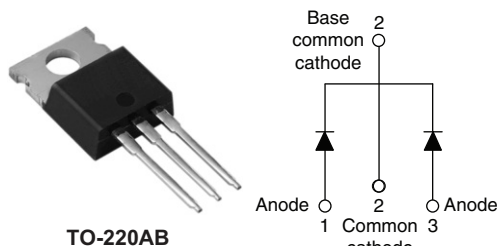


## High Performance Schottky Generation 5.0, 2 x 10 A



### FEATURES

- 175 °C high performance Schottky diode
- Very low forward voltage drop
- Extremely low reverse leakage
- Optimized  $V_F$  vs.  $I_R$  trade off for high efficiency
- Increased ruggedness for reverse avalanche capability
- RBSOA available
- Negligible switching losses
- Submicron trench technology
- Full lead (Pb)-free and RoHS compliant devices
- Designed and qualified for industrial level


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

|                         |          |
|-------------------------|----------|
| $I_{F(AV)}$             | 2 x 10 A |
| $V_R$                   | 100 V    |
| $V_F$ at 10 A at 125 °C | 0.68 V   |

### APPLICATIONS

- High efficiency SMPS
- Automotive
- High frequency switching
- Output rectification
- Reverse battery protection
- Freewheeling
- Dc-to-dc systems
- Increased power density systems

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL    | CHARACTERISTICS                           | VALUES      | UNITS |
|-----------|---|-------------|-------|
| $V_{RRM}$ |   | 100         | V     |
| $V_F$     | 10 Apk, $T_J = 125$ °C (typical, per leg) | 0.62        |       |
| $T_J$     | Range                                     | - 55 to 175 | °C    |

### VOLTAGE RATINGS

| PARAMETER                  | SYMBOL | TEST CONDITIONS | MBR20T100CT | UNITS |
|----------------------------|--------|-----------------|-------------|-------|
| Maximum DC reverse voltage | $V_R$  | $T_J = 25$ °C   | 100         | V     |

### ABSOLUTE MAXIMUM RATINGS

| ABSOLUTE MAXIMUM RATINGS  |                    |  |  |  |       |
|---|--------------------|--|--|--|-------|
| PARAMETER   | SYMBOL             | TEST CONDITIONS  |  | VALUES                                 | UNITS |
| Maximum average forward current<br><div>per leg</div> <div>per device</div> | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 159 °C, rectangular waveform   |  | 10                                     | A     |
|   |                    |  |  | 20                                     |       |
| Maximum peak one cycle non-repetitive surge current per leg                 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse  | Following any rated load condition and with rated V <sub>RRM</sub> applied | 850                                    | A     |
|   |                    | 10 ms sine or 6 ms rect. pulse   |  | 200                                    |       |
| Non-repetitive avalanche energy per leg                                     | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3 A, L = 12 mH   |  | 54                                     | mJ    |
| Repetitive avalanche current per leg  | I <sub>AR</sub>    | Limited by frequency of operation and time pulse duration so that T <sub>J</sub> < T <sub>J</sub> max. I <sub>AS</sub> at T <sub>J</sub> max. as a function of time pulse See fig. 8 |  | I <sub>AS</sub> at T <sub>J</sub> max. | A     |

| ELECTRICAL SPECIFICATIONS       |                |   |                                     |      |        |                  |
|---------------------------------|----------------|---|-------------------------------------|------|--------|------------------|
| PARAMETER                       | SYMBOL         | TEST CONDITIONS   |                                     | TYP. | MAX.   | UNITS            |
| Forward voltage drop per leg    | $V_{FM}^{(1)}$ | 10 A  | $T_J = 25\text{ }^{\circ}\text{C}$  | -    | 0.79   | V                |
|                                 |                | 20 A  |                                     | -    | 0.88   |                  |
|                                 |                | 10 A  | $T_J = 125\text{ }^{\circ}\text{C}$ | -    | 0.68   |                  |
|                                 |                | 20 A  |                                     | -    | 0.80   |                  |
| Reverse leakage current per leg | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = \text{Rated } V_R$           | -    | 100    | $\mu\text{A}$    |
|                                 |                | $T_J = 125\text{ }^{\circ}\text{C}$   |                                     | -    | 4      | mA               |
| Junction capacitance per leg    | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                     | 400  | -      | pF               |
| Series inductance per leg       | $L_S$          | Measured lead to lead 5 mm from package body  |                                     | 8.0  | -      | nH               |
| Maximum voltage rate of change  | dV/dt          | Rated $V_R$   |                                     | -    | 10 000 | V/ $\mu\text{s}$ |

## Note

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS                     |         |                                   |                                      |             |                        |
|---|---------|-----------------------------------|--------------------------------------|-------------|------------------------|
| PARAMETER   |         | SYMBOL                            | TEST CONDITIONS                      | VALUES      | UNITS                  |
| Maximum junction and storage temperature range          |         | T <sub>J</sub> , T <sub>Stg</sub> |                                      | - 55 to 175 | °C                     |
| Maximum thermal resistance, junction to case per leg    |         | R <sub>thJC</sub>                 | DC operation                         | 2           | °C/W                   |
| Maximum thermal resistance, junction to case per device |         |                                   |                                      | 1           |                        |
| Typical thermal resistance, case to heatsink            |         | R <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.5         |                        |
| Approximate weight                                      |         |                                   |                                      | 2           | g                      |
|   |         |                                   |                                      | 0.07        | oz.                    |
| Mounting torque   | minimum |                                   |                                      | 6 (5)       | kgf · cm<br>(lbf · in) |
|   | maximum |                                   |                                      | 12 (10)     |                        |
| Marking device  |         |                                   | Case style TO-220AB                  | MBR20T100CT |                        |

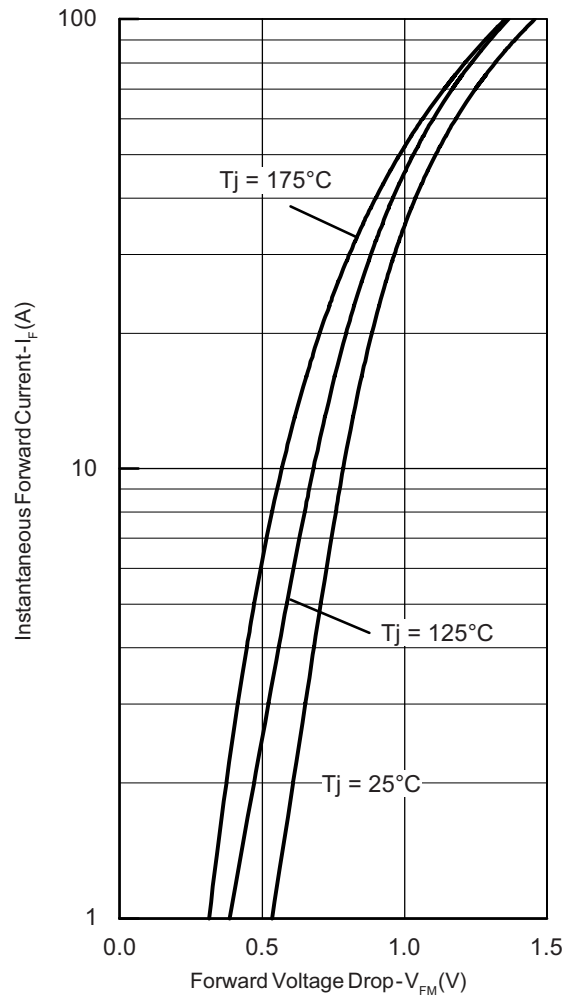


Fig. 1 - Maximum Forward Voltage Drop Characteristics

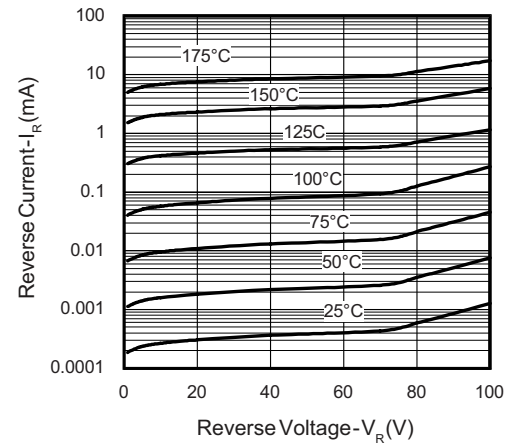


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

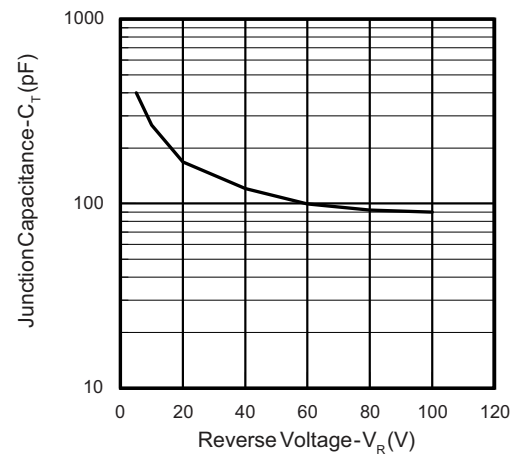


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

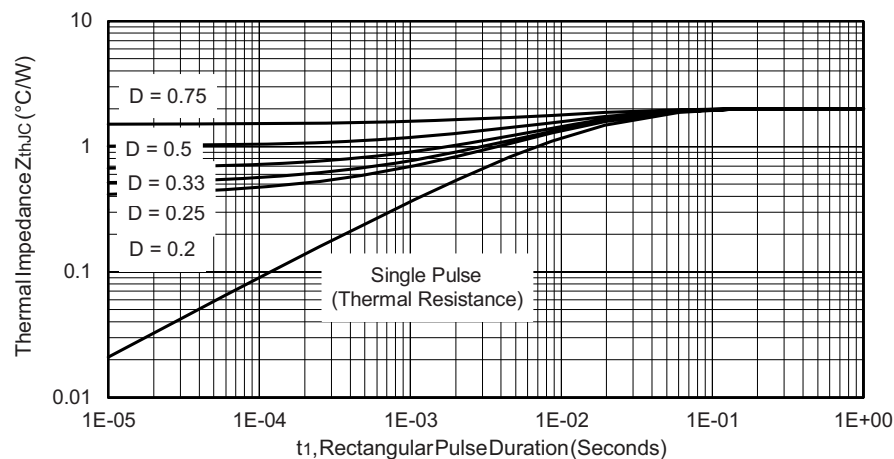


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

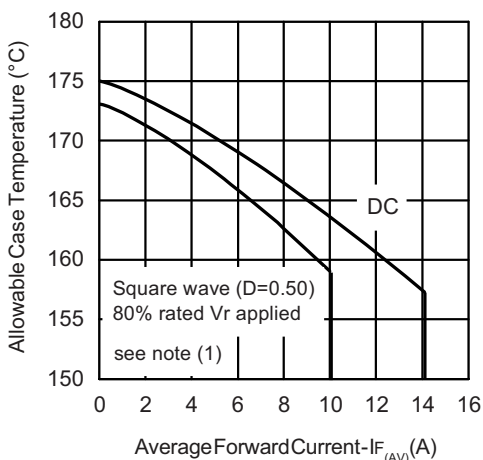


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

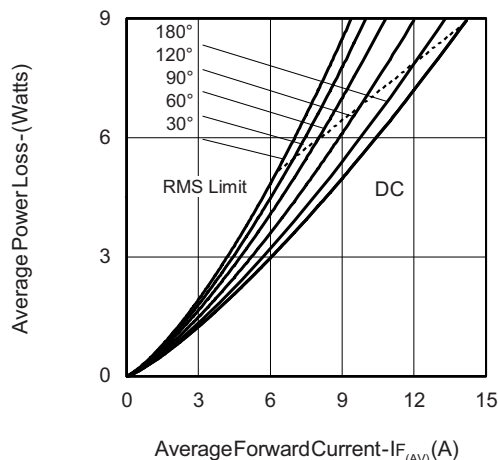


Fig. 6 - Forward Power Loss Characteristics

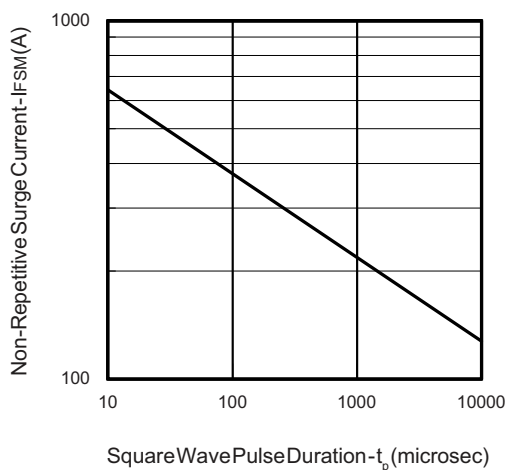


Fig. 7 - Maximum Non-Repetitive Surge Current

## Note

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



High Performance  
Schottky Generation 5.0,  
2 x 10 A

Vishay High Power Products

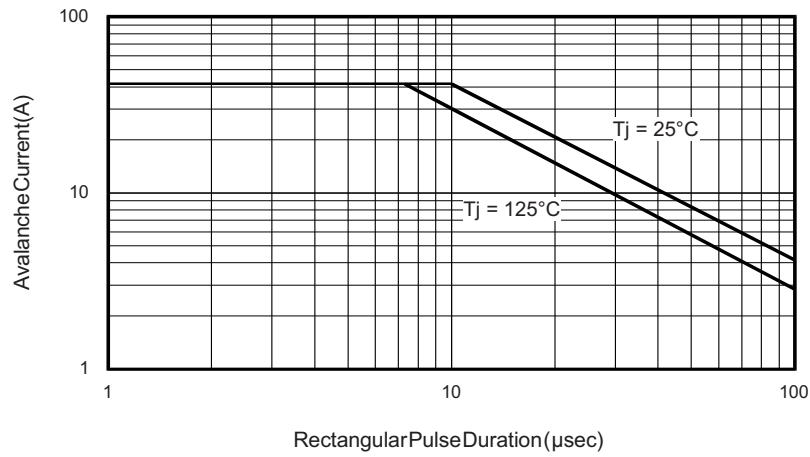


Fig. 8 - Reverse Bias Safe Operating Area (Avalanche Current vs. Rectangular Pulse Duration)

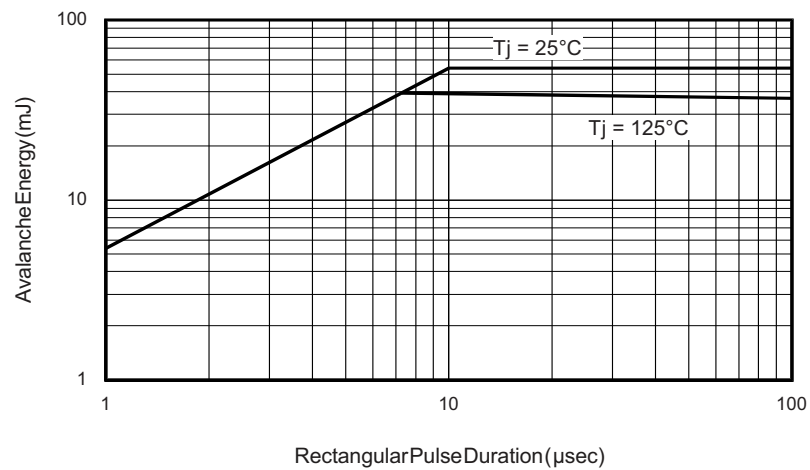


Fig. 9 - Reverse Bias Safe Operating Area (Avalanche Energy vs. Rectangular Pulse Duration)

# MBR20T100CT

Vishay High Power Products

High Performance  
Schottky Generation 5.0,  
2 x 10 A



## ORDERING INFORMATION TABLE

|             |            |           |          |            |           |
|-------------|------------|-----------|----------|------------|-----------|
| Device code | <b>MBR</b> | <b>20</b> | <b>T</b> | <b>100</b> | <b>CT</b> |
|             | 1          | 2         | 3        | 4          | 5         |

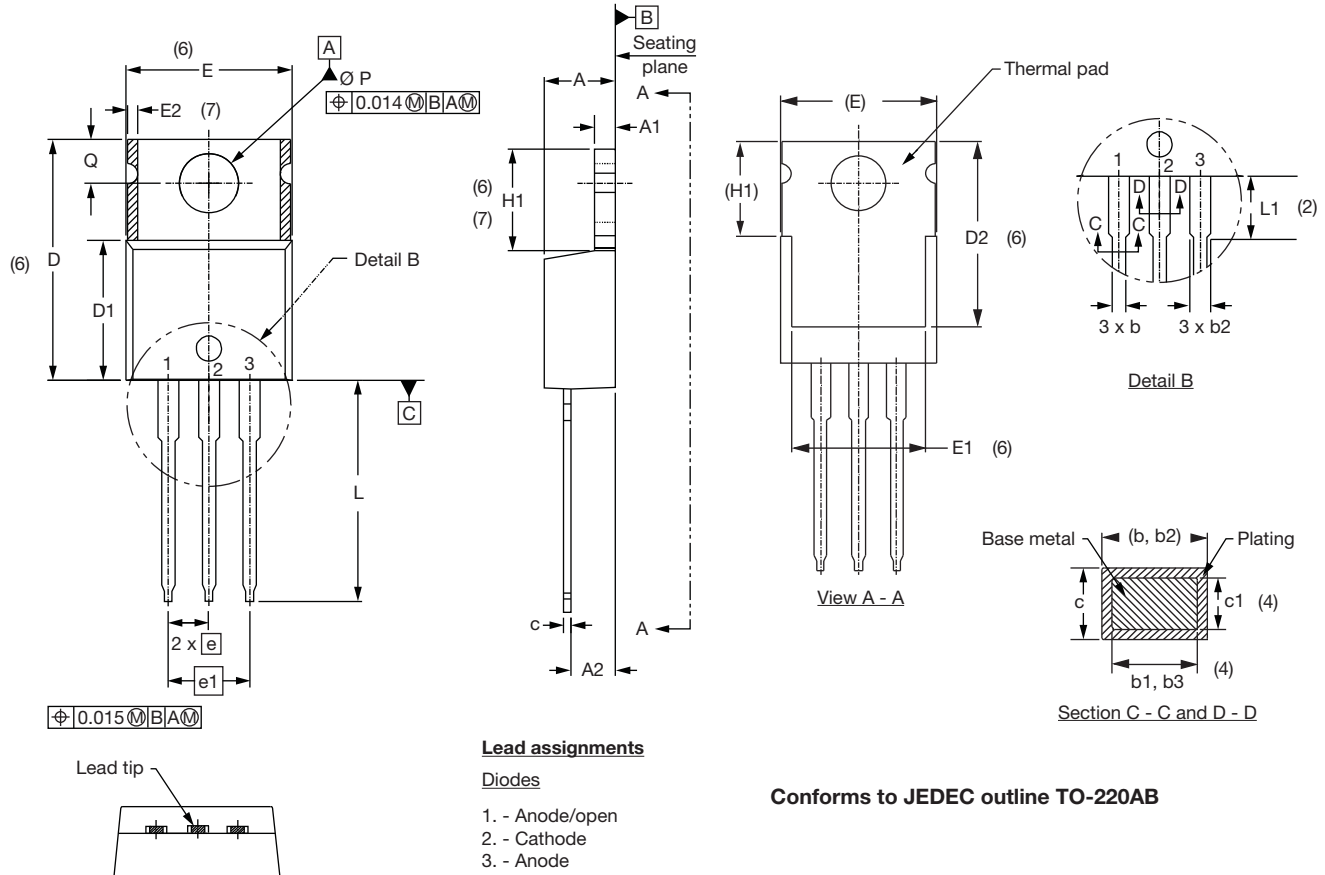
- 1** - MBR series
- 2** - Current rating (20 = 20 A)
- 3** - T = Trench
- 4** - Voltage rating (100 = 100 V)
- 5** - CT = Essential part number

Tube standard pack quantity: 50 pieces

| LINKS TO RELATED DOCUMENTS |   |
|----------------------------|---|
| Dimensions                 | <a href="http://www.vishay.com/doc?95222">http://www.vishay.com/doc?95222</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95225">http://www.vishay.com/doc?95225</a> |

### TO-220AB

**DIMENSIONS** in millimeters and inches



| 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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