



## BAT20J

### HIGH EFFICIENCY SWITCHING AND ULTRA LOW LEAKAGE CURRENT SCHOTTKY DIODE

#### MAIN PRODUCT CHARACTERISTICS

|                                      |               |
|--------------------------------------|---------------|
| <b>I<sub>F(AV)</sub></b>             | <b>1 A</b>    |
| <b>V<sub>RRM</sub></b>               | <b>23 V</b>   |
| <b>I<sub>R</sub> 25°C(max) @ 15V</b> | <b>12 µA</b>  |
| <b>T<sub>j</sub> (max)</b>           | <b>150 °C</b> |

#### FEATURES AND BENEFITS

- Low conduction losses
- Very low reverse current
- Negligible switching losses
- Low capacitance diode
- Low forward and reverse recovery times
- Extremely fast switching
- Surface mount device

#### DESCRIPTION

The BAT20J is using 23V schottky barrier diode encapsulated on a SOD-323 package. This is specially suited for switching mode in mobile phone and PDA power management applications or LED driver circuits (step up converters).

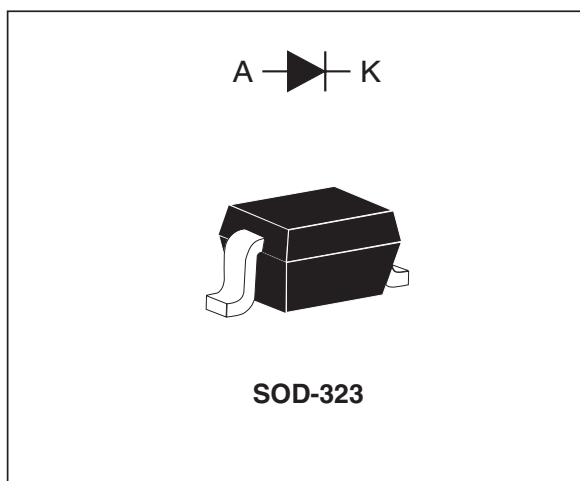
#### ABSOLUTE RATINGS (limiting values)

| Symbol              | Parameter                                                              | Value        | Unit |
|---------------------|------------------------------------------------------------------------|--------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                                        | 23           | V    |
| I <sub>F(RMS)</sub> | Repetitive peak forward current                                        | 2            | A    |
| I <sub>F(AV)</sub>  | Average forward current                                                | 1            | A    |
|                     | δ = 0.38                                                               |              |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current (t <sub>p</sub> =10ms sinusoidal) | 5            | A    |
| T <sub>stg</sub>    | Maximum storage temperature range                                      | - 65 to +150 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature *                               | 150          | °C   |
| TL                  | Maximum temperature for soldering during *                             | 260          | °C   |

\* :  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th}(j - a)}$  thermal runaway condition for a diode on its own heatsink

#### Order code

| Part Number | Marking |
|-------------|---------|
| BAT20JFILM  | 20      |



## BAT20J

### THERMAL RESISTANCE

| Symbol        | Parameter               | Value | Unit |
|---------------|-------------------------|-------|------|
| $R_{th(j-a)}$ | Junction to Ambient (*) | 600   | °C/W |

(\*) Mounted on epoxy board without copper heat sink.

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol     | Parameters                                      | Tests conditions         |                                                                     | Min. | Typ.                 | Max.                 | Unit          |
|------------|-------------------------------------------------|--------------------------|---------------------------------------------------------------------|------|----------------------|----------------------|---------------|
| $I_R^*$    | Reverse leakage current<br>(see <b>note 1</b> ) | $T_j = 25^\circ\text{C}$ | $V_R = 5\text{ V}$<br>$V_R = 8\text{ V}$<br>$V_R = 15\text{ V}$     |      | 0.65<br>0.88<br>3.00 | 2<br>3<br>12         | $\mu\text{A}$ |
| $I_R^*$    | Reverse leakage current                         | $T_j = 85^\circ\text{C}$ | $V_R = 5\text{ V}$<br>$V_R = 8\text{ V}$<br>$V_R = 15\text{ V}$     |      | 55<br>70<br>120      | 120<br>150<br>250    |               |
| $V_F^{**}$ | Forward voltage drop                            | $T_j = 25^\circ\text{C}$ | $I_F = 10\text{ mA}$<br>$I_F = 100\text{ mA}$<br>$I_F = 1\text{ A}$ |      | 0.28<br>0.35<br>0.54 | 0.31<br>0.40<br>0.62 | V             |

\* Pulse test  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

\*\* Pulse test  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

**Note 1:**  $I_R$  at 23 V and  $T_j = 25^\circ\text{C}$  is equal to 60  $\mu\text{A}$  typ.

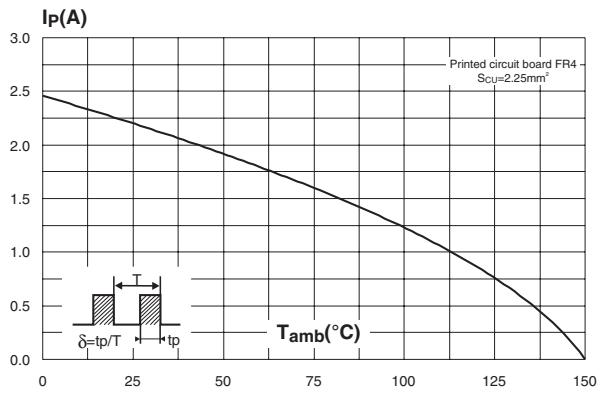
### DYNAMIC ELECTRICAL CHARACTERISTICS

| Symbol | Parameters        | Tests conditions                      | Min. | Typ. | Max. | Unit |
|--------|-------------------|---------------------------------------|------|------|------|------|
| $C_d$  | Diode capacitance | $V_R = 5\text{ V}$ $F = 1\text{ MHz}$ |      | 20   | 30   | pF   |

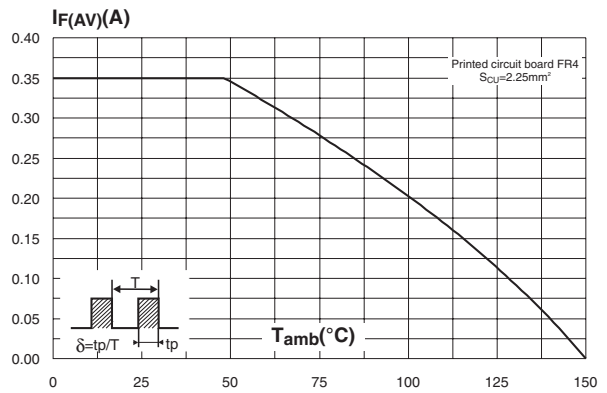
To evaluate the maximum conduction losses, use the following equations :

$$P = 0.32 \times I_{F(AV)} + 0.23 \times I_{F(RMS)}^2$$

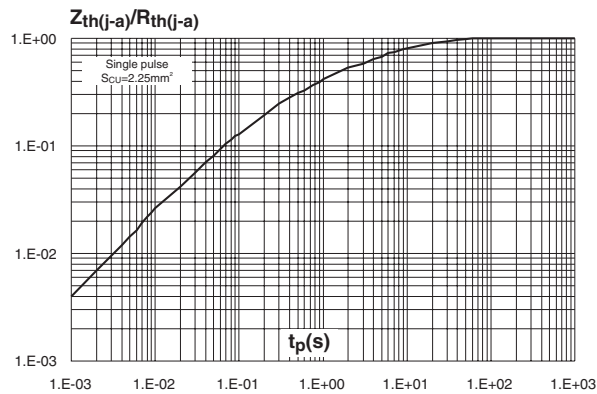
**Fig. 1:** Peak forward current versus ambient temperature ( $\delta = 0.11$ ).



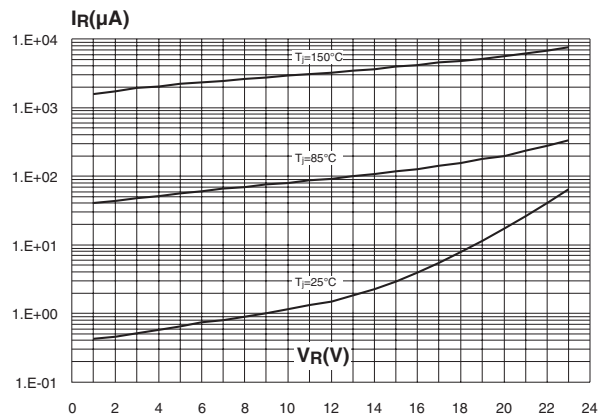
**Fig. 2:** Average forward current versus ambient temperature ( $\delta = 0.5$ ).



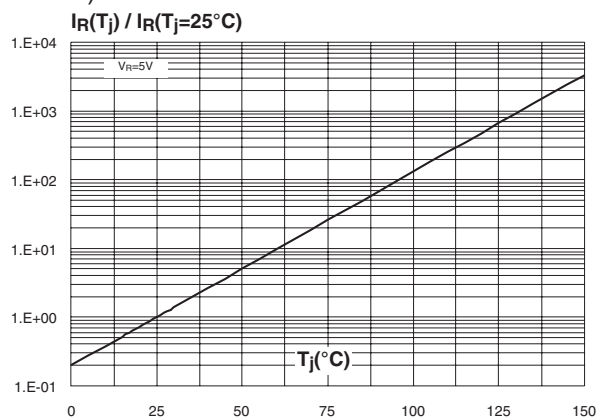
**Fig. 3:** Relative variation of thermal impedance junction to ambient versus pulse duration.



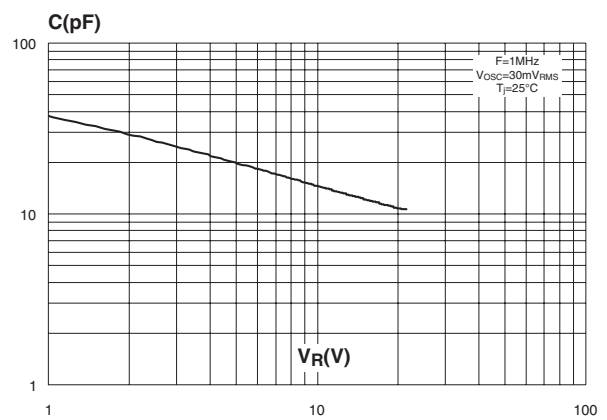
**Fig. 4:** Reverse leakage current versus reverse voltage applied (typical values).



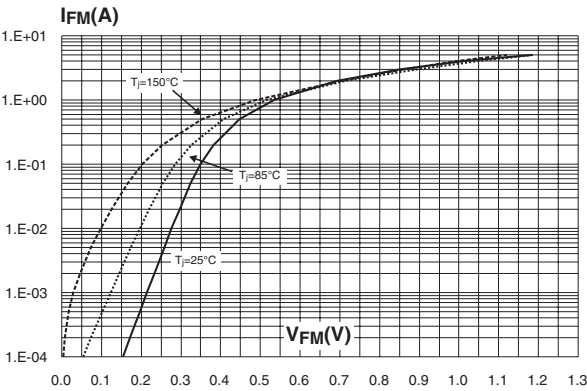
**Fig. 5:** Relative variation of reverse leakage current versus junction temperature (typical values).



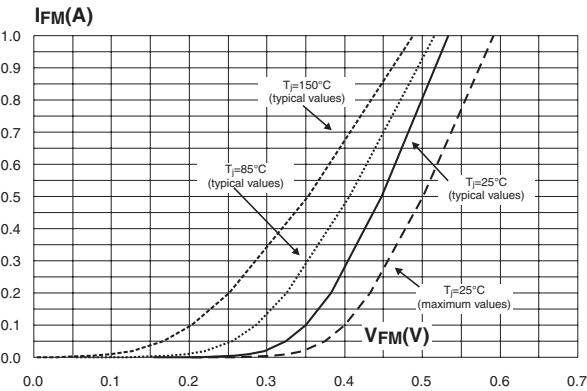
**Fig. 6:** Junction capacitance versus reverse voltage applied (typical values).



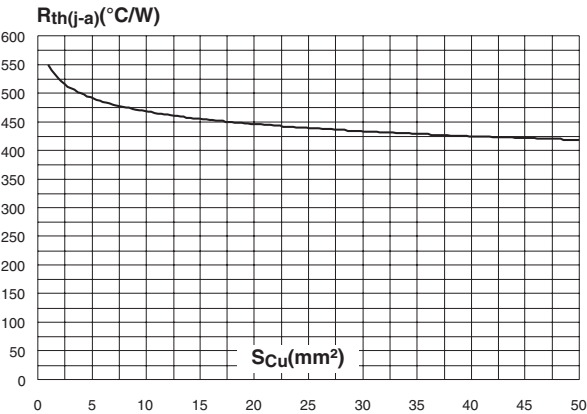
**Fig. 7-1:** Forward voltage drop versus forward current (typical values, high level).



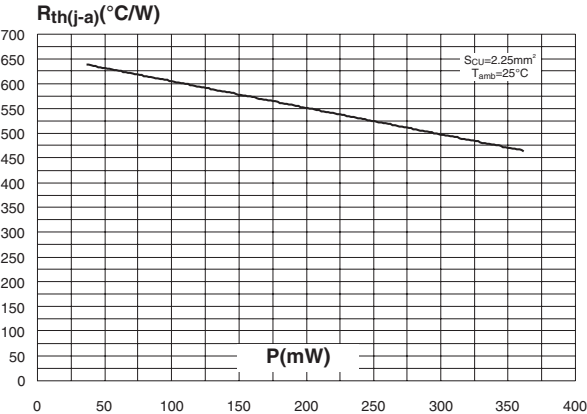
**Fig. 7-2:** Forward voltage drop versus forward current (low level).



**Fig. 8:** Thermal resistance junction to ambient versus copper surface under tab (epoxy printed circuit board FR4,  $e_{CU}=35\mu m$ , typical values).



**Fig. 9:** Thermal resistance junction to ambient versus power dissipation (epoxy printed circuit board FR4,  $e_{CU}=35\mu m$ , typical values).



**PACKAGE MECHANICAL DATA**  
**SOD-323**

| REF. | DIMENSIONS  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    |             | 1.13 |        | 0.045 |
| A1   | 0           | 0.1  | 0      | 0.004 |
| b    | 0.25        | 0.44 | 0.01   | 0.017 |
| c    | 0.1         | 0.25 | 0.004  | 0.01  |
| D    | 1.52        | 1.8  | 0.06   | 0.071 |
| E    | 1.11        | 1.35 | 0.044  | 0.053 |
| H    | 2.3         | 2.7  | 0.09   | 0.106 |
| L    | 0.1         | 0.46 | 0.004  | 0.02  |
| Q1   | 0.1         | 0.41 | 0.004  | 0.016 |

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|---------|---------|--------|----------|---------------|
| BAT20JFILM    | 20      | SOD-323 | 0.005g | 3000     | Tape & reel   |

- Epoxy meets UL94,V0

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