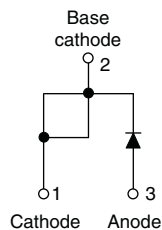


## High Voltage, Input Rectifier Diode, 10 A



### FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### PRODUCT SUMMARY

|                 |                 |
|-----------------|-----------------|
| Package         | TO-220AC        |
| $I_{F(AV)}$     | 10 A            |
| $V_R$           | 800 V to 1200 V |
| $V_F$ at $I_F$  | 1.1 V           |
| $I_{FSM}$       | 160 A           |
| $T_J$ max.      | 150 °C          |
| Diode variation | Single die      |

### APPLICATIONS

- Input rectification
- Vishay Semiconductors switches and output rectifiers which are available in identical package outlines

### DESCRIPTION

High voltage rectifiers optimized for very low forward voltage drop with moderate leakage.

These devices are intended for use in main rectification (single or three phase bridge).

### OUTPUT CURRENT IN TYPICAL APPLICATIONS

| APPLICATIONS                                                                       | SINGLE-PHASE BRIDGE | THREE-PHASE BRIDGE | UNITS |
|------------------------------------------------------------------------------------|---------------------|--------------------|-------|
| Capacitive input filter $T_A = 55$ °C, $T_J = 125$ °C<br>common heatsink of 1 °C/W | 12.0                | 16.0               | A     |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS     | VALUES      | UNITS |
|-------------|---------------------|-------------|-------|
| $I_{F(AV)}$ | Sinusoidal waveform | 10          | A     |
| $V_{RRM}$   |                     | 800/1200    | V     |
| $I_{FSM}$   |                     | 160         | A     |
| $V_F$       | 10 A, $T_J = 25$ °C | 1.1         | V     |
| $T_J$       |                     | -40 to +150 | °C    |

### VOLTAGE RATINGS

| PART NUMBER                  | $V_{RRM}$ , MAXIMUM PEAK<br>REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$<br>AT 150 °C<br>mA |
|------------------------------|--------------------------------------------------|-----------------------------------------------------------------|------------------------------|
| VS-10ETS08PbF, VS-10ETS08-M3 | 800                                              | 900                                                             | 0.5                          |
| VS-10ETS12PbF, VS-10ETS12-M3 | 1200                                             | 1300                                                            |                              |


**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                                      | VALUES | UNITS                       |
|-----------------------------------------------------|---------------|----------------------------------------------------------------------|--------|-----------------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 105\text{ }^{\circ}\text{C}$ , 180° conduction half sine wave | 10     | A                           |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                            | 135    |                             |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                               | 160    |                             |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                            | 91     | $\text{A}^2\text{s}$        |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                               | 130    |                             |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied           | 1300   | $\text{A}^2\sqrt{\text{s}}$ |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                       | SYMBOL      | TEST CONDITIONS                          | VALUES | UNITS            |
|---------------------------------|-------------|------------------------------------------|--------|------------------|
| Maximum forward voltage drop    | $V_{FM}$    | 10 A, $T_J = 25\text{ }^{\circ}\text{C}$ | 1.1    | V                |
| Forward slope resistance        | $r_t$       | $T_J = 150\text{ }^{\circ}\text{C}$      | 20     | $\text{m}\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |                                          | 0.82   | V                |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^{\circ}\text{C}$       | 0.05   | mA               |
|                                 |             | $T_J = 150\text{ }^{\circ}\text{C}$      | 0.50   |                  |

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                                   | SYMBOL         | TEST CONDITIONS     | VALUES      | UNITS                |
|-------------------------------------------------------------|----------------|---------------------|-------------|----------------------|
| Maximum junction and storage temperature range              | $T_J, T_{Stg}$ |                     | -40 to +150 | $^{\circ}\text{C}$   |
| Maximum thermal resistance, junction to case                | $R_{thJC}$     | DC operation        | 2.5         | $^{\circ}\text{C/W}$ |
| Maximum thermal resistance, junction to ambient (PCB mount) | $R_{thJA}$     |                     | 62          |                      |
| Soldering temperature                                       | $T_S$          |                     | 240         | $^{\circ}\text{C}$   |
| Approximate weight                                          |                |                     | 2           | g                    |
|                                                             |                |                     | 0.07        | oz.                  |
| Marking device                                              |                | Case style TO-220AC | 10ETS08     |                      |
|                                                             |                |                     | 10ETS12     |                      |

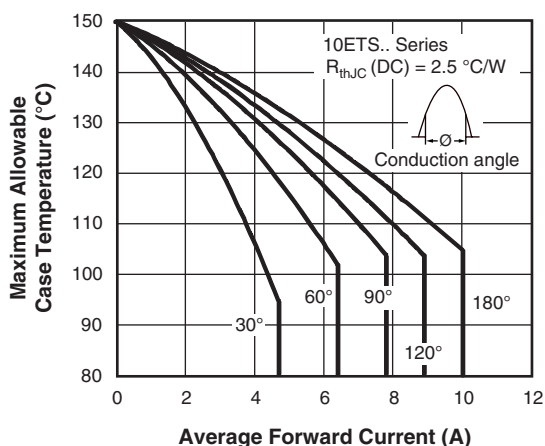


Fig. 1 - Current Rating Characteristics

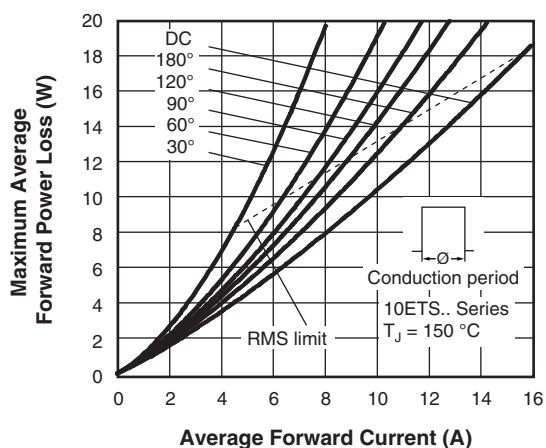


Fig. 4 - Forward Power Loss Characteristics

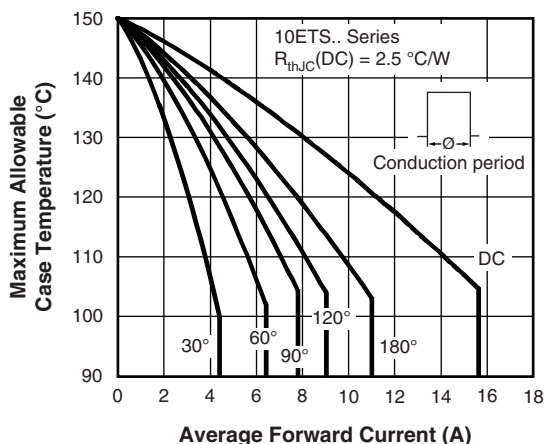


Fig. 2 - Current Rating Characteristics

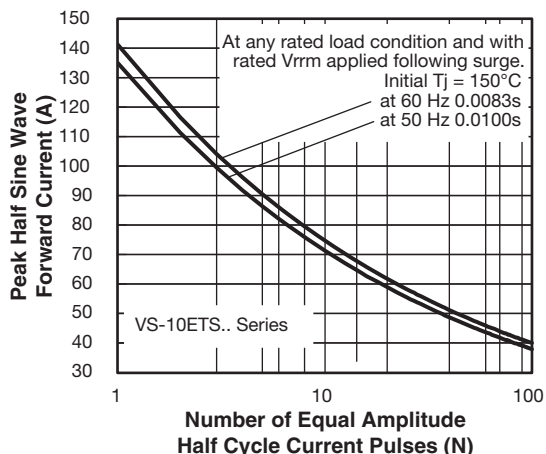


Fig. 5 - Maximum Non-Repetitive Surge Current

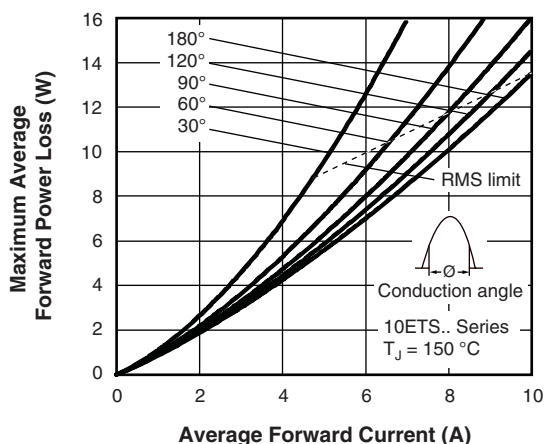


Fig. 3 - Forward Power Loss Characteristics

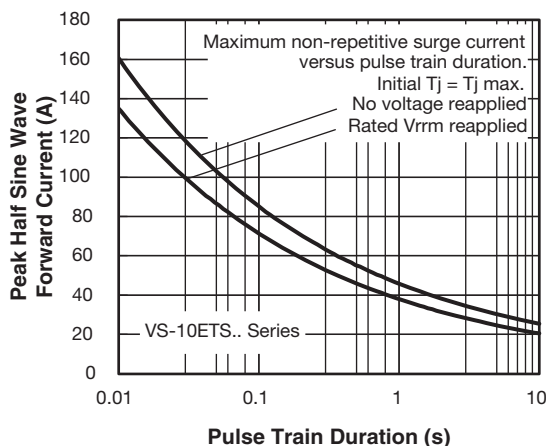


Fig. 6 - Maximum Non-Repetitive Surge Current

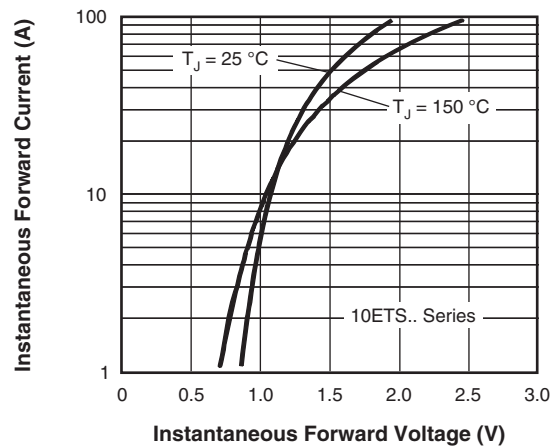


Fig. 7 - Forward Voltage Drop Characteristics

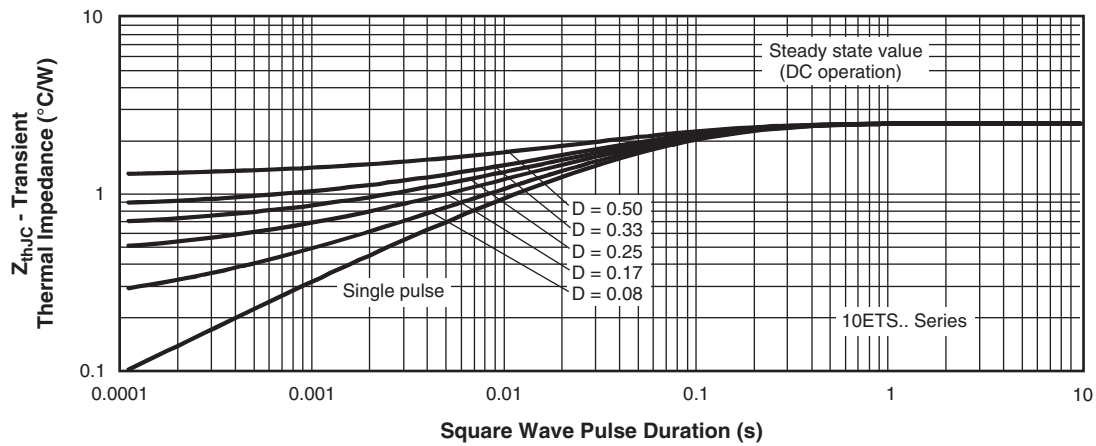


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |          |          |          |           |            |
|-------------|------------|-----------|----------|----------|----------|-----------|------------|
| Device code | <b>VS-</b> | <b>10</b> | <b>E</b> | <b>T</b> | <b>S</b> | <b>12</b> | <b>PbF</b> |
|             | 1          | 2         | 3        | 4        | 5        | 6         | 7          |

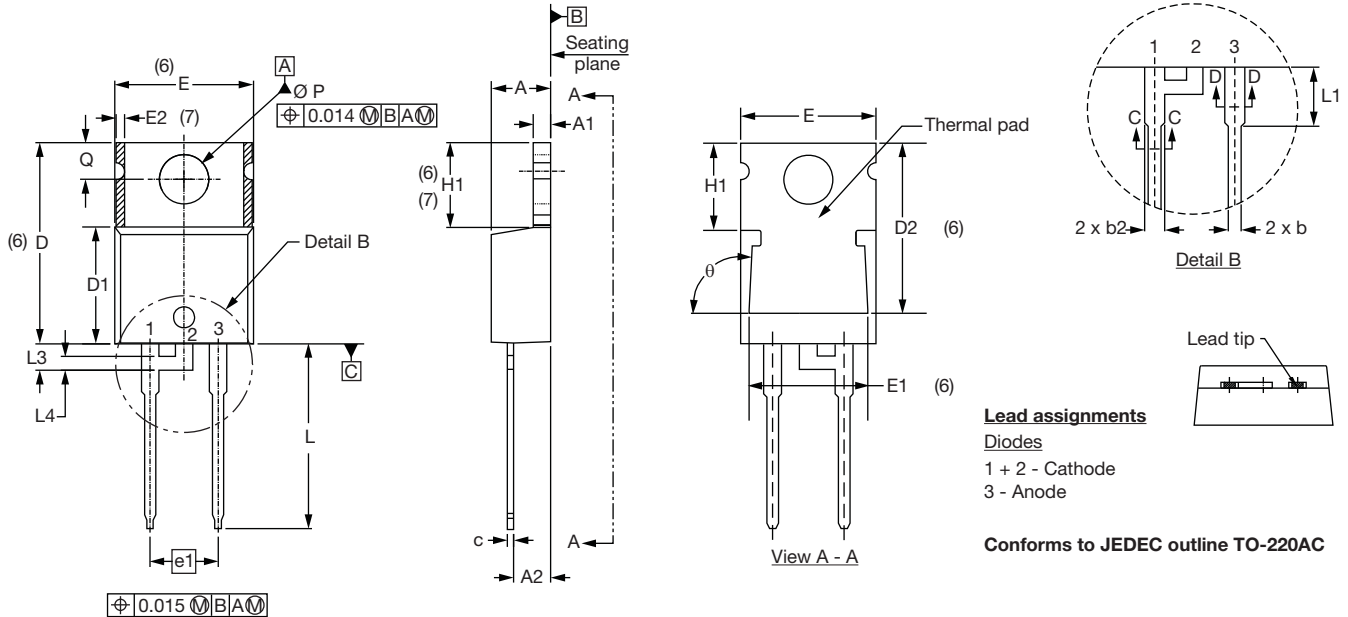
- 1** - Vishay Semiconductors product
- 2** - Current rating (10 = 10 A)
- 3** - Circuit configuration:  
E = single diode
- 4** - Package:  
T = TO-220AC
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$  08 = 800 V  
12 = 1200 V
- 7** - Environmental digit:  
PbF = lead (Pb)-free and RoHS-compliant  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

| <b>ORDERING INFORMATION</b> (Example) |                  |                        |                          |
|---------------------------------------|------------------|------------------------|--------------------------|
| PREFERRED P/N                         | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
| VS-10ETS08PbF                         | 50               | 1000                   | Antistatic plastic tubes |
| VS-10ETS08-M3                         | 50               | 1000                   | Antistatic plastic tubes |
| VS-10ETS12PbF                         | 50               | 1000                   | Antistatic plastic tubes |
| VS-10ETS12-M3                         | 50               | 1000                   | Antistatic plastic tubes |

| <b>LINKS TO RELATED DOCUMENTS</b> |              |                                                                        |
|-----------------------------------|--------------|------------------------------------------------------------------------|
| Dimensions                        |              | <a href="http://www.vishay.com/doc?95221">www.vishay.com/doc?95221</a> |
| Part marking information          | TO-220AC PbF | <a href="http://www.vishay.com/doc?95224">www.vishay.com/doc?95224</a> |
|                                   | TO-220AC -M3 | <a href="http://www.vishay.com/doc?95068">www.vishay.com/doc?95068</a> |

### TO-220AC

**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     |
| E      | 10.11       | 10.51 | 0.398  | 0.414 | 3, 6  |

| SYMBOL | MILLIMETERS |       | INCHES     |       | NOTES |
|--------|-------------|-------|------------|-------|-------|
|        | MIN.        | MAX.  | MIN.       | MAX.  |       |
| 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     |
| L3     | 1.78        | 2.13  | 0.070      | 0.084 |       |
| L4     | 0.76        | 1.27  | 0.030      | 0.050 | 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 dimension: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



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