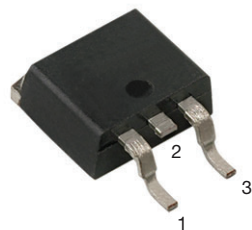
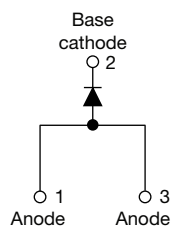




## High Voltage Surface Mount Input Rectifier Diode, 10 A


TO-263AB (D<sup>2</sup>PAK)


### FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- 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**

### APPLICATIONS

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

### DESCRIPTION

The VS-10ETS..S-M3 rectifier series has been optimized for very low forward voltage drop, with moderate leakage. The glass passivation technology used has reliable operation up to 150 °C junction temperature.

### PRODUCT SUMMARY

|                 |                               |
|-----------------|-------------------------------|
| Package         | TO-263AB (D <sup>2</sup> PAK) |
| $I_{F(AV)}$     | 10 A                          |
| $V_R$           | 800 V, 1000 V, 1200 V         |
| $V_F$ at $I_F$  | 1.1 V                         |
| $I_{FSM}$       | 160 A                         |
| $T_J$ max.      | 150 °C                        |
| Diode variation | Single die                    |

### 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-10ETS08S-M3 | 800                                              | 900                                                             | 0.5                          |
| VS-10ETS10S-M3 | 1000                                             | 1100                                                            |                              |
| VS-10ETS12S-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           | 1290   | $\text{A}^2\sqrt{\text{s}}$ |

| 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) | $R_{thJA}^{(1)}$ |                                          | 62          |                      |
| Soldering temperature                                       | $T_S$            |                                          | 260         | $^{\circ}\text{C}$   |
| Approximate weight                                          |                  |                                          | 2           | g                    |
|                                                             |                  |                                          | 0.07        | oz.                  |
| Marking device                                              |                  | Case style TO-263AB (D <sup>2</sup> PAK) | 10ETS08S    |                      |
|                                                             |                  |                                          | 10ETS10S    |                      |
|                                                             |                  |                                          | 10ETS12S    |                      |

## Note

- <sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz. (140  $\mu\text{m}$ ) copper 40  $^{\circ}\text{C/W}$   
For recommended footprint and soldering techniques refer to application note #AN-994

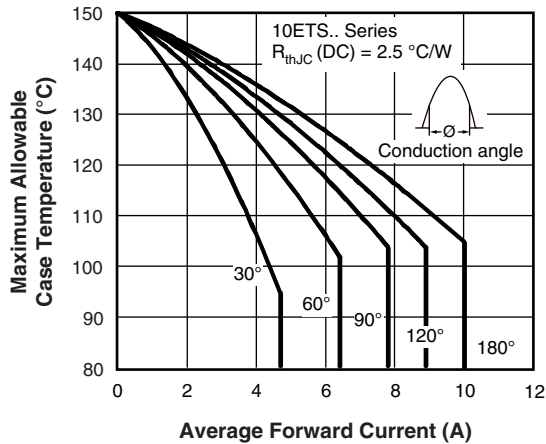


Fig. 1 - Current Rating Characteristics

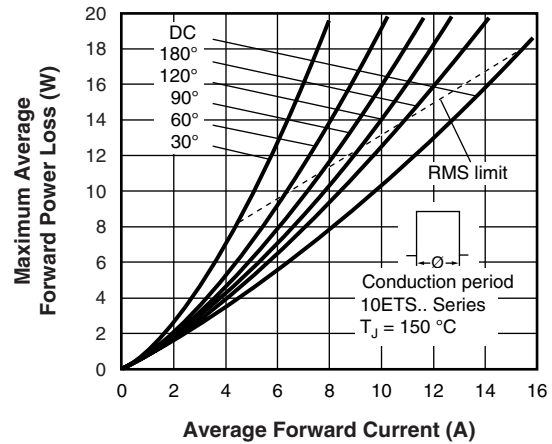


Fig. 4 - Forward Power Loss Characteristics

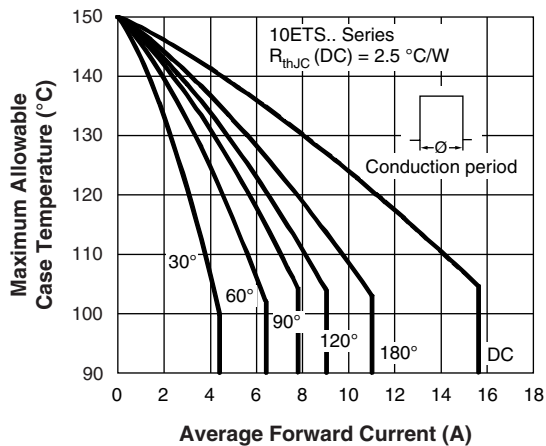


Fig. 2 - Current Rating Characteristics

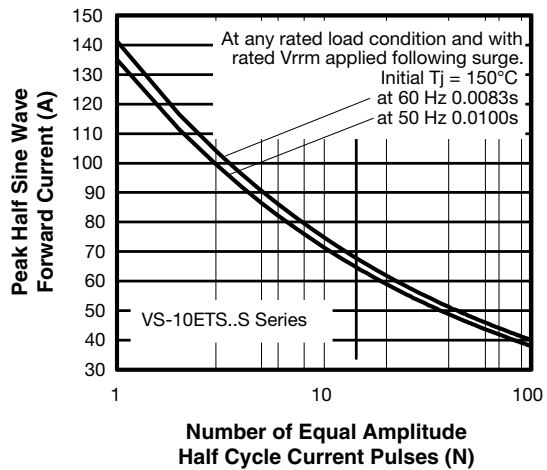


Fig. 5 - Maximum Non-Repetitive Surge Current

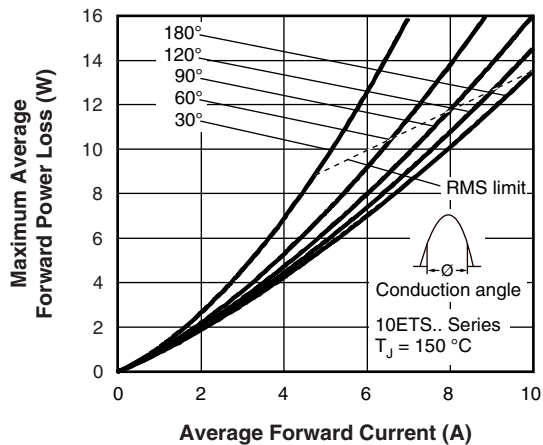


Fig. 3 - Forward Power Loss Characteristics

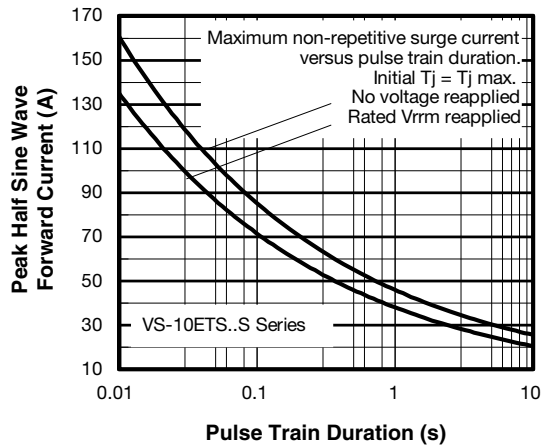


Fig. 6 - Maximum Non-Repetitive Surge Current

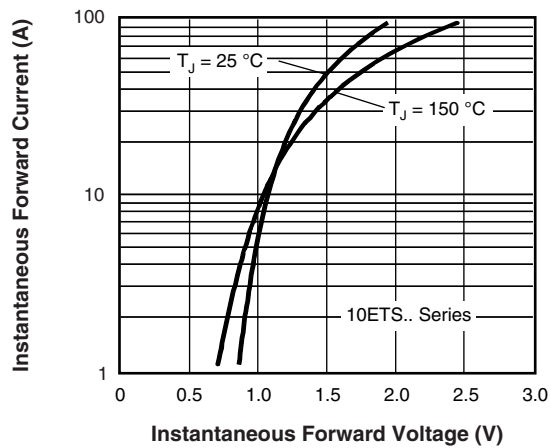


Fig. 7 - Forward Voltage Drop Characteristics

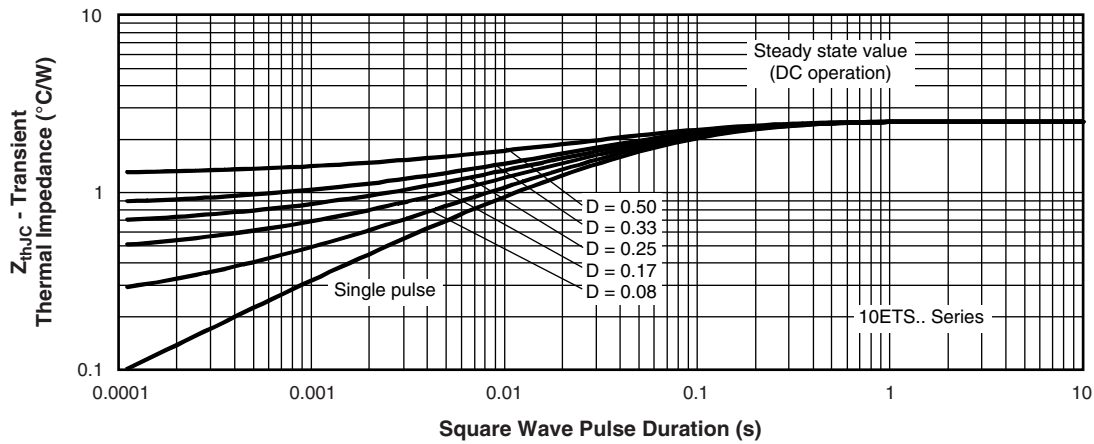


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |          |          |          |           |          |            |            |
|-------------|------------|-----------|----------|----------|----------|-----------|----------|------------|------------|
| Device code | <b>VS-</b> | <b>10</b> | <b>E</b> | <b>T</b> | <b>S</b> | <b>12</b> | <b>S</b> | <b>TRL</b> | <b>-M3</b> |
|             | 1          | 2         | 3        | 4        | 5        | 6         | 7        | 8          | 9          |

- |          |   |                                                                                                  |                                          |
|----------|---|--------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>1</b> | - | Vishay Semiconductors product                                                                    |                                          |
| <b>2</b> | - | Current rating (10 = 10 A)                                                                       |                                          |
| <b>3</b> | - | Circuit configuration:<br>E = single diode                                                       |                                          |
| <b>4</b> | - | Package:<br>T = D <sup>2</sup> PAK                                                               |                                          |
| <b>5</b> | - | Type of silicon:<br>S = standard recovery rectifier                                              |                                          |
| <b>6</b> | - | Voltage code x 100 = V <sub>RRM</sub>                                                            | 08 = 800 V<br>10 = 1000 V<br>12 = 1200 V |
| <b>7</b> | - | S = surface mountable                                                                            |                                          |
| <b>8</b> | - | • None = tube<br>• TRL = tape and reel (left oriented)<br>• TRR = tape and reel (right oriented) |                                          |
| <b>9</b> | - | -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free                              |                                          |

| <b>ORDERING INFORMATION (Example)</b> |                          |                               |                              |
|---------------------------------------|--------------------------|-------------------------------|------------------------------|
| <b>PREFERRED P/N</b>                  | <b>QUANTITY PER TUBE</b> | <b>MINIMUM ORDER QUANTITY</b> | <b>PACKAGING DESCRIPTION</b> |
| VS-10ETS08S-M3                        | 50                       | 1000                          | Antistatic plastic tube      |
| VS-10ETS08STRR-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS08STRL-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS10S-M3                        | 50                       | 1000                          | Antistatic plastic tube      |
| VS-10ETS10STRR-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS10STRL-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS12S-M3                        | 50                       | 1000                          | Antistatic plastic tube      |
| VS-10ETS12STRR-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS12STRL-M3                     | 800                      | 800                           | 13" diameter reel            |
| VS-10ETS08S-M3                        | 50                       | 1000                          | Antistatic plastic tube      |

| <b>LINKS TO RELATED DOCUMENTS</b> |                                                                        |
|-----------------------------------|------------------------------------------------------------------------|
| Dimensions                        | <a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a> |
| Part marking information          | <a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a> |
| Packaging information             | <a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a> |



## D<sup>2</sup>PAK

### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.06        | 4.83  | 0.160  | 0.190 |       |
| A1     | 0.00        | 0.254 | 0.000  | 0.010 |       |
| b      | 0.51        | 0.99  | 0.020  | 0.039 |       |
| b1     | 0.51        | 0.89  | 0.020  | 0.035 | 4     |
| b2     | 1.14        | 1.78  | 0.045  | 0.070 |       |
| b3     | 1.14        | 1.73  | 0.045  | 0.068 | 4     |
| c      | 0.38        | 0.74  | 0.015  | 0.029 |       |
| c1     | 0.38        | 0.58  | 0.015  | 0.023 | 4     |
| c2     | 1.14        | 1.65  | 0.045  | 0.065 |       |
| D      | 8.51        | 9.65  | 0.335  | 0.380 | 2     |

| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D1     | 6.86        | 8.00  | 0.270     | 0.315 | 3     |
| E      | 9.65        | 10.67 | 0.380     | 0.420 | 2, 3  |
| E1     | 7.90        | 8.80  | 0.311     | 0.346 | 3     |
| e      | 2.54 BSC    |       | 0.100 BSC |       |       |
| H      | 14.61       | 15.88 | 0.575     | 0.625 |       |
| L      | 1.78        | 2.79  | 0.070     | 0.110 |       |
| L1     | -           | 1.65  | -         | 0.066 | 3     |
| L2     | 1.27        | 1.78  | 0.050     | 0.070 |       |
| L3     | 0.25 BSC    |       | 0.010 BSC |       |       |
| L4     | 4.78        | 5.28  | 0.188     | 0.208 |       |

#### Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC® outline TO-263AB



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