>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 –<br>Junction-to-Ambient<br>Derate Above $25^\circ\text{C}$ | $R_{\theta JA}$ | 328         | $^\circ\text{C/W}$   |
|  |                 | 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 | $^\circ\text{C}$     |

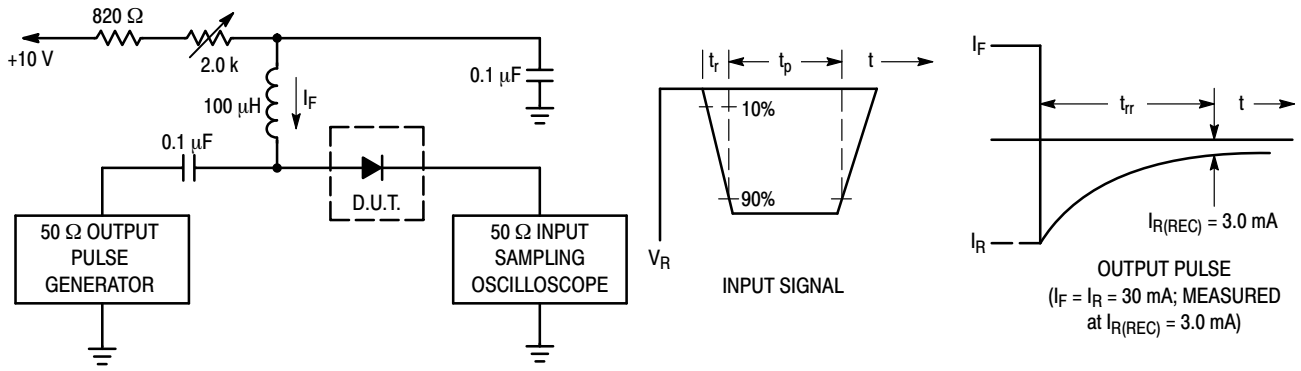
2. FR-5 = 1.0 × 0.75 × 0.062 in.
3. Alumina = 0.4 × 0.3 × 0.024 in. 99.5% alumina.
4. Mounted on FR-5 Board = 1.0 × 0.75 × 0.062 in.

## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# BAS19L, BAS20L, BAS21L, BAS21DW5



- 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.  $I_F$

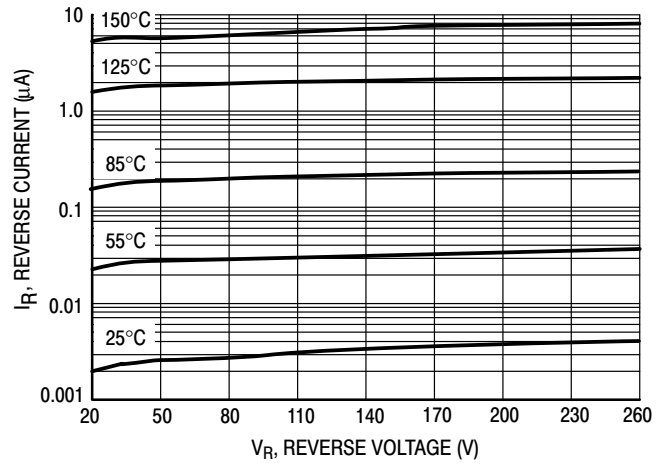


Figure 3.  $I_R$  vs.  $V_R$



Figure 4. Capacitance

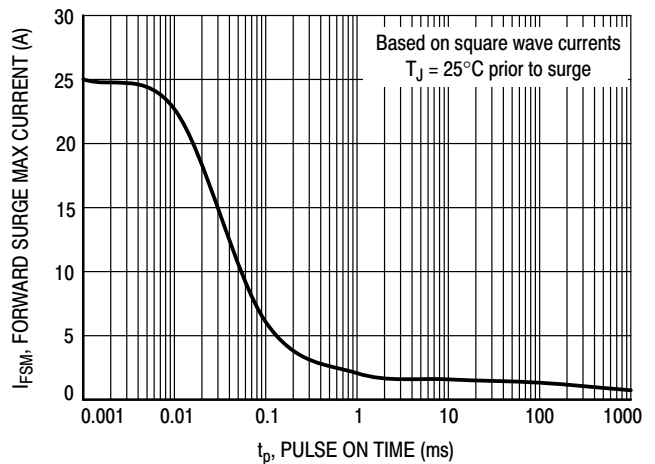


Figure 5. Forward Surge Current

## BAS19L, BAS20L, BAS21L, BAS21DW5

### ORDERING INFORMATION

| Device        | Package             | Shipping†           |
|---------------|---------------------|---------------------|
| BAS19LT1G     | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| BAS19LT3G     | SOT-23<br>(Pb-Free) | 10000 / Tape & Reel |
| NSVBAS19LT1G* | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| BAS20LT1G     | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| BAS20LT3G     | SOT-23<br>(Pb-Free) | 10000 / Tape & Reel |
| NSVBAS20LT3G* | SOT-23<br>(Pb-Free) | 10000 / Tape & Reel |
| SBAS20LT1G*   | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| BAS21LT1G     | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| SBAS21LT1G*   | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| BAS21LT3G     | SOT-23<br>(Pb-Free) | 10000 / Tape & Reel |
| SBAS21LT3G*   | SOT-23<br>(Pb-Free) | 10000 / Tape & Reel |
| BAS21DW5T1G   | SC-88A<br>(Pb-Free) | 3000 / Tape & Reel  |
| SBAS21DW5T1G* | SC-88A<br>(Pb-Free) | 3000 / Tape & Reel  |
| SBAS21DW5T3G* | SC-88A<br>(Pb-Free) | 10000 / Tape & Reel |

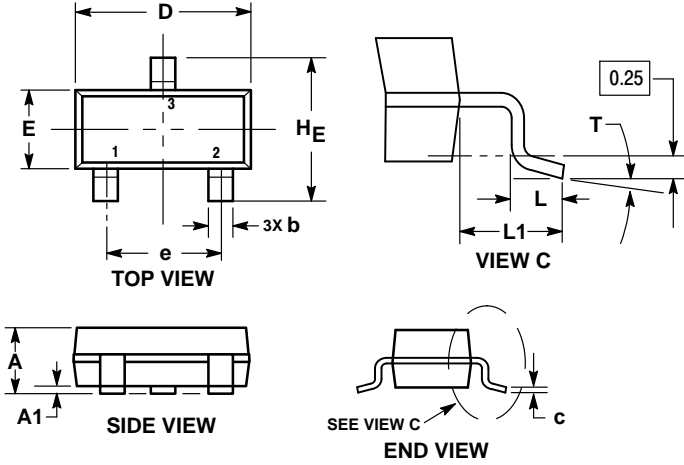
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

# BAS19L, BAS20L, BAS21L, BAS21DW5

## PACKAGE DIMENSIONS

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



NOTES:

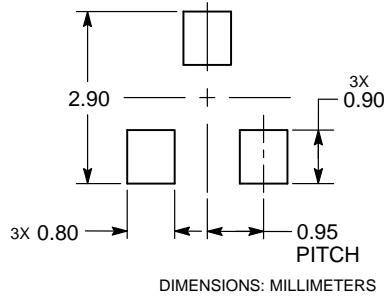
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c   | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| 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 | 0.080 |
| L   | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T   | 0°          | —    | 10°  | 0°     | —     | 10°   |

STYLE 8:

- PIN 1: ANODE
- NO CONNECTION
- CATHODE

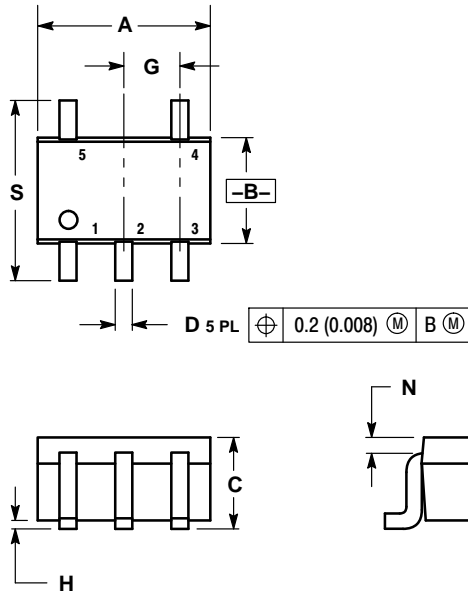
### RECOMMENDED SOLDERING FOOTPRINT



# BAS19L, BAS20L, BAS21L, BAS21DW5

## PACKAGE DIMENSIONS

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

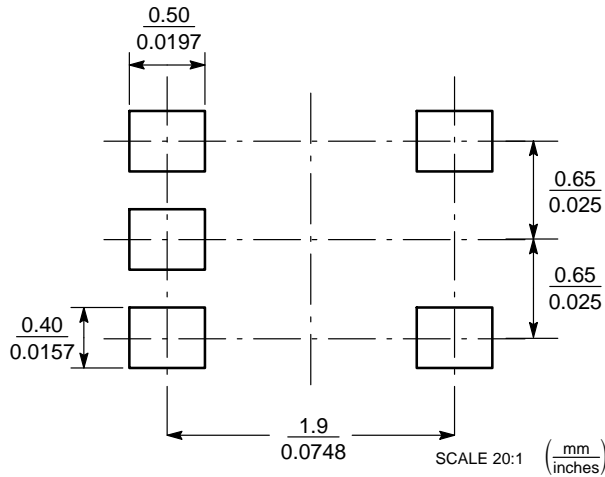


**NOTES:**

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 |

## SOLDER FOOTPRINT



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