

## 20A, 50V - 600V Super Fast Rectifier

### FEATURES

- AEC-Q101 qualified available
- High efficiency, low  $V_F$
- High current capability
- High surge current capability
- Low power loss
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

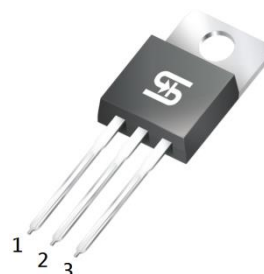
### APPLICATIONS

- DC to DC converters
- Switching mode converters and inverters
- Freewheeling application

### MECHANICAL DATA

- Case: TO-220AB
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Mounting torque: 0.56 N·m maximum
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 1.82g (approximately)

| KEY PARAMETERS |           |      |
|----------------|-----------|------|
| PARAMETER      | VALUE     | UNIT |
| $I_F$          | 20        | A    |
| $V_{RRM}$      | 50 - 600  | V    |
| $I_{FSM}$      | 150       | A    |
| $T_{J\ MAX}$   | 150       | °C   |
| Package        | TO-220AB  |      |
| Configuration  | Dual dies |      |



TO-220AB



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)        |              |             |             |             |             |             |             |             |             |      |
|------------------------------------------------------------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
| PARAMETER                                                                          | SYMBOL       | SF<br>2001G | SF<br>2002G | SF<br>2003G | SF<br>2004G | SF<br>2005G | SF<br>2006G | SF<br>2007G | SF<br>2008G | UNIT |
| Marking code on the device                                                         |              | SF<br>2001G | SF<br>2002G | SF<br>2003G | SF<br>2004G | SF<br>2005G | SF<br>2006G | SF<br>2007G | SF<br>2008G |      |
| Repetitive peak reverse voltage                                                    | $V_{RRM}$    | 50          | 100         | 150         | 200         | 300         | 400         | 500         | 600         | V    |
| Reverse voltage, total rms value                                                   | $V_{R(RMS)}$ | 35          | 70          | 105         | 140         | 210         | 280         | 350         | 420         | V    |
| Forward current                                                                    | $I_F$        | 20          |             |             |             |             |             |             |             | A    |
| Surge peak forward current, 8.3ms single half sine wave superimposed on rated load | $I_{FSM}$    | 150         |             |             |             |             |             |             |             | A    |
| Junction temperature                                                               | $T_J$        | -55 to +150 |             |             |             |             |             |             |             | °C   |
| Storage temperature                                                                | $T_{STG}$    | -55 to +150 |             |             |             |             |             |             |             | °C   |

**THERMAL PERFORMANCE**

| PARAMETER                           | SYMBOL          | TYP | UNIT |
|-------------------------------------|-----------------|-----|------|
| Junction-to-case thermal resistance | $R_{\theta JC}$ | 2.5 | °C/W |

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

| PARAMETER                                              | CONDITIONS                                                                                                                         | SYMBOL   | TYP | MAX   | UNIT          |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------|-----|-------|---------------|
| Forward voltage per diode <sup>(1)</sup>               | SF2001G<br>SF2002G<br>SF2003G<br>SF2004G<br>SF2005G<br>SF2006G<br>SF2007G<br>SF2008G<br>$I_F = 10\text{A}, T_J = 25^\circ\text{C}$ | $V_F$    | -   | 0.975 | V             |
|                                                        |                                                                                                                                    |          | -   | 1.300 | V             |
|                                                        |                                                                                                                                    |          | -   | 1.700 | V             |
|                                                        |                                                                                                                                    |          | -   | 5     | $\mu\text{A}$ |
| Reverse current @ rated $V_R$ per diode <sup>(2)</sup> | $T_J = 25^\circ\text{C}$                                                                                                           | $I_R$    | -   | 400   | $\mu\text{A}$ |
|                                                        | $T_J = 125^\circ\text{C}$                                                                                                          |          | -   | 35    | ns            |
| Junction capacitance per diode                         | 1MHz, $V_R = 4.0\text{V}$                                                                                                          | $C_J$    | 80  | -     | pF            |
| Reverse recovery time                                  | $I_F = 0.5\text{A}, I_R = 1.0\text{A}, I_{rr} = 0.25\text{A}$                                                                      | $t_{rr}$ | -   | 35    | ns            |

**Notes:**

1. Pulse test with  $PW = 0.3\text{ms}$
2. Pulse test with  $PW = 30\text{ms}$

**ORDERING INFORMATION**

| ORDERING CODE <sup>(1)(2)</sup> | PACKAGE  | PACKING   |
|---------------------------------|----------|-----------|
| SF20xG                          | TO-220AB | 50 / Tube |
| SF20xGH                         | TO-220AB | 50 / Tube |

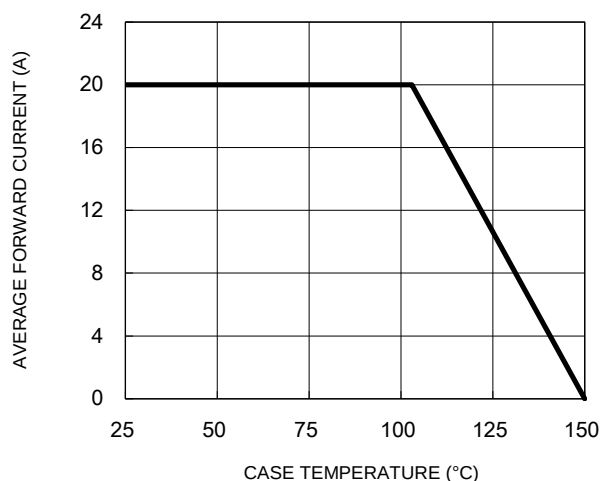
**Notes:**

1. "x" defines voltage from 50V(SF2001G) to 600V(SF2008G)
2. "H" means AEC-Q101 qualified

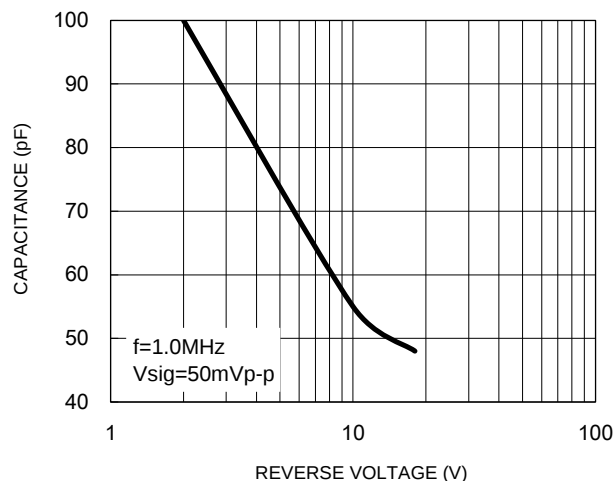
## CHARACTERISTICS CURVES

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

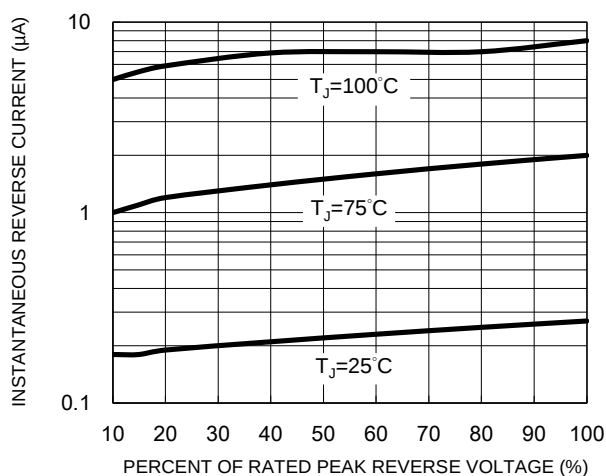
**Fig.1 Forward Current Derating Curve**



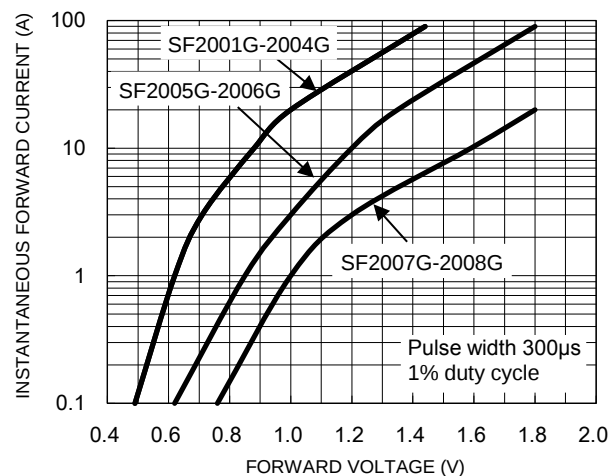
**Fig.2 Typical Junction Capacitance**



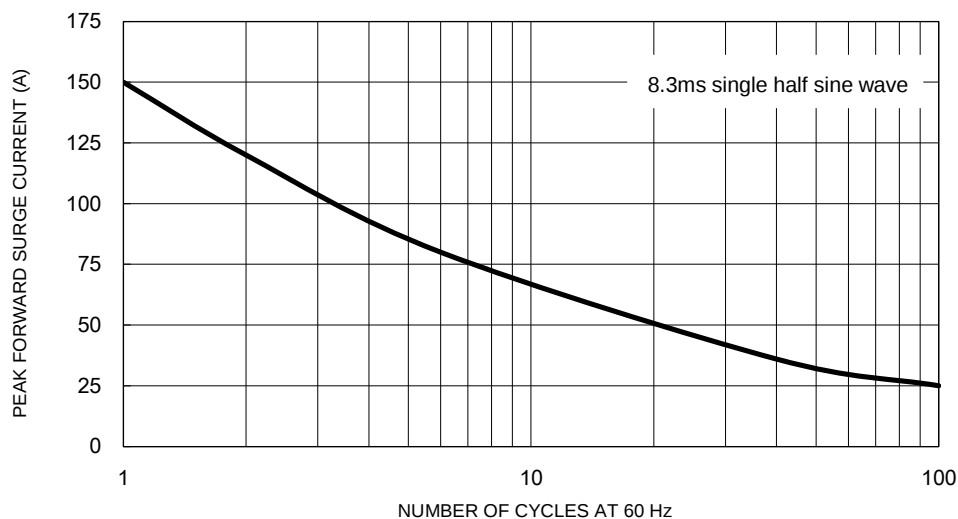
**Fig.3 Typical Reverse Characteristics**



**Fig.4 Typical Forward Characteristics**



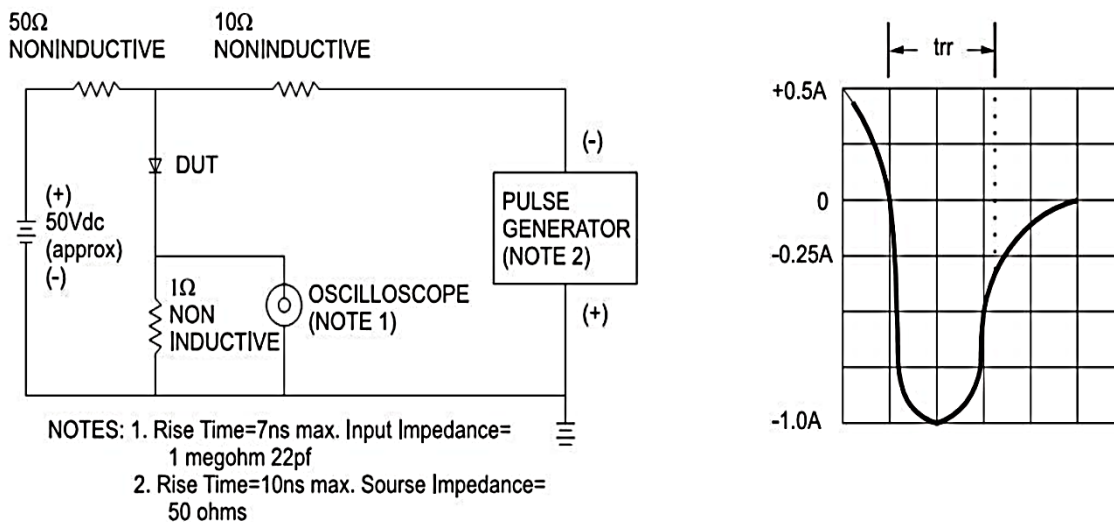
**Fig.5 Maximum Non-Repetitive Forward Surge Current**



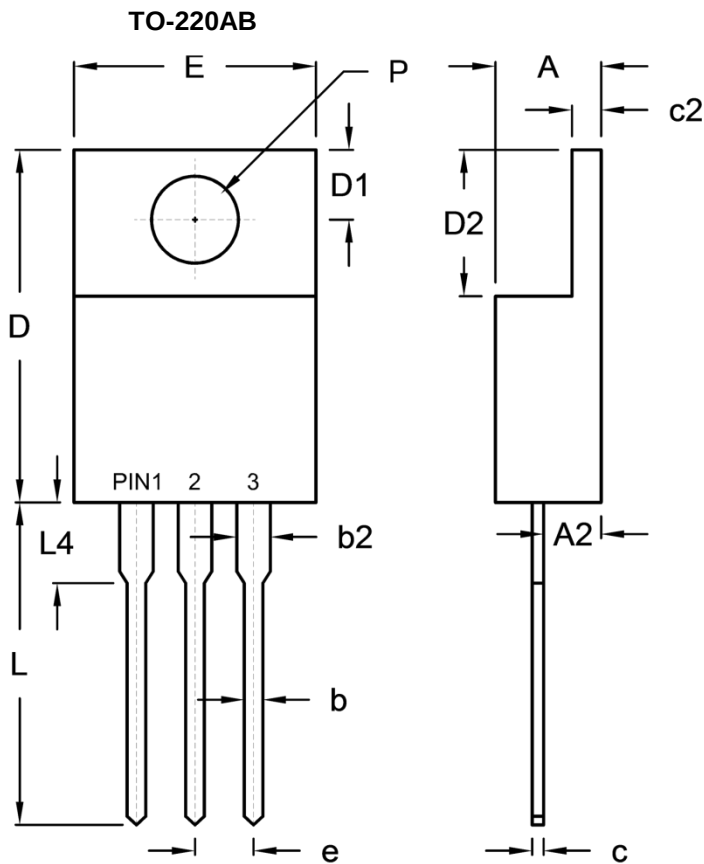
## CHARACTERISTICS CURVES

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

**Fig.6 Reverse Recovery Time Characteristic and Test Circuit Diagram**



## PACKAGE OUTLINE DIMENSIONS



| DIM. | Unit (mm) |       | Unit (inch) |       |
|------|-----------|-------|-------------|-------|
|      | Min.      | Max.  | Min.        | Max.  |
| A    | 4.42      | 4.76  | 0.174       | 0.187 |
| A2   | 2.20      | 2.80  | 0.087       | 0.110 |
| b    | 0.68      | 0.94  | 0.027       | 0.037 |
| b2   | 1.14      | 1.77  | 0.045       | 0.070 |
| c    | 0.35      | 0.64  | 0.014       | 0.025 |
| c2   | 1.14      | 1.40  | 0.045       | 0.055 |
| D    | 14.60     | 16.00 | 0.575       | 0.630 |
| D1   | 2.62      | 3.44  | 0.103       | 0.135 |
| D2   | 5.84      | 6.86  | 0.230       | 0.270 |
| E    | -         | 10.50 | -           | 0.413 |
| e    | 2.41      | 2.67  | 0.095       | 0.105 |
| L    | 13.19     | 14.79 | 0.519       | 0.582 |
| L4   | 2.80      | 4.20  | 0.110       | 0.165 |
| P    | 3.54      | 4.00  | 0.139       | 0.157 |

## MARKING DIAGRAM



P/N = Marking Code  
G = Green Compound  
YWW = Date Code  
F = Factory Code

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