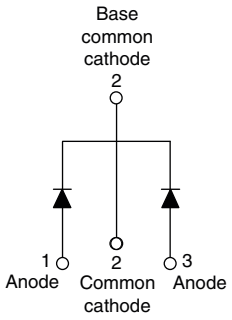
## Schottky Rectifier, 2 x 30 A

TO-220AB




### FEATURES

- 175 °C $T_J$ operation
- Low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE Available

### DESCRIPTION

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

| PRODUCT SUMMARY | |
|---|---|
| Package | TO-220AB |
| $I_{F(AV)}$ | 2 x 30 A |
| $V_R$ | 100 V |
| $V_F$ at $I_F$ | 0.69 V |
| $I_{RM}$ max. | 20 mA at 125 °C |
| $T_J$ max. | 175 °C |
| Diode variation | Common cathode |
| $E_{AS}$ | 11.25 mJ |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform (per device) | 60 | A |
| $V_{RRM}$ | | 100 | V |
| $I_{FRM}$ | $T_C$ = 139 °C (per leg) | 60 | A |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 1500 | |
| $V_F$ | 30 $A_{pk}$, $T_J$ = 125 °C | 0.69 | V |
| $T_J$ | Range | - 65 to 175 | °C |

| VOLTAGE RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | VS-63CTQ100GPbF | VS-63CTQ100G-N3 | UNITS |
| Maximum DC reverse voltage | $V_R$ | 100 | 100 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average forward current | per leg | $I_{F(AV)}$ | 50 % duty cycle at $T_C$ = 139 °C, rectangular waveform | | 30 | A |
| | per device | | | | 60 | |
| Peak repetitive forward current per leg | | $I_{FRM}$ | Rated $V_R$, square wave, 20 kHz, $T_C$ = 140 °C | | 60 | |
| Maximum peak one cycle non-repetitive surge current per leg | | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 1500 | |
| | | | 10 ms sine or 6 ms rect. pulse | | 300 | |
| Non-repetitive avalanche energy per leg | | $E_{AS}$ | $T_J$ = 25 °C, $I_{AS}$ = 0.75 A, L = 40 mH | | 11.25 | mJ |
| Repetitive avalanche current per leg | | $I_{AR}$ | Current decaying linearly to zero in 1 µs<br>Frequency limited by $T_J$ maximum $V_A$ = 1.5 x $V_R$ typical | | 0.75 | A |

## ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Maximum forward voltage drop | $V_{FM}$ (1) | 30 A | $T_J$ = 25 °C | 0.78 | 0.82 | V |
| | | 60 A | | 0.94 | 1.0 | |
| | | 30 A | $T_J$ = 125 °C | 0.64 | 0.69 | |
| | | 60 A | | 0.78 | 0.83 | |
| Maximum instantaneous reverse current | $I_{RM}$ | $T_J$ = 25 °C | $V_R$ = Rated $V_R$ | 0.02 | 0.3 | mA |
| | | $T_J$ = 125 °C | | 11 | 20 | |
| Maximum junction capacitance | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | | 1100 | | pF |
| Typical series inductance | $L_S$ | Measured from top of terminal to mounting plane | | 8.0 | | nH |
| Maximum voltage rate of change | dV/dt | Rated $V_R$ | | 10 000 | | V/µs |

**Note**

(1) Pulse width < 300 µs, duty cycle < 2 %

## THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|---|
| Maximum junction and storage temperature range | | $T_J$, $T_{Stg}$ | | - 65 to 175 | °C |
| Maximum thermal resistance, junction to case per leg | | $R_{thJC}$ | DC operation | 1.2 | °C/W |
| Typical thermal resistance, case to heatsink | | $R_{thCS}$ | Mounting surface, smooth and greased | 0.50 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | Non-lubricated threads | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | | Case style TO-220AB | 63CTQ100G | |

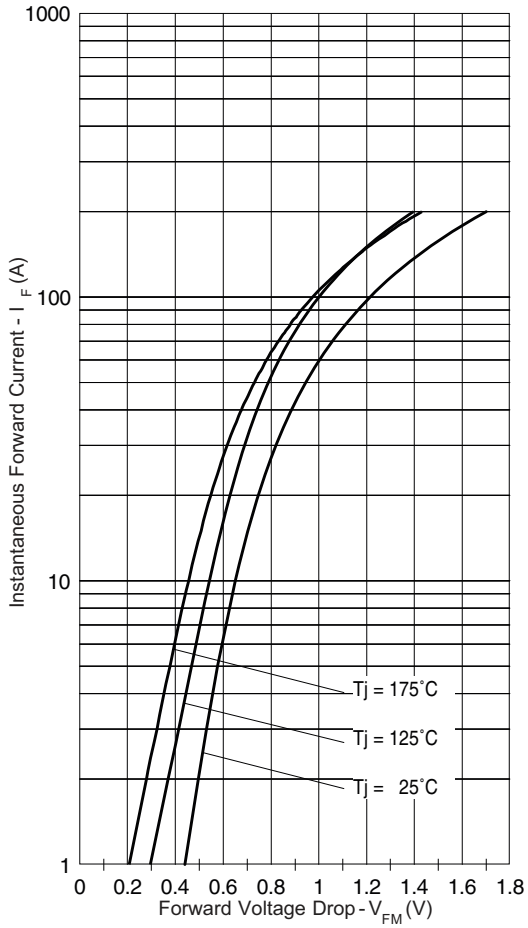



Fig. 1 - Maximum Forward Voltage Drop Characteristics

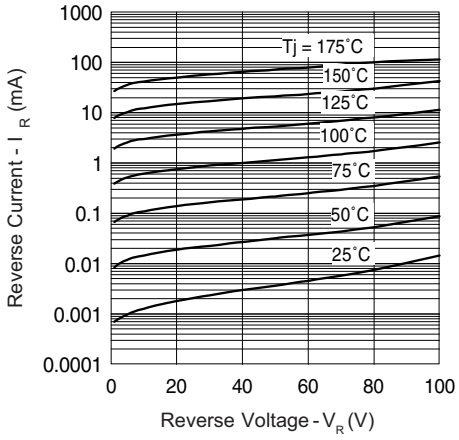



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

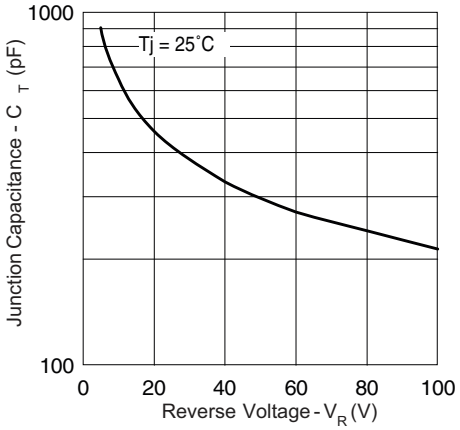



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

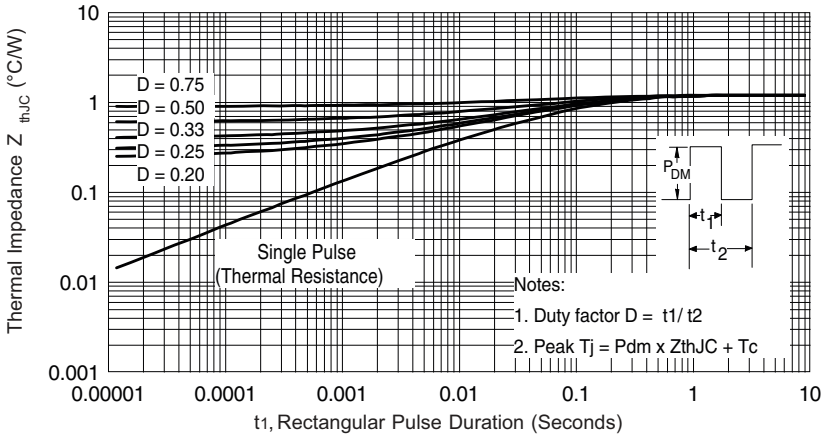



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics

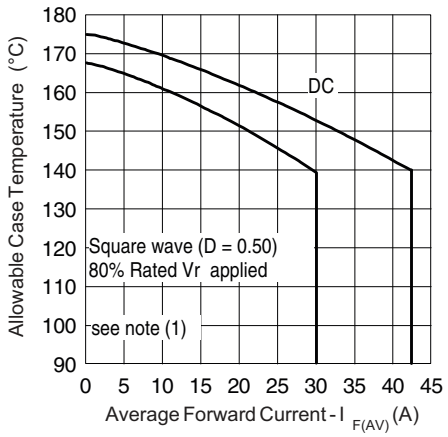



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

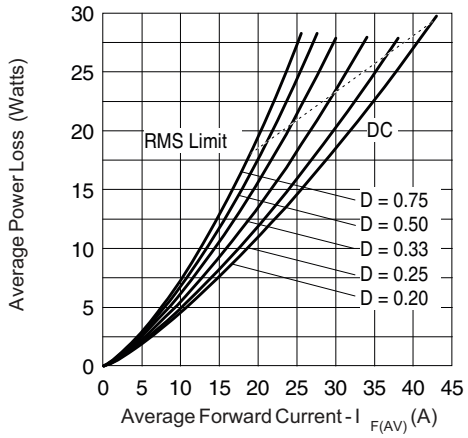



Fig. 6 - Forward Power Loss Characteristics

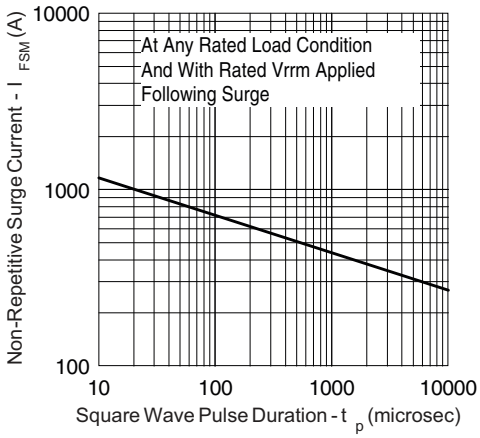



Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
$Pd_{REV}$ = Inverse power loss = $V_{R1} \times I_R (1 - D)$; $I_R$ at $V_{R1}$ = 80 % rated $V_R$

## ORDERING INFORMATION TABLE

Device code

| VS- | 63 | C | T | Q | 100 | G | PbF |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

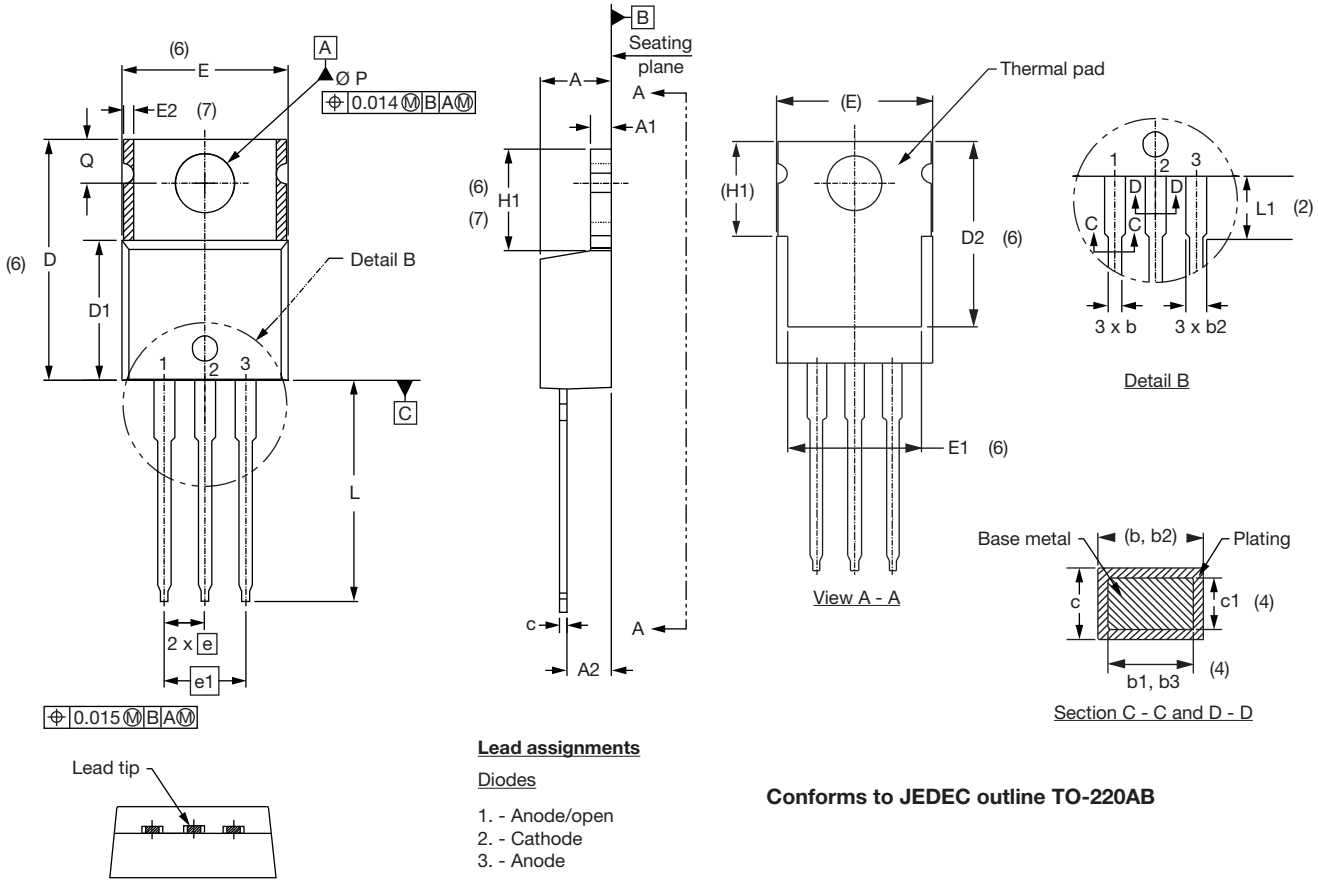
1 - Vishay Semiconductors product
2 - Current rating (60 A)
3 - C = Common cathode
4 - T = TO-220
5 - Q = Schottky “Q” series
6 - Voltage rating (100 = 100 V)
7 - G = Schottky generation
8 - Environmental digit
- PbF = Lead (Pb)-free and RoHS compliant
- -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

| **ORDERING INFORMATION** (Example) | | | |
|---|---|---|---|
| **PREFERRED P/N** | **QUANTITY PER T/R** | **MINIMUM ORDER QUANTITY** | **PACKAGING DESCRIPTION** |
| VS-63CTQ100GPbF | 50 | 1000 | Antistatic plastic tube |
| VS-63CTQ100G-N3 | 50 | 1000 | Antistatic plastic tube |

| **LINKS TO RELATED DOCUMENTS** | | |
|---|---|---|
| Dimensions | | www.vishay.com/doc?95222 |
| Part marking information | TO-220AB PbF | www.vishay.com/doc?95225 |
| | TO-220AB -N3 | www.vishay.com/doc?95028 |

# TO-220AB

**DIMENSIONS** in millimeters and inches




Lead tip



**Lead assignments**

Diodes

1. - Anode/open
2. - Cathode
3. - Anode

**Conforms to JEDEC outline TO-220AB**

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.25 | 4.65 | 0.167 | 0.183 | |
| A1 | 1.14 | 1.40 | 0.045 | 0.055 | |
| A2 | 2.56 | 2.92 | 0.101 | 0.115 | |
| b | 0.69 | 1.01 | 0.027 | 0.040 | |
| b1 | 0.38 | 0.97 | 0.015 | 0.038 | 4 |
| b2 | 1.20 | 1.73 | 0.047 | 0.068 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.36 | 0.61 | 0.014 | 0.024 | |
| c1 | 0.36 | 0.56 | 0.014 | 0.022 | 4 |
| D | 14.85 | 15.25 | 0.585 | 0.600 | 3 |
| D1 | 8.38 | 9.02 | 0.330 | 0.355 | |
| D2 | 11.68 | 12.88 | 0.460 | 0.507 | 6 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | |
| E | 10.11 | 10.51 | 0.398 | 0.414 | 3, 6 |
| E1 | 6.86 | 8.89 | 0.270 | 0.350 | 6 |
| E2 | - | 0.76 | - | 0.030 | 7 |
| e | 2.41 | 2.67 | 0.095 | 0.105 | |
| e1 | 4.88 | 5.28 | 0.192 | 0.208 | |
| H1 | 6.09 | 6.48 | 0.240 | 0.255 | 6, 7 |
| L | 13.52 | 14.02 | 0.532 | 0.552 | |
| L1 | 3.32 | 3.82 | 0.131 | 0.150 | 2 |
| Ø P | 3.54 | 3.73 | 0.139 | 0.147 | |
| Q | 2.60 | 3.00 | 0.102 | 0.118 | |
| θ | 90° to 93° | | 90° to 93° | | |

**Notes**

(1) Dimensioning and tolerancing as per ASME Y14.5M-1994
(2) Lead dimension and finish uncontrolled in L1
(3) Dimension D, D1 and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
(4) Dimension b1, b3 and c1 apply to base metal only
(5) Controlling dimensions: inches
(6) Thermal pad contour optional within dimensions E, H1, D2 and E1
(7) Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
(8) Outline conforms to JEDEC TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline

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