# BAT20J

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

### MAIN PRODUCT CHARACTERISTICS

| | |
|---|---|
| $I_{F(AV)}$ | 1 A |
| $V_{RRM}$ | 23 V |
| $I_R$ 25°C(max) @ 15V | 12 µA |
| Tj (max) | 150 °C |


**SOD-323**

### 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 |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 23 | V |
| $I_{F(RMS)}$ | Repetitive peak forward current | | 2 | A |
| $I_{F(AV)}$ | Average forward current | $\delta = 0.38$ | 1 | A |
| $I_{FSM}$ | Surge non repetitive forward current ($t_p$=10ms sinusoidal) | | 5 | A |
| $T_{stg}$ | Maximum storage temperature range | | - 65 to +150 | °C |
| Tj | Maximum operating junction temperature * | | 150 | °C |
| TL | Maximum temperature for soldering during * | | 260 | °C |

* : $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ thermal runaway condition for a diode on its own heatsink

### Order code

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

April 2004 - Ed: 1

## 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 (see **note 1**) | Tj = 25°C | $V_R$ = 5 V<br>$V_R$ = 8 V<br>$V_R$ = 15 V | | 0.65<br>0.88<br>3.00 | 2<br>3<br>12 | µA |
| $I_R$ * | Reverse leakage current | Tj = 85°C | $V_R$ = 5 V<br>$V_R$ = 8 V<br>$V_R$ = 15 V | | 55<br>70<br>120 | 120<br>150<br>250 | |
| $V_F$ ** | Forward voltage drop | Tj = 25°C | $I_F$ = 10 mA<br>$I_F$ = 100 mA<br>$I_F$ = 1 A | | 0.28<br>0.35<br>0.54 | 0.31<br>0.40<br>0.62 | V |

* Pulse test tp = 380 µs, $\delta < 2\%$

** Pulse test tp = 5 ms, $\delta < 2\%$

**Note 1:** $I_R$ at 23 V and Tj = 25°C is equal to 60 µA typ.

## DYNAMIC ELECTRICAL CHARACTERISTICS

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

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

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

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

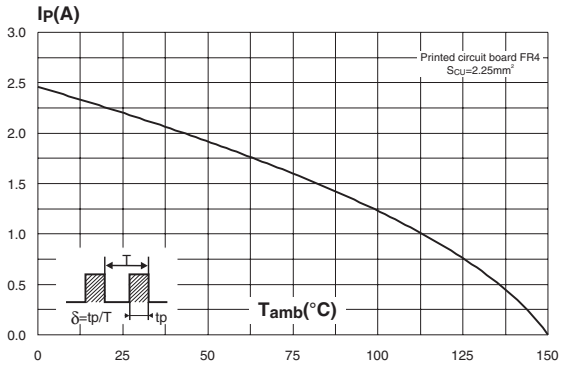



**Fig. 2:** Average forward current versus ambient temperature ( $\delta = 0.5$).

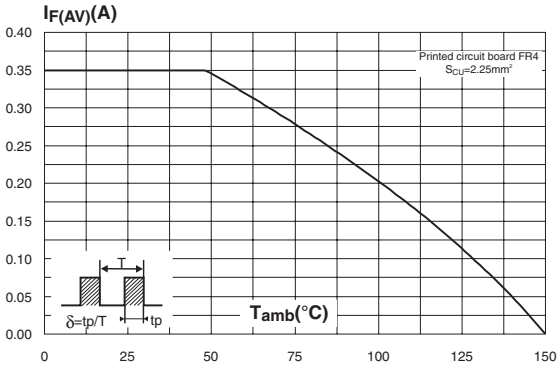



**Fig. 3:** Relative variation of thermal impedance junction to ambient versus pulse duration .

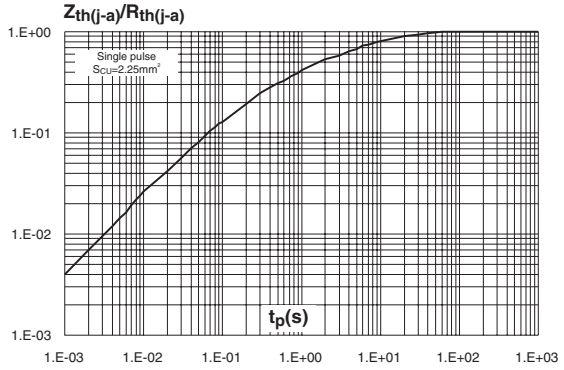



**Fig. 4:** Reverse leakage currrent versus reverse voltage applied (typical values).

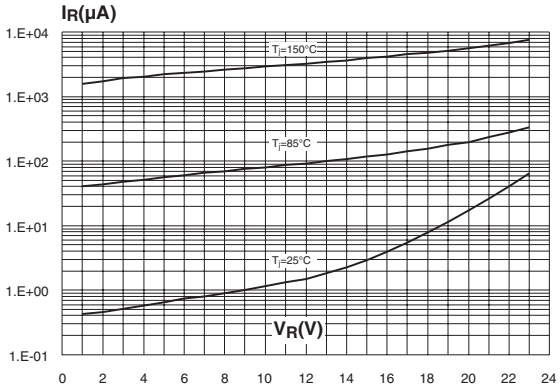



**Fig. 5:** Relative variation of reverse leakage currrent versus junction temperature (typical values).

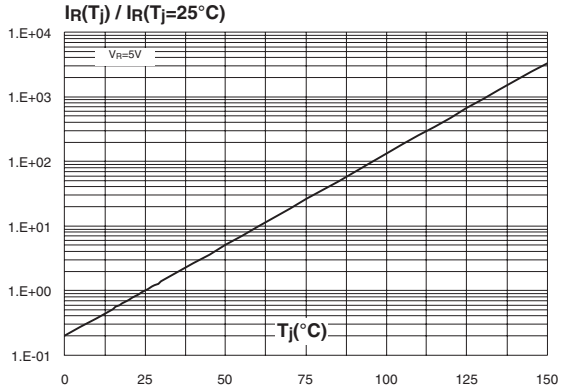



**Fig. 6:** Junction capacitance versus reverse voltage applied (typical values).

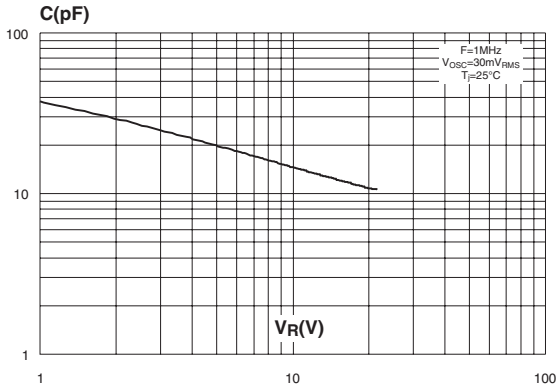


**Fig. 7-1:** Forward voltage drop versus forward current (typical values, high level).

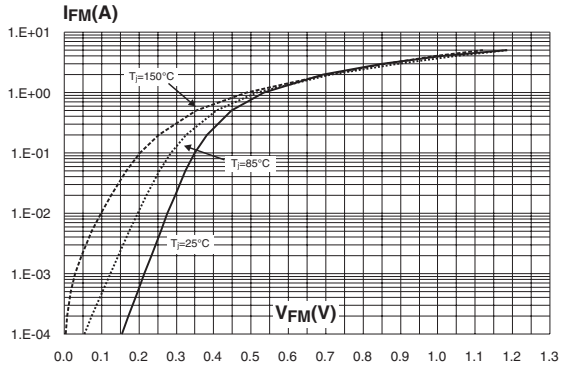



**Fig. 7-2:** Forward voltage drop versus forward current (low level).

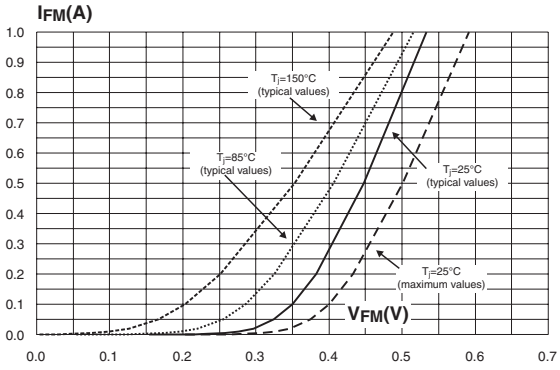



**Fig. 8:** Thermal resistance junction to ambient versus copper surface under tab (epoxy printed circuit board FR4, $e_{CU}$=35µm, typical values).

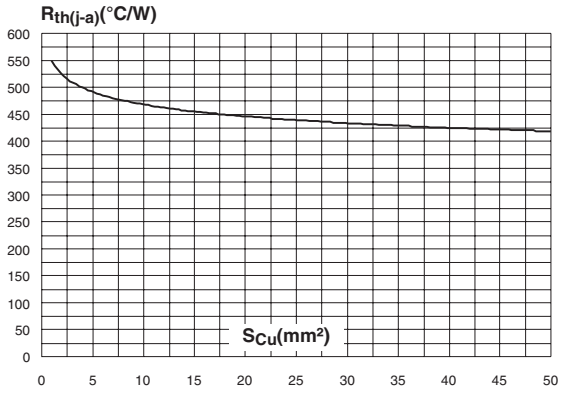
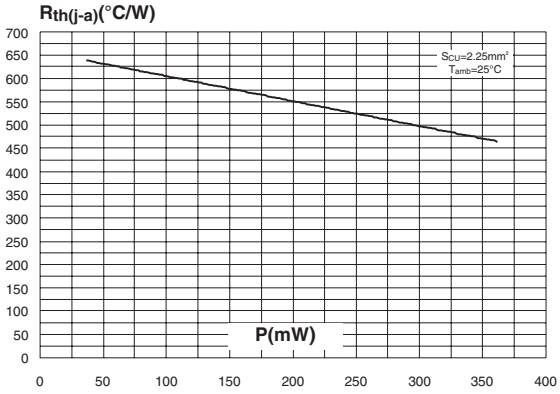
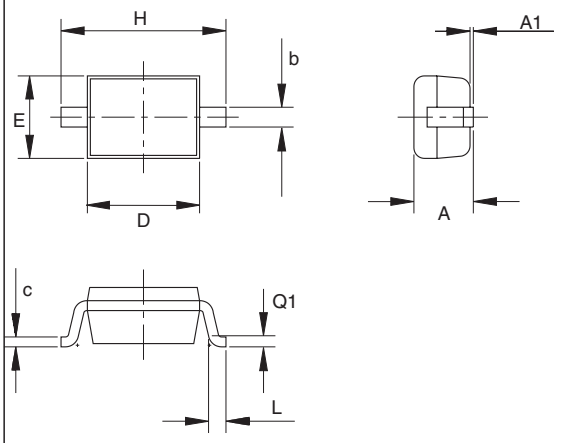



**Fig. 9:** Thermal resistance junction to ambient versus power dissipation (epoxy printed circuit board FR4, $e_{CU}$=35µm, typical values).



## 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