



eSMP® Flat Type Surface-Mount Packages with Space-Saving Footprints



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RESOURCES

- For technical questions contact [Diodes@vishay.com](mailto:Diodes@vishay.com)

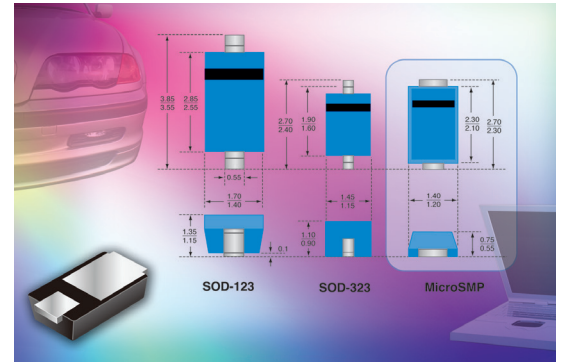




## MicroSMP Miniature, High-Power-Density Package for Rectifiers and Transient Voltage Suppressors (TVS)

### Features

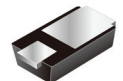
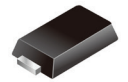
- High-power-density rectifiers and TVS in space-saving 2.5 mm by 1.3 mm footprint with a 0.65 mm height
- High forward current up to 1 A for rectifiers and 150 W (10/1000  $\mu$ s waveform) clamping power capability in TVS
- All the devices offer a high 25 A forward surge current capability for an 8.3 ms pulse for rectifiers
- up to 175 °C maximum operation junction temperature for rectifiers
- Provides improved reliability and a longer operational life span



### Applications

- Secondary rectification and freewheeling diode functions for miniature AC/DC and DC/DC converters
- Flywheel and polarity protection for miniature power converters and portable electronic equipment such as digital cameras, MP3 players, navigation systems, GPS, and cellular phones
- Polarity protection of power lines and signal lines for industrial systems
- Power and signal line protection for microprocessors, signal processing ICs, and logic circuits
- High-power voltage regulation for non-sensitive input voltage circuits in automotive and industrial electronics

### eSMP® Series

**MicroSMP**



## DIODES

## MicroSMP Package

## Schottky Rectifiers

| Device                              | $V_{RRM}$ Range | $I_{F(AV)}$ | Max $V_F$ @ $I_F$ |     | $t_{rr}$ Typical | $I_{FSM}$ | $T_J$ max |
|-------------------------------------|-----------------|-------------|-------------------|-----|------------------|-----------|-----------|
|                                     | (V)             | (A)         | (V)               | (A) | (ns)             | (A)       | (°C)      |
| <a href="#">MSS1P2L and MSS1P3L</a> | 20 - 30         | 1.0         | 0.50              | 1.0 | <10              | 25        | 150       |
| <a href="#">MSS1P3 and MSS1P4</a>   | 30 - 40         | 1.0         | 0.55              | 1.0 | <10              | 25        | 150       |
| <a href="#">MSS1P5 and MSS1P6</a>   | 50 - 60         | 1.0         | 0.68              | 1.0 | <10              | 25        | 150       |
| <a href="#">MSS2P2 and MSS2P3</a>   | 20 - 30         | 2.0         | 0.6               | 2.0 | <10              | 30        | 150       |

## Standard ESD Capability Rectifiers

| Device                             | $V_{RRM}$ Range | $I_{F(AV)}$ | Max $V_F$ @ $I_F$ |     | $t_{rr}$ Typical | $I_{FSM}$ | $T_J$ max |
|------------------------------------|-----------------|-------------|-------------------|-----|------------------|-----------|-----------|
|                                    | (V)             | (A)         | (V)               | (A) | (ns)             | (A)       | (°C)      |
| <a href="#">MSE1PB thru MSE1PJ</a> | 100 - 600       | 1.0         | 1.1               | 1.0 | 780              | 30        | 175       |

## TRANSZORB® TVS

| Device                                | $V_{(BR)}$ Range | $V_{WM}$ Range | $P_{PPM}$ (10 x 1000 $\mu$ s) | $P_{PPM}$ (8 x 20 $\mu$ s) | $T_J$ max |
|---------------------------------------|------------------|----------------|-------------------------------|----------------------------|-----------|
|                                       | (V)              | (V)            | (W)                           | (W)                        | (°C)      |
| <a href="#">MSP3V3, MSP5.0A</a>       | 4.1 - 6.4        | 3.3 - 5.0      | 150                           | 1000                       | 150       |
| <a href="#">MSMP6.0A thru MSMP20A</a> | 6.67 - 22.2      | 6.0 - 20       | 150                           | 1000                       | 150       |



# DIODES

## DO-220AA SMP Package

### SMP Miniature, High-Power-Density Package for Rectifiers and Transient Voltage Suppressors (TVS)

#### Features

- High-power-density rectifiers and TVS in space-saving 3.8 mm by 2 mm footprint with a 1 mm height
- Low forward voltage drop
- Provides space saving with:
  - Rectifiers rated up to 3 A
  - TVS rated up to 400 W ( for above 13 V)
- 1 mm device height
- Solder pad compatible with other SMD devices
- Low thermal resistance
- Wide product offering
- Available for TVS and Schottky, Ultrafast, and standard rectifiers



#### Applications

- Secondary rectification of AC/DC and DC/DC converters, freewheeling and polarity protection
- General purpose, polarity protection, and rail-to-rail protection in automotive applications
- Secondary rectification and freewheeling for ultrafast switching speeds of AC/DC and DC/DC converters in computer and consumer end products and in high-temperature conditions such as automotive applications
- Protection for ICs, drive transistors, signal lines of sensor units, and electronic units in consumer, computer, industrial, and automotive applications

#### eSMP® Series



SMP



## DIODES

## DO-220AA SMP Package

## Schottky Rectifiers

| Device                                 | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max       |
|----------------------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------------|
|                                        | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | ( $^{\circ}$ C) |
| <a href="#">SS1P3L and SS1P4L</a>      | 1.0         | 30 - 40         | 0.45, 0.48        | 1.0 | 150               | 50        | 150             |
| <a href="#">SS1P3 and SS1P4</a>        | 1.0         | 30 - 40         | 0.53              | 1.0 | 150               | 30        | 150             |
| <a href="#">SS1P5L and SS1P6L</a>      | 1.0         | 50 - 60         | 0.59              | 1.0 | 100               | 50        | 150             |
| <a href="#">SS2P2, SS2P3 and SS2P4</a> | 2.0         | 20 - 40         | 0.55              | 2.0 | 150               | 50        | 150             |
| <a href="#">SS2P2L and SS2P3L</a>      | 2.0         | 20 - 30         | 0.50              | 2.0 | 200               | 50        | 150             |
| <a href="#">SS2P5 and SS2P6</a>        | 2.0         | 50 - 60         | 0.70              | 2.0 | 100               | 50        | 150             |
| <a href="#">SS2PH9 and SS2PH10</a>     | 2.0         | 90 - 100        | 0.80              | 2.0 | 1.0               | 50        | 150             |
| <a href="#">SS3P3</a>                  | 3.0         | 30              | 0.58              | 3.0 | 200               | 50        | 150             |
| <a href="#">SS3P4</a>                  | 3.0         | 40              | 0.60              | 3.0 | 150               | 50        | 150             |
| <a href="#">SS3P5 and SS3P6</a>        | 3.0         | 50 - 60         | 0.78              | 3.0 | 100               | 50        | 150             |

TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifiers

| Device               | $I_{F(AV)}$ | $V_{(BR)}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max       |
|----------------------|-------------|------------------|-------------------|-----|-------------------|-----------|-----------------|
|                      | (A)         | (V)              | (V)               | (A) | ( $\mu$ A)        | (A)       | ( $^{\circ}$ C) |
| <a href="#">V3P6</a> | 3           | 60               | 0.63              | 3.0 | 900               | 60        | 150             |

## Ultrafast Recovery Rectifiers

| Device                                    | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |           | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $t_{rr}$ max | $T_J$ max       |
|-------------------------------------------|-------------|-----------------|-------------------|-----------|-------------------|-----------|--------------|-----------------|
|                                           | (A)         | (V)             | (V)               | (A)       | ( $\mu$ A)        | (A)       | (ns)         | ( $^{\circ}$ C) |
| <a href="#">ES1PB, ES1PC and ES1PD</a>    | 1.0         | 100 - 200       | 0.865 / 0.92      | 0.6 / 1.0 | 5                 | 30        | 15           | 150             |
| <a href="#">ESH1PB, ESH1PC and ESH1PD</a> | 1.0         | 100 - 200       | 0.86 / 0.90       | 0.7 / 1.0 | 1                 | 50        | 25           | 175             |
| <a href="#">ESH2PB, ESH2PC and ESH2PD</a> | 2.0         | 100 - 200       | 0.98              | 2.0       | 1                 | 50        | 25           | 175             |

## Standard Rectifiers

| Device                         | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $t_{rr}$ Typ. | $I_{FSM}$ | $T_J$ max       |
|--------------------------------|-------------|-----------------|-------------------|-----|-------------------|---------------|-----------|-----------------|
|                                | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)          | (A)       | ( $^{\circ}$ C) |
| <a href="#">S1PB thru S1PM</a> | 1.0         | 100 - 1000      | 1.1               | 1.0 | 1                 | 1800          | 30        | 150             |



## DIODES

## DO-220AA SMP Package

## Standard ESD Capability Rectifiers

| Device                             | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $t_{rr}$ Typ. | $I_{FSM}$ | $T_J$ max       |
|------------------------------------|-------------|-----------------|-------------------|-----|-------------------|---------------|-----------|-----------------|
|                                    | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)          | (A)       | ( $^{\circ}$ C) |
| <a href="#">SE07PB thru SE07PJ</a> | 0.7         | 100 - 600       | 1.05              | 0.7 | 5                 |               | 20        | 175             |
| <a href="#">SE10PB thru SE10PJ</a> | 1.0         | 100 - 600       | 1.05              | 1.0 | 5                 | 780           | 25        | 175             |
| <a href="#">SE15PB thru SE15PJ</a> | 1.5         | 100 - 600       | 1.05              | 1.5 | 5                 | 900           | 30        | 175             |
| <a href="#">SE20PB thru SE20PJ</a> | 2.0         | 100 - 600       | 1.05              | 2.0 | 5                 | 1200          | 32        | 175             |

## Avalanche Rectifiers

| Device                              | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $E_R$ | $t_{rr}$ max | $I_{FSM}$ | $T_J$ max       |
|-------------------------------------|-------------|-----------------|-------------------|-----|-------------------|-------|--------------|-----------|-----------------|
|                                     | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (mJ)  | (ns)         | (A)       | ( $^{\circ}$ C) |
| <a href="#">AS1PD thru AS1PM</a>    | 1.5         | 200 - 1000      | 1.15              | 1.5 | 5                 | 20    | 1500         | 30        | 175             |
| <a href="#">AR1PD, AR1PG, AR1PJ</a> | 1           | 200 - 600       | 1.25              | 1   | 1                 | 20    | 140          | 20        | 175             |
| <a href="#">AR1PK, AR1PM</a>        | 1           | 800 - 1000      | 1.6               | 1   | 1                 | 20    | 120          | 30        | 175             |
| <a href="#">AU1PD, AU1PG, AU1PJ</a> | 1           | 200 - 600       | 1.5               | 1   | 1                 | 20    | 75           | 30        | 175             |
| <a href="#">AU1PK, AU1PM</a>        | 1           | 800 - 1000      | 1.85              | 1   | 1                 | 20    | 75           | 25        | 175             |

## PAR® TVS

| Device                                   | $P_{PPM}$ (10x1000us) | $V_{(BR)}$ Range | $V_{WM}$ Range | $T_J$ max       |
|------------------------------------------|-----------------------|------------------|----------------|-----------------|
|                                          | (W)                   | (V)              | (V)            | ( $^{\circ}$ C) |
| <a href="#">TPSMP6.8(A)</a>              | 250                   | 6.8              | 5.5 - 5.8      | 185             |
| <a href="#">TPSMP7.5 thru TPSMP12(A)</a> | 300                   | 7.5 - 12         | 6.05 - 10.2    | 185             |
| <a href="#">TPSMP13 thru TPSMP43(A)</a>  | 400                   | 13 - 43          | 10.5 - 36.8    | 185             |

## TRANSZORB® TVS

| Device                             | $P_{PPM}$ (10x1000us) | $V_{(BR)}$ Range | $V_{WM}$ Range | $T_J$ max       |
|------------------------------------|-----------------------|------------------|----------------|-----------------|
|                                    | (W)                   | (V)              | (V)            | ( $^{\circ}$ C) |
| <a href="#">SMP3V3 thru SMP36A</a> | 400                   | 4.10 - 40.0      | 3.3 - 36       | 150             |

## Power Voltage-Regulating Diodes

| Device                                | $P_D$ | $V_Z$ Range | $T_J$ max       |
|---------------------------------------|-------|-------------|-----------------|
|                                       | (mW)  | (V)         | ( $^{\circ}$ C) |
| <a href="#">PTV3.9B - PTV36B</a>      | 1500  | 3.9 - 36    | 150             |
| <a href="#">SMPZ3919B - SMPZ3940B</a> | 1500  | 5.6 - 43    | 150             |



# DIODES

## DO-221BC SMPA Package

### TMBS® Trench MOS Barrier Schottky Rectifiers in Low-Profile SMPA Package

#### Features

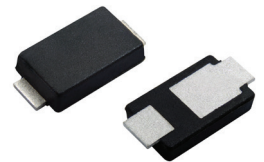
- Low-profile DO-221BC(SMPA) package
  - Typical height of 0.95 mm
- Current ratings from 3 A to 8 A
- Low forward voltage drop down to 0.37 V at 3 A
  - Low power losses and high efficiency
- Trench MOS Schottky technology
- Ideal for automated placement
- Maximum operation junction temperature of 150 °C
- Meets MSL moisture sensitivity level of 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS Directive 2011/65/EU
- Halogen free according to JEDEC JS709A standards
- 45 V devices are AEC-Q101 qualified

#### Applications

- Low-voltage, high-frequency DC/DC converters, switching power supplies, freewheeling diodes, and polarity protection in automotive applications and mobile device chargers



#### eSMP® Series



SMPA

### TMBS® (Trench MOS Barrier Schottky) Rectifiers

| Device                  | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max |
|-------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------|
|                         | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | (°C)      |
| <a href="#">V3PAL45</a> | 3           | 45              | 0.54              | 3.0 | 450               | 80        | 150       |
| <a href="#">V4PAL45</a> | 4           | 45              | 0.57              | 4.0 | 450               | 80        | 150       |
| <a href="#">V8PAL45</a> | 8           | 45              | 0.57              | 8.0 | 1850              | 120       | 150       |
| <a href="#">V3PAN50</a> | 3           | 50              | 0.57              | 3.0 | 600               | 80        | 150       |
| <a href="#">V4PAL50</a> | 4           | 50              | 0.59              | 4.0 | 600               | 80        | 150       |
| <a href="#">V8PAN50</a> | 8           | 50              | 0.56              | 8.0 | 1500              | 120       | 150       |
| <a href="#">V8PAL50</a> | 8           | 50              | 0.57              | 8.0 | 400               | 120       | 150       |



# DIODES

## TO-277A SMPC Package

### SMPC Miniature, High-Power-Density Package for Rectifiers and Transient Voltage Suppressors (TVS)

#### Features

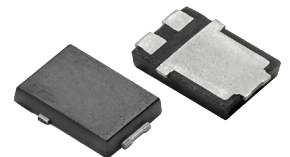
- Enable higher-current-density power supply designs
- Very small 1.1 mm height and 4.8 mm by 6.7 mm footprint saves space
- Provide more power in a smaller package
  - TMBS rectifiers rated up to 15 A
  - Planar Schottky rectifiers rated up to 15 A
- Industry-standard TO-277A package outline for easy outline compatibility
- Low forward voltage drops and special wide-bottom plate designs provide greater heat dissipation than other packages of similar sizes
- Ideal for automated placement
- Single- or dual-chip, surface-mount SMPC (TO-277A) package features solder pads that are compatible with other SMD devices

#### Applications

- Secondary rectifiers and freewheeling circuitry for AC/DC and DC/DC converters
  - Output rectification for small and medium power adapters
- Switchmode power supplies in consumer electronics such as computers, LCD monitors, and cell phones
- Flywheel and polarity protection for solenoid drive circuits in automotive and industry systems
- OR-ing diodes for telecommunication and industrial systems



#### eSMP® Series



SMPC



## Schottky Rectifiers

| Device                                | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max       |
|---------------------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------------|
|                                       | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | ( $^{\circ}$ C) |
| <a href="#">SS3P3L and SS3P4L</a>     | 3.0         | 30 - 40         | 0.47              | 3.0 | 250               | 150       | 150             |
| <a href="#">SS3P5L and SS3P6L</a>     | 3.0         | 50 - 60         | 0.60              | 3.0 | 150               | 150       | 150             |
| <a href="#">SS5P3 and SS5P4</a>       | 5.0         | 50 - 60         | 0.52              | 5.0 | 250               | 150       | 150             |
| <a href="#">SS5P5 and SS5P6</a>       | 5.0         | 50 - 60         | 0.69              | 5.0 | 150               | 150       | 150             |
| <a href="#">SS5P9 &amp; SS5P10</a>    | 5.0         | 90 - 100        | 0.88              | 5.0 | 15                | 150       | 150             |
| <a href="#">SS6P4C</a>                | 6.0         | 40              | 0.65              | 3.0 | 200               | 70        | 150             |
| <a href="#">SS8P2L and SS8P3L</a>     | 8.0         | 20 - 30         | 0.57              | 8.0 | 200               | 150       | 150             |
| <a href="#">SS8PH9 and SS8PH10</a>    | 8.0         | 90 - 100        | 0.9               | 8.0 | 2                 | 150       | 175             |
| <a href="#">SS8P2CL and SS8P3CL</a>   | 8.0         | 20 - 30         | 0.54              | 4.0 | 300               | 120       | 150             |
| <a href="#">SS8P3C and SS8P4C</a>     | 8.0         | 30 - 40         | 0.58              | 4.0 | 300               | 120       | 150             |
| <a href="#">SS8P5C and SS8P6C</a>     | 8.0         | 50 - 60         | 0.70              | 4.0 | 50                | 120       | 150             |
| <a href="#">SS10P2CL and SS10P3CL</a> | 10          | 20 - 30         | 0.52              | 5.0 | 850               | 200       | 150             |
| <a href="#">SS10P3C and SS10P4C</a>   | 10          | 30 - 40         | 0.53              | 5   | 550               | 200       | 150             |
| <a href="#">SS10P3 and SS10P4</a>     | 10          | 30 - 40         | 0.56              | 10  | 800               | 280       | 150             |
| <a href="#">SS10P5 and SS10P6</a>     | 10          | 50 - 60         | 0.67              | 10  | 150               | 280       | 150             |
| <a href="#">SS10PH45</a>              | 10          | 45              | 0.72              | 10  | 80                | 200       | 175             |
| <a href="#">SS10PH9 and SS10PH10</a>  | 10          | 90 - 100        | 0.88              | 10  | 10                | 200       | 175             |
| <a href="#">SS12P2L and SS12P3L</a>   | 12          | 20 - 30         | 0.56              | 12  | 1000              | 280       | 150             |
| <a href="#">SS12P4C</a>               | 12          | 40              | 0.52              | 6   | 500               | 150       | 150             |
| <a href="#">SS12P4S</a>               | 12          | 40              | 0.60              | 12  | 800               | 280       | 150             |
| <a href="#">SS15P3S</a>               | 15          | 30              | 0.57              | 15  | 1000              | 280       | 150             |

TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifiers

| Device                  | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max       |
|-------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------------|
|                         | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | ( $^{\circ}$ C) |
| <a href="#">V8P10</a>   | 8           | 100             | 0.68              | 8.0 | 70                | 150       | 150             |
| <a href="#">V8P12</a>   | 8           | 120             | 0.84              | 8.0 | 300               | 140       | 150             |
| <a href="#">V8PM12</a>  | 8           | 120             | 0.84              | 8.0 | 300               | 140       | 150             |
| <a href="#">V8P20</a>   | 8           | 200             | 1.40              | 8.0 | 250               | 150       | 150             |
| <a href="#">V10P10</a>  | 10          | 100             | 0.68              | 10  | 150               | 180       | 150             |
| <a href="#">V10P12</a>  | 10          | 120             | 0.82              | 10  | 400               | 160       | 150             |
| <a href="#">V10PM12</a> | 10          | 120             | 0.83              | 10  | 400               | 160       | 150             |
| <a href="#">V10PN50</a> | 10          | 50              | 0.55              | 10  | 150               | 180       | 150             |
| <a href="#">V10P20</a>  | 10          | 200             | 1.34              | 10  | 400               | 180       | 150             |
| <a href="#">V10P45</a>  | 10          | 45              | 0.57              | 10  | 800               | 180       | 150             |
| <a href="#">V10P45S</a> | 10          | 45              | 0.57              | 10  | 800               | 180       | 150             |
| <a href="#">V10PL45</a> | 10          | 45              | 0.52              | 10  | 5000              | 200       | 150             |
| <a href="#">V10PN50</a> | 10          | 50              | 0.55              | 10  | 1500              | 180       | 150             |
| <a href="#">V12P10</a>  | 12          | 100             | 0.70              | 12  | 250               | 200       | 150             |
| <a href="#">V12P12</a>  | 12          | 120             | 0.80              | 12  | 500               | 150       | 150             |
| <a href="#">V12PM12</a> | 12          | 120             | 0.80              | 12  | 500               | 160       | 150             |
| <a href="#">V15P45</a>  | 15          | 45              | 0.58              | 15  | 1500              | 210       | 150             |
| <a href="#">V15P45S</a> | 15          | 45              | 0.58              | 15  | 1500              | 210       | 150             |
| <a href="#">V15PL50</a> | 15          | 50              | 0.58              | 15  | 1500              | 200       | 150             |
| <a href="#">V15PN50</a> | 15          | 50              | 0.56              | 15  | 3000              | 200       | 150             |



## Standard ESD Capability Rectifiers

| Device                             | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $t_{rr}$ max | $I_{FSM}$ | $T_J$ max       |
|------------------------------------|-------------|-----------------|-------------------|-----|-------------------|--------------|-----------|-----------------|
|                                    | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)         | (A)       | ( $^{\circ}$ C) |
| <a href="#">SE40PB thru SE40PJ</a> | 4.0         | 100 - 600       | 1.1               | 4.0 | 10                | 2200         | 60        | 175             |
| <a href="#">SE70PB thru SE70PJ</a> | 7.0         | 100 - 600       | 1.05              | 7.0 | 20                | 2600         | 120       | 175             |

## Standard Rectifiers

| Device                         | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $t_{rr}$ max | $I_{FSM}$ | $T_J$ max       |
|--------------------------------|-------------|-----------------|-------------------|-----|-------------------|--------------|-----------|-----------------|
|                                | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)         | (A)       | ( $^{\circ}$ C) |
| <a href="#">S4PB thru S4PM</a> | 4.0         | 100 - 1000      | 1.10              | 4.0 | 10                | 2500         | 100       | 150             |
| <a href="#">S5PMS</a>          | 5.0         | 1000            | 1.15              | 5.0 | 10                | 2500         | 100       | 150             |

## Fred Pt Ultrafast Rectifiers

| Device                        | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $t_{rr}$ max | $T_J$ max       |
|-------------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|--------------|-----------------|
|                               | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | (ns)         | ( $^{\circ}$ C) |
| <a href="#">VS-4CSH01HM3</a>  | 4.0         | 100             | 0.95              | 2.0 | 2                 | 90        | 16           | 175             |
| <a href="#">VS-4CSH01-M3</a>  | 4.0         | 100             | 0.95              | 2.0 | 2                 | 90        | 16           | 175             |
| <a href="#">VS-4CSH02HM3</a>  | 4.0         | 200             | 0.95              | 2.0 | 2                 | 90        | 16           | 175             |
| <a href="#">VS-4CSH02-M3</a>  | 4.0         | 200             | 0.95              | 2.0 | 2                 | 90        | 16           | 175             |
| <a href="#">VS-4ESH01HM3</a>  | 4.0         | 100             | 0.93              | 4.0 | 2                 | 130       | 20           | 175             |
| <a href="#">VS-4ESH01-M3</a>  | 4.0         | 100             | 0.93              | 4.0 | 2                 | 130       | 20           | 175             |
| <a href="#">VS-4ESH02HM3</a>  | 4.0         | 200             | 0.93              | 4.0 | 2                 | 130       | 20           | 175             |
| <a href="#">VS-4ESH02-M3</a>  | 4.0         | 200             | 0.93              | 4.0 | 2                 | 130       | 20           | 175             |
| <a href="#">VS-6ESH01HM3</a>  | 6.0         | 100             | 0.94              | 6.0 | 2                 | 150       | 22           | 175             |
| <a href="#">VS-6ESH01-M3</a>  | 6.0         | 100             | 0.94              | 6.0 | 2                 | 150       | 22           | 175             |
| <a href="#">VS-6ESH02HM3</a>  | 6.0         | 200             | 0.94              | 6.0 | 2                 | 150       | 22           | 175             |
| <a href="#">VS-6ESH02-M3</a>  | 6.0         | 200             | 0.94              | 6.0 | 2                 | 150       | 22           | 175             |
| <a href="#">VS-6CSH01HM3</a>  | 6.0         | 100             | 0.94              | 3.0 | 2                 | 150       | 20           | 175             |
| <a href="#">VS-6CSH01-M3</a>  | 6.0         | 100             | 0.94              | 3.0 | 2                 | 150       | 20           | 175             |
| <a href="#">VS-6CSH02HM3</a>  | 6.0         | 200             | 0.94              | 3.0 | 2                 | 150       | 20           | 175             |
| <a href="#">VS-6CSH02-M3</a>  | 6.0         | 200             | 0.94              | 3.0 | 2                 | 150       | 20           | 175             |
| <a href="#">VS-8CSH01HM3</a>  | 8.0         | 100             | 0.95              | 4.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-8CSH01-M3</a>  | 8.0         | 100             | 0.95              | 4.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-8CSH02HM3</a>  | 8.0         | 200             | 0.95              | 4.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-8CSH02-M3</a>  | 8.0         | 200             | 0.95              | 4.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-10CSH01HM3</a> | 10          | 100             | 0.98              | 5.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-10CSH01-M3</a> | 10          | 100             | 0.98              | 5.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-10CSH02HM3</a> | 10          | 200             | 0.98              | 5.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-10CSH02-M3</a> | 10          | 200             | 0.98              | 5.0 | 2                 | 130       | 18           | 175             |
| <a href="#">VS-6ESU06HM3</a>  | 6.0         | 600             | 1.3               | 6.0 | 5                 | 120       | 58           | 175             |
| <a href="#">VS-6ESU06-M3</a>  | 6.0         | 600             | 1.3               | 6.0 | 5                 | 120       | 58           | 175             |
| <a href="#">VS-6ESH06HM3</a>  | 6.0         | 600             | 1.8               | 6.0 | 5                 | 90        | 40           | 175             |
| <a href="#">VS-6ESH06-M3</a>  | 6.0         | 600             | 1.8               | 6.0 | 5                 | 90        | 40           | 175             |



## DIODES

## TO-277A SMPC Package

## Avalanche Rectifiers

| Device                              | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $E_R$ | $t_{rr}$ | $I_{FSM}$ | $T_J$ max |
|-------------------------------------|-------------|-----------------|-------------------|-----|-------------------|-------|----------|-----------|-----------|
|                                     | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (mJ)  | (ns)     | (A)       | (°C)      |
| <a href="#">AS3PD thru AS3PM</a>    | 3.0         | 200 - 1000      | 1.1               | 3   | 10                | 20    | 1200     | 70        | 175       |
| <a href="#">AS4PD thru AS4PM</a>    | 4.0         | 200 - 1000      | 1.1               | 4   | 10                | 20    | 1800     | 100       | 175       |
| <a href="#">AR3PD, AR3PG, AR3PJ</a> | 3           | 200, 400, 600   | 1.6               | 3   | 10                | 20    | 140      | 50        | 175       |
| <a href="#">AR3PK, AR3PM</a>        | 3           | 800, 1000       | 1.9               | 3   | 10                | 20    | 120      | 50        | 175       |
| <a href="#">AR4PD, AR4PG, AR4PJ</a> | 4           | 200, 400, 600   | 1.6               | 4   | 10                | 20    | 140      | 65        | 175       |
| <a href="#">AR4PK, AR4PM</a>        | 4           | 800, 1000       | 1.9               | 4   | 10                | 20    | 120      | 65        | 175       |
| <a href="#">AU2PD, AU2PG, AU2PJ</a> | 2           | 200, 400, 600   | 1.9               | 2   | 10                | 20    | 75       | 30        | 175       |
| <a href="#">AU2PK, AU2PM</a>        | 2           | 800, 1000       | 2.5               | 2   | 10                | 20    | 75       | 30        | 175       |
| <a href="#">AU3PD, AU3PG, AU3PJ</a> | 3           | 200, 400, 600   | 1.9               | 3   | 10                | 20    | 75       | 45        | 175       |
| <a href="#">AU3PK, AU3PM</a>        | 3           | 800, 1000       | 2.5               | 3   | 10                | 20    | 75       | 45        | 175       |

## PAR® TVS

| Device                                  | $P_{PPM}$ (10x1000us) | $V_{(BR)}$ Range | $V_{WM}$ Range | $T_J$ max |
|-----------------------------------------|-----------------------|------------------|----------------|-----------|
|                                         | (W)                   | (V)              | (V)            | (°C)      |
| <a href="#">TPC6.8(A) thru TPC51(A)</a> | 1500                  | 6.8 - 51         | 5.5 - 43.6     | 185       |

## TRANSZORB® TVS

| Device                               | $P_{PPM}$ (10x1000us) | $V_{(BR)}$ Range | $V_{WM}$ Range | $T_J$ max |
|--------------------------------------|-----------------------|------------------|----------------|-----------|
|                                      | (W)                   | (V)              | (V)            | (°C)      |
| <a href="#">SMPC5.0A thru SMP36A</a> | 1500                  | 6.4 - 40.0       | 5.0 - 36       | 150       |



# DIODES

## TO-263AC SMPD Package

### TMBS® Trench MOS Barrier Schottky and Standard Rectifiers in SMPD Package

#### Features

- Low-profile SMPD package
  - Typical height of 1.7 mm
- Ideal for automated placement
- Meets MSL moisture sensitivity level of 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS Directive 2011/65/EU
- Halogen free according to JEDEC JS709A standards

#### Features for TMBS® Rectifiers

- Current ratings from 10 A to 60 A
- Low forward voltage drop down to 0.40 V at 15 A
  - Low power losses and high efficiency
- Trench MOS Schottky technology
- Maximum operation junction temperature of 150 °C
- Halogen free according to JEDEC JS709A standards

#### Features for Standard Rectifiers

- Oxide planar chip technology
- Current ratings range from 10 A to 20 A
- Low forward voltage drop
- ESD capability
- Maximum operation junction temperature of 175 °C
- AEC-Q101 qualified
- Halogen free according to JEDEC JS709A standards

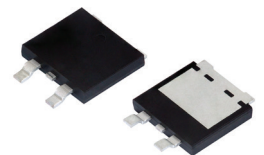
#### Applications

- For use in high-frequency DC/DC converters, switching power supplies, freewheeling diodes, OR-ing diodes, and reverse battery protection
- General purpose, power line polarity protection in automotive application

#### Rectifiers in Low-Profile SMPD Package



#### eSMP® Series



SMPD



## DIODES

## TO-263AC SMPD Package

## TMBS® (Trench MOS Barrier Schottky) Rectifiers

| Device                    | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max |
|---------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------|
|                           | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | (°C)      |
| <a href="#">V10D45C</a>   | 10          | 45              | 0.58              | 5.0 | 500               | 100       | 150       |
| <a href="#">V10D60C</a>   | 10          | 60              | 0.70              | 5.0 | 700               | 100       | 150       |
| <a href="#">V10D100C</a>  | 10          | 100             | 0.75              | 5.0 | 500               | 100       | 150       |
| <a href="#">V10D120C</a>  | 10          | 120             | 0.94              | 5.0 | 500               | 100       | 150       |
| <a href="#">V10D45C</a>   | 10          | 45              | 0.58              | 5.0 | 500               | 100       | 150       |
| <a href="#">V20DL45</a>   | 20          | 45              | 0.64              | 20  | 2500              | 160       | 150       |
| <a href="#">V20DL45BP</a> | 20          | 45              | 0.64              | 20  | 2500              | 160       | 150       |
| <a href="#">V20DM120C</a> | 20          | 120             | 0.93              | 10  | 600               | 120       | 150       |
| <a href="#">V30D45C</a>   | 30          | 45              | 0.57              | 15  | 1500              | 200       | 150       |
| <a href="#">V30D60C</a>   | 30          | 60              | 0.70              | 15  | 1200              | 170       | 150       |
| <a href="#">V30D60CL</a>  | 30          | 60              | 0.61              | 15  | 4000              | 200       | 150       |
| <a href="#">V30DL45</a>   | 30          | 45              | 0.65              | 30  | 3000              | 200       | 150       |
| <a href="#">V30DL45BP</a> | 30          | 45              | 0.65              | 30  | 3000              | 200       | 150       |
| <a href="#">V30DL50C</a>  | 30          | 50              | 0.57              | 15  | 1800              | 300       | 150       |
| <a href="#">V30DM120C</a> | 30          | 120             | 0.93              | 15  | 800               | 150       | 150       |
| <a href="#">V40DL45</a>   | 40          | 45              | 0.66              | 40  | 5000              | 240       | 150       |
| <a href="#">V40DL45BP</a> | 40          | 45              | 0.66              | 40  | 5000              | 240       | 150       |
| <a href="#">V40DM120C</a> | 40          | 120             | 0.89              | 20  | 500               | 250       | 150       |
| <a href="#">V60D45C</a>   | 60          | 45              | 0.64              | 30  | 2500              | 320       | 150       |
| <a href="#">V60D100C</a>  | 60          | 100             | 0.81              | 30  | 1000              | 320       | 150       |
| <a href="#">V60D120C</a>  | 60          | 120             | 0.96              | 30  | 800               | 320       | 150       |

## Standard ESD Capability Rectifiers

| Device                             | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | trr Typ. | $I_{FSM}$ | $T_J$ max |
|------------------------------------|-------------|-----------------|-------------------|-----|-------------------|----------|-----------|-----------|
|                                    | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)     | (A)       | (°C)      |
| <a href="#">SE10DB thru SE10DJ</a> | 10          | 100 - 600       | 1.15              | 10  | 15                | 3000     | 110       | 175       |
| <a href="#">SE12DB thru SE12DJ</a> | 12          | 100 - 600       | 1.15              | 12  | 20                | 3000     | 125       | 175       |
| <a href="#">SE20DB thru SE20DJ</a> | 20          | 100 - 600       | 1.20              | 20  | 25                | 3000     | 150       | 175       |



# DIODES

## DO-219AB SMF Package

### Diodes in SMF Package: Improved Performance in a Smaller Footprint

#### INTRODUCTION

Vishay Semiconductors diodes in the SMF (DO-219AB) package meet the demand for smaller and thinner devices that enable small and light portable products, such as cellular phones, notebook PCs, and portable consumer products, as well as space-constrained automotive modules. With its exceptionally low height profile of 0.98 mm, the SMF package reduces space requirements and improves circuit board density. Vishay diode products offered in the SMF address all industry segments and include switching, fast switching, ultrafast switching, Schottky, ESD protection, and Zener diodes.



#### eSMP® Series



SMF

#### Features

- SOD-123 footpad size
- 0.98 mm package height
- 0.8 W power dissipation
- Broad product range
- Excellent stability
- Best-in-class reliability
- Flat terminal allows stable mounting on PCB
- High reliability due to planar structure of the die
- High surge current capability due to soldered construction
- High power rating despite small package size
- Ultra-low stress epoxy molding compound
- Automotive (AEC-Q101) qualified
- Reflow and wave solderable
- Symmetrical leads allow visual inspection after soldering
- Reverse voltage up to 1000 V
- Halogen-free versions available
- Package dimensions are common industry standard

#### Applications

- Fast and superfast diodes
  - Portable products
  - Reverse current protection
  - DC/DC converters
  - Lighting
- General purpose and Schottky diodes
  - Rectification
  - Reverse polarity protection
  - Free wheeling
  - Automotive
- Zener and ESD protection diodes
  - Voltage stabilization
  - Gate protection for MOSFETs
  - ESD protection
  - Lighting

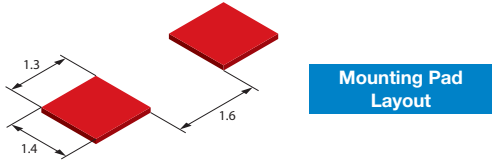
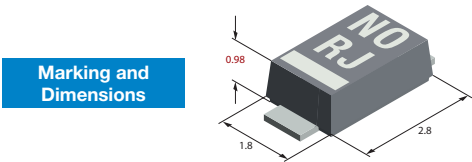
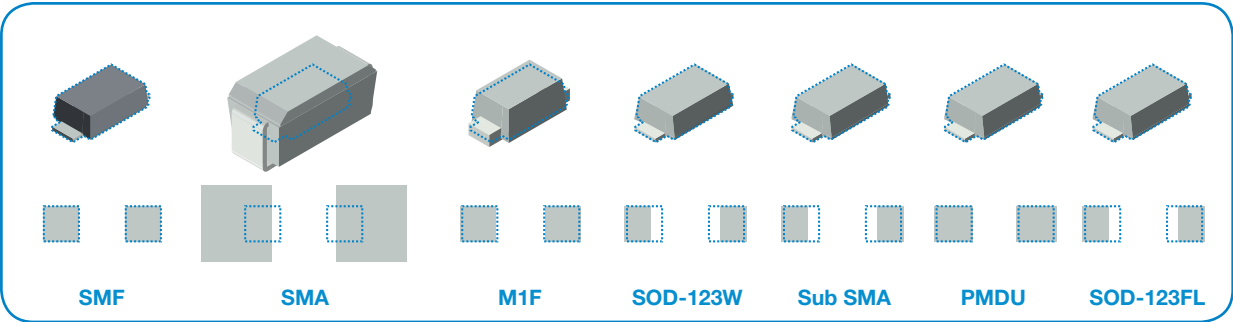
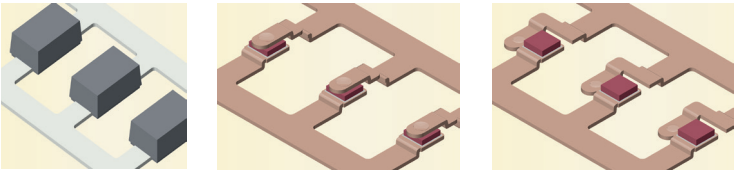


DIODES

DO-219AB SMF Package

Diodes - Low-Profile Surface-Mount Packages

Patented



ESD Protection Diodes

| Device                                  | $T_j$ max.<br>(°C) | $V_f$<br>(V) | $P_{ppm}$ at<br>10/1000 $\mu$ s<br>(W) | $P_{ppm}$ at<br>8/20 $\mu$ s<br>(W) | $V_{(BR)}$<br>(V) | ESD<br>Protection<br>Air/Contact<br>(kV) |
|-----------------------------------------|--------------------|--------------|----------------------------------------|-------------------------------------|-------------------|------------------------------------------|
| <a href="#">SMF5V0A - SMF51A</a>        | 150                | 3.5 at 12 A  | 200                                    | 1000                                | 6.4 to 56.7       | 30/8                                     |
| <a href="#">BZD27C3V6P - BZD27C200P</a> | 150                | 1.2 at 0.2 A | 150 (< 100 V)<br>100 ( $\geq$ 110 V)   | –                                   | 7.0 to 188        | 30/8                                     |

Zener Diodes

| Device                                  | $T_j$ max.<br>(°C) | $V_F$ at 0.2 A<br>(V) | $P_{tot}$<br>(W) | $V_Z$<br>(V) |
|-----------------------------------------|--------------------|-----------------------|------------------|--------------|
| <a href="#">BZD27C3V6P - BZD27C200P</a> | 150                | 1.2                   | 0.8              | 3.6 to 200   |

### Schottky Diodes

| Device               | T <sub>j</sub> max.<br>(°C) | I <sub>FSM</sub><br>(A) | I <sub>F(AV)</sub><br>(A) | V <sub>RRM</sub><br>(V) | V <sub>F</sub> at<br>0.5 A<br>(V) | V <sub>F</sub> at<br>1.1 A<br>(V) | I <sub>R</sub> at<br>25 °C<br>(μA) | I <sub>R</sub> at<br>100 °C<br>(mA) |
|----------------------|-----------------------------|-------------------------|---------------------------|-------------------------|-----------------------------------|-----------------------------------|------------------------------------|-------------------------------------|
| <a href="#">SL02</a> | 125                         | 40                      | 1.1                       | 20                      | 0.36                              | 0.42                              | 250                                | 8                                   |
| <a href="#">SL03</a> | 125                         | 40                      | 1.1                       | 30                      | 0.395                             | 0.45                              | 130                                | 6                                   |
| <a href="#">SL04</a> | 125                         | 40                      | 1.1                       | 40                      | 0.45                              | 0.53                              | 20                                 | 6                                   |

### Switching Diodes

| Device               | T <sub>j</sub> max.<br>(°C) | I <sub>FSM</sub><br>(A) | I <sub>F(AV)</sub><br>(A) | V <sub>RRM</sub><br>(V) | V <sub>F</sub> at<br>1.0 A<br>(V) | I <sub>R</sub> at<br>25 °C<br>(μA) | I <sub>R</sub> at<br>125 °C<br>(μA) | t <sub>rr</sub><br>(μs) |
|----------------------|-----------------------------|-------------------------|---------------------------|-------------------------|-----------------------------------|------------------------------------|-------------------------------------|-------------------------|
| <a href="#">S07B</a> | 150                         | 25                      | 1.5                       | 100                     | 1.1                               | 10                                 | 50                                  | 1.8                     |
| <a href="#">S07D</a> | 150                         | 25                      | 1.5                       | 200                     | 1.1                               | 10                                 | 50                                  | 1.8                     |
| <a href="#">S07G</a> | 150                         | 25                      | 1.5                       | 400                     | 1.1                               | 10                                 | 50                                  | 1.8                     |
| <a href="#">S07J</a> | 150                         | 25                      | 1.5                       | 600                     | 1.1                               | 10                                 | 50                                  | 1.8                     |
| <a href="#">S07M</a> | 150                         | 25                      | 1.5                       | 1000                    | 1.1                               | 10                                 | 50                                  | 1.8                     |

### Fast Switching Diodes

| Device                | T <sub>j</sub> max.<br>(°C) | I <sub>FSM</sub><br>(A) | I <sub>F(AV)</sub><br>(A) | V <sub>RRM</sub><br>(V) | V <sub>F</sub> at<br>0.7 A<br>(V) | I <sub>R</sub> at<br>25 °C<br>(μA) | I <sub>R</sub> at<br>125 °C<br>(μA) | t <sub>rr</sub><br>(μs) |
|-----------------------|-----------------------------|-------------------------|---------------------------|-------------------------|-----------------------------------|------------------------------------|-------------------------------------|-------------------------|
| <a href="#">RS07B</a> | 150                         | 30                      | 1.4                       | 100                     | 1.15                              | 10                                 | 50                                  | 150                     |
| <a href="#">RS07D</a> | 150                         | 30                      | 1.4                       | 200                     | 1.15                              | 10                                 | 50                                  | 150                     |
| <a href="#">RS07G</a> | 150                         | 30                      | 1.4                       | 400                     | 1.15                              | 10                                 | 50                                  | 150                     |
| <a href="#">RS07J</a> | 150                         | 30                      | 1.4                       | 600                     | 1.15                              | 10                                 | 50                                  | 250                     |
| <a href="#">RS07K</a> | 150                         | 30                      | 1.4                       | 800                     | 1.3 @ 1 A                         | 2                                  | 150                                 | 300                     |

### Ultrafast Switching Diodes

| Device                | T <sub>j</sub> max.<br>(°C) | I <sub>FSM</sub><br>(A) | I <sub>F(AV)</sub><br>(A) | V <sub>RRM</sub><br>(V) | V <sub>F</sub> at<br>1.0 A<br>(V) | I <sub>R</sub> at<br>25 °C<br>(μA) | I <sub>R</sub> at<br>100 °C<br>(μA) | t <sub>rr</sub><br>(ns) |
|-----------------------|-----------------------------|-------------------------|---------------------------|-------------------------|-----------------------------------|------------------------------------|-------------------------------------|-------------------------|
| <a href="#">ES07B</a> | 150                         | 30                      | 1.2                       | 100                     | 0.98                              | 10                                 | 50                                  | 25                      |
| <a href="#">ES07D</a> | 150                         | 30                      | 1.2                       | 200                     | 0.98                              | 10                                 | 50                                  | 25                      |

### FRED Pt® Ultrafast Recovery Rectifiers

| Device                        | I <sub>F(AV)</sub> | V <sub>(BR)</sub> | Max V <sub>F</sub> @ I <sub>F</sub> |     | Typ t <sub>rr</sub> @ see setup |                                                           | Typ Q <sub>rr</sub> @ see setup |
|-------------------------------|--------------------|-------------------|-------------------------------------|-----|---------------------------------|-----------------------------------------------------------|---------------------------------|
|                               | (A)                | (V)               | (V)                                 | (A) | (ns)                            | @ (I <sub>F</sub> , di <sub>F</sub> /dt, V <sub>R</sub> ) | (nC)                            |
| <a href="#">VS-1EFH02W-M3</a> | 1.0                | 200               | 0.80                                | 1   | 16                              | 1A, 200A/us, 160V                                         | 13                              |
| <a href="#">VS-1EFH02WHM3</a> | 1.0                | 200               | 0.80                                | 1   | 16                              | 1A, 200A/us, 160V                                         | 13                              |
| <a href="#">VS-1EFH01W-M3</a> | 1.0                | 100               | 0.80                                | 1   | 16                              | 1A, 200A/us, 160V                                         | 13                              |
| <a href="#">VS-1EFH01WHM3</a> | 1.0                | 100               | 0.80                                | 1   | 16                              | 1A, 200A/us, 160V                                         | 13                              |

### Compatible with Common Industry Standards Packages

| Package         | SMF Mounting Pad Compatibility | SMF Package Height Comparison | SMF Mounting Pad Area Comparison |
|-----------------|--------------------------------|-------------------------------|----------------------------------|
| SMA             | -                              | -120 %                        | -110 %                           |
| M1F             | Yes                            | -40%                          | -5 %                             |
| SOD123W         | Yes                            | -2%                           | 5%                               |
| SMF Competition | Yes                            | 0%                            | 19%                              |
| PMDU            | Yes                            | 8%                            | 17%                              |
| SubSMA          | Yes                            | -36%                          | 0%                               |
| SOD-123FL       | Yes                            | 0%                            | -5 %                             |

\* Reflow soldering/wave soldering



## DIODES

## DO-221AC SlimSMA Package

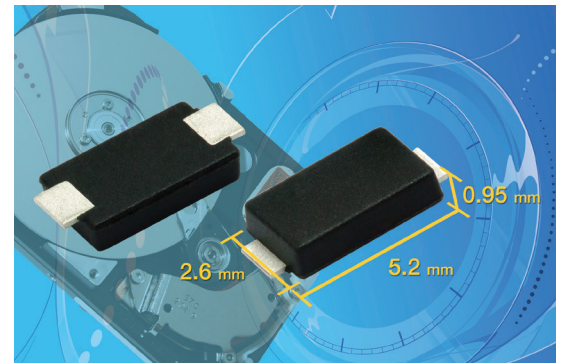
## Low-Profile SlimSMA Package for Rectifiers and Transient Voltage Suppressors (TVS)

## Features

- Very low profile - typical height of 0.95 mm
- Ideal for automated placement
- AEC-Q101 qualified
- Halogen-free, RoHS-compliant
- Meet the MSL Level 1 standard, per J-STD-020, LF maximum peak of 260 °C

## Applications

- Consumer
- Computer
- Telecommunication
- Industrial
- Automotive



eSMP® Series



SlimSMA

## TMBS® (Trench MOS Barrier Schottky) Rectifiers

| Device                    | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $I_{FSM}$ | $T_J$ max |
|---------------------------|-------------|-----------------|-------------------|-----|-------------------|-----------|-----------|
|                           | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (A)       | (°C)      |
| <a href="#">VSSAF3L45</a> | 3           | 45              | 0.54              | 3.0 | 450               | 80        | 150       |
| <a href="#">VSSAF5L45</a> | 5           | 45              | 0.56              | 5.0 | 650               | 100       | 150       |

## FRED Pt® Ultrafast Diodes

| Device                       | $I_F$ (AV)<br>(A) | $V_{(BR)}$<br>(V) | Max $V_F$ @ $I_F$ |     | Typ $t_{rr}$ @ see setup |                                 | Typ $Q_{rr}$ @ see setup |  |
|------------------------------|-------------------|-------------------|-------------------|-----|--------------------------|---------------------------------|--------------------------|--|
|                              |                   |                   | (V)               | (A) | (ns)                     | @ ( $I_F$ , $di_F/dt$ , $V_R$ ) | (nC)                     |  |
| <a href="#">VS-2EJH02-M3</a> | 2.0               | 200               | 0.77              | 2   | 17                       | 2A, 200 A/ $\mu$ s, 160 V       | 17                       |  |
| <a href="#">VS-2EJH02HM3</a> | 2.0               | 200               | 0.77              | 2   | 17                       | 2A, 200 A/ $\mu$ s, 160 V       | 17                       |  |
| <a href="#">VS-2EJH01-M3</a> | 2.0               | 100               | 0.77              | 2   | 17                       | 2A, 200 A/ $\mu$ s, 160 V       | 17                       |  |
| <a href="#">VS-2EJH01HM3</a> | 2.0               | 100               | 0.77              | 2   | 17                       | 2A, 200 A/ $\mu$ s, 160 V       | 17                       |  |
| <a href="#">VS-3EJH02-M3</a> | 3.0               | 200               | 0.78              | 3   | 18                       | 3A, 200 A/ $\mu$ s, 160 V       | 23                       |  |
| <a href="#">VS-3EJH02HM3</a> | 3.0               | 200               | 0.78              | 3   | 18                       | 3A, 200 A/ $\mu$ s, 160 V       | 23                       |  |
| <a href="#">VS-3EJH01-M3</a> | 3.0               | 100               | 0.78              | 3   | 18                       | 3A, 200 A/ $\mu$ s, 160 V       | 23                       |  |
| <a href="#">VS-3EJH01HM3</a> | 3.0               | 100               | 0.78              | 3   | 18                       | 3A, 200 A/ $\mu$ s, 160 V       | 23                       |  |

## Standard ESD Capability Rectifiers

| Device                               | $I_{F(AV)}$ | $V_{RRM}$ Range | Max $V_F$ @ $I_F$ |     | $I_R$ @ $V_{RRM}$ | $t_{rr}$ Typ. | $I_{FSM}$ | $T_J$ max |
|--------------------------------------|-------------|-----------------|-------------------|-----|-------------------|---------------|-----------|-----------|
|                                      | (A)         | (V)             | (V)               | (A) | ( $\mu$ A)        | (ns)          | (A)       | (°C)      |
| <a href="#">SE20AFB thru SE20AFJ</a> | 2.0         | 100 to 600      | 1.1               | 2.0 | 5                 | 1200          | 35        | 175       |
| <a href="#">SE30AFB thru SE30AFJ</a> | 3.0         | 100 to 600      | 1.1               | 2.0 | 10                | 1500          | 40        | 175       |

**DIODES****DO-221AC SlimSMA Package****PAR® TVS**

| Device                                | P <sub>PPM</sub> (10x1000us) | V <sub>(BR)</sub> Range | V <sub>WM</sub> Range | T <sub>J</sub> max |
|---------------------------------------|------------------------------|-------------------------|-----------------------|--------------------|
|                                       | (W)                          | (V)                     | (V)                   | (°C)               |
| <a href="#">TA6F6.8A thru TA6F51A</a> | 600                          | 6.8 - 51                | 5.8 - 43.6            | 185                |

**TRANSZORB® TVS**

| Device                                  | P <sub>PPM</sub> (10x1000us) | V <sub>(BR)</sub> Range | V <sub>WM</sub> Range | T <sub>J</sub> max |
|-----------------------------------------|------------------------------|-------------------------|-----------------------|--------------------|
|                                         | (W)                          | (V)                     | (V)                   | (°C)               |
| <a href="#">SMA6F5.0A thru SMA6F20A</a> | 600                          | 6.4 - 22.2              | 5.0 - 20              | 150                |



**DIODES**

**eSMP® Series**

**Diodes - Low-Profile Surface-Mount Packages**

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