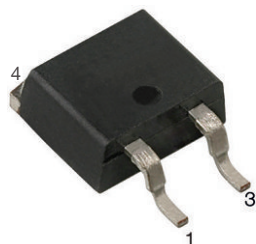
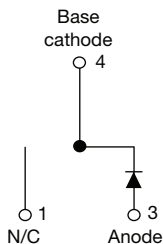


# 1200 V Gen 4 Power Silicon Carbide Schottky Diode, 30 A


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


## FEATURES

- Positive  $V_F$  temperature coefficient for easy paralleling
- Virtually no recovery tail and no switching losses
- Temperature invariant switching behavior
- Minimum creepage and clearance distances are 5.2 mm and 5.4 mm respectively
- High CTI molding compound provides excellent electrical insulation at relevant working voltages
- 175 °C maximum operating junction temperature
- AEC-Q101 qualified meets JESD 201 class 2 whisker test
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


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

## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS       |                                     |
|-------------------------------|-------------------------------------|
| $I_F$                         | 30 A                                |
| $V_R$                         | 1200 V                              |
| $V_F$ at $I_F$ at 25 °C, typ. | 1.36 V                              |
| $T_J$ max.                    | 175 °C                              |
| $I_R$ at $V_R$ at 175 °C      | 550 $\mu$ A                         |
| $Q_C$ ( $V_R = 800$ V)        | 158 nC                              |
| Package                       | D <sup>2</sup> PAK 2L (TO-263AB 2L) |
| Circuit configuration         | Single                              |

## DESCRIPTION / APPLICATIONS

Wide band gap SiC based 1200 V Schottky diode, designed for high performance and ruggedness.

Optimized for extreme high speed hard switching across a wide temperature range. This SiC diode is ideal for applications with high  $dI/dt$  such as high efficiency PFC and ultra-high frequency output rectifiers in AC/DC and DC/DC converters.

## MECHANICAL DATA

**Case:** D<sup>2</sup>PAK 2L (TO-263AB 2L)

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise specified) |                      |                                                    |             |                  |
|-------------------------------------------------------------|----------------------|----------------------------------------------------|-------------|------------------|
| PARAMETER                                                   | SYMBOL               | TEST CONDITIONS                                    | VALUES      | UNITS            |
| Peak repetitive reverse voltage                             | $V_{RRM}$            |                                                    | 1200        | V                |
| Continuous forward current                                  | $I_F^{(1)}$          | $T_C = 141$ °C (DC)                                | 30          | A                |
|                                                             | $I_F^{(2)}$          | $T_C = 124$ °C (DC)                                | 30          | A                |
| DC blocking voltage                                         | $V_{DC}$             |                                                    | 1200        | V                |
| Repetitive peak forward current                             | $I_{FRM}$            | $T_C = 25$ °C, $f = 50$ Hz, square wave, DC = 25 % | 98          | A                |
| Non-repetitive peak forward surge current                   | $I_{FSM}$            | $T_C = 25$ °C, $t_p = 10$ ms, half sine wave       | 144         | A                |
|                                                             |                      | $T_C = 110$ °C, $t_p = 10$ ms, half sine wave      | 120         |                  |
| Power dissipation                                           | $P_{tot}^{(1)}$      | $T_C = 25$ °C                                      | 250         | W                |
|                                                             |                      | $T_C = 110$ °C                                     | 108.3       |                  |
|                                                             | $P_{tot}^{(2)}$      | $T_C = 25$ °C                                      | 166.7       | W                |
|                                                             |                      | $T_C = 110$ °C                                     | 72.2        |                  |
| $I^2t$ value                                                | $\int i^2 dt$        | $T_C = 25$ °C                                      | 103         | A <sup>2</sup> s |
|                                                             |                      | $T_C = 110$ °C                                     | 72          |                  |
| Operating junction and storage temperatures                 | $T_J^{(3)}, T_{Stg}$ |                                                    | -55 to +175 | °C               |

## Notes

(1) Based on typical  $R_{th}$

(2) Based on maximum  $R_{th}$

(3) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$

**ELECTRICAL SPECIFICATIONS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

| PARAMETER               | SYMBOL | TEST CONDITIONS                                             | MIN. | TYP. | MAX. | UNITS         |
|-------------------------|--------|-------------------------------------------------------------|------|------|------|---------------|
| Forward voltage         | $V_F$  | $I_F = 30\text{ A}$                                         | -    | 1.36 | 1.5  | V             |
|                         |        | $I_F = 30\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$      | -    | 1.75 | 2.15 |               |
|                         |        | $I_F = 30\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$      | -    | 1.88 | -    |               |
| Reverse leakage current | $I_R$  | $V_R = V_R\text{ rated}$                                    | -    | 15   | 160  | $\mu\text{A}$ |
|                         |        | $V_R = V_R\text{ rated}, T_J = 150\text{ }^{\circ}\text{C}$ | -    | 250  | 1000 |               |
|                         |        | $V_R = V_R\text{ rated}, T_J = 175\text{ }^{\circ}\text{C}$ | -    | 550  | -    |               |
| Total capacitance       | C      | $V_R = 1\text{ V}, f = 1\text{ MHz}$                        | -    | 1821 | -    | pF            |
|                         |        | $V_R = 800\text{ V}, f = 1\text{ MHz}$                      | -    | 109  | -    |               |
| Total capacitive charge | $Q_C$  | $V_R = 800\text{ V}, f = 1\text{ MHz}$                      | -    | 158  | -    | nC            |

**THERMAL - MECHANICAL SPECIFICATIONS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

| PARAMETER                            | SYMBOL     | TEST CONDITIONS | MIN.      | TYP. | MAX. | UNITS                |
|--------------------------------------|------------|-----------------|-----------|------|------|----------------------|
| Thermal resistance, junction-to-case | $R_{thJC}$ |                 | -         | 0.6  | 0.9  | $^{\circ}\text{C/W}$ |
| Marking device                       |            |                 | 4C30ET12S |      |      |                      |

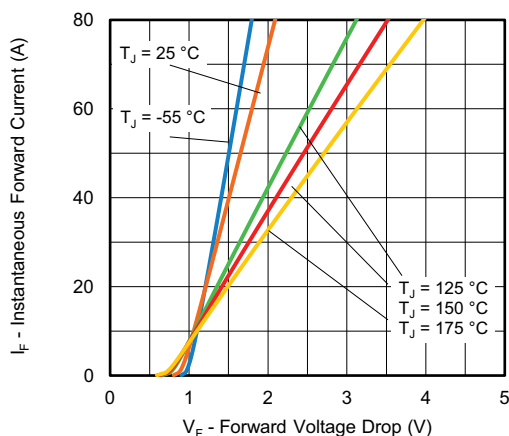


Fig. 1 - Typical Forward Voltage Drop Characteristics

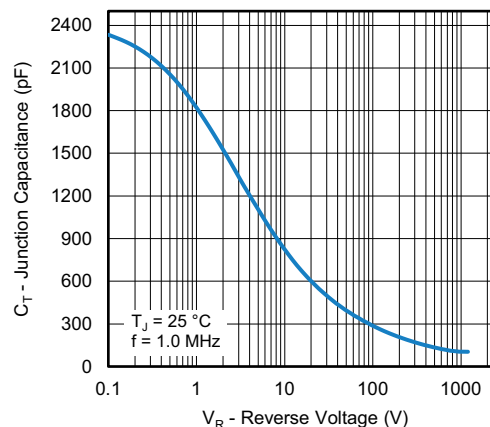


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

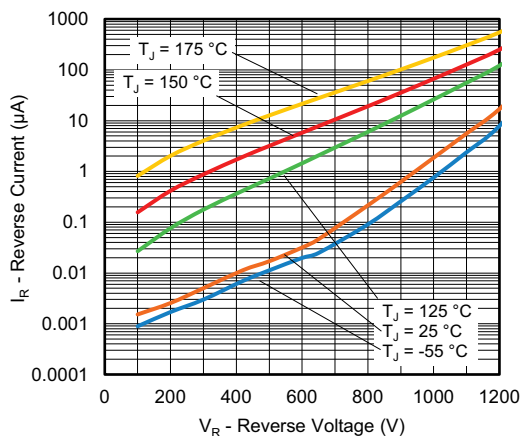


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

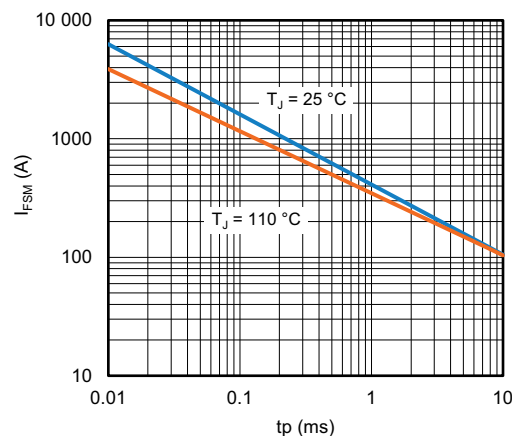


Fig. 4 - Non-Repetitive Peak Forward Surge Current vs. Pulse Duration (Square Wave)

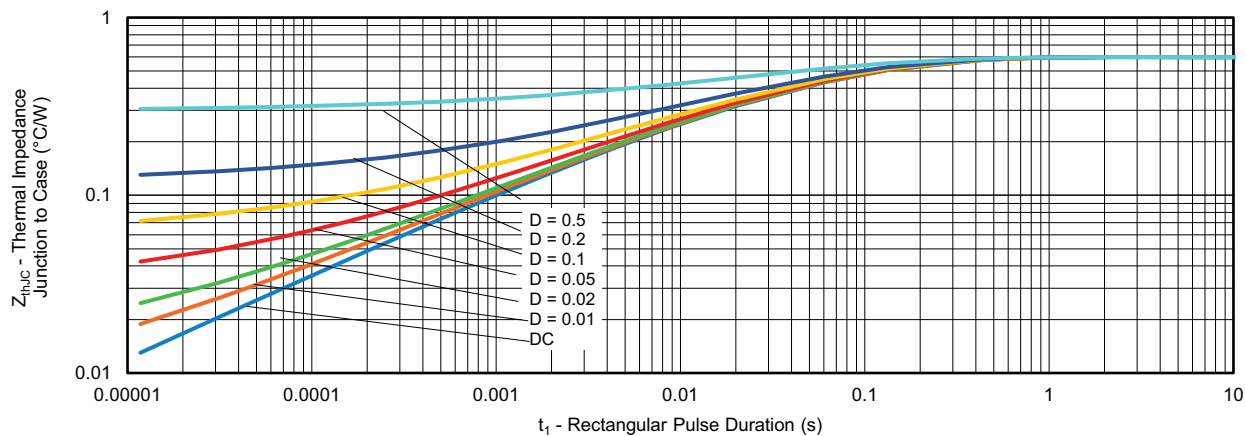
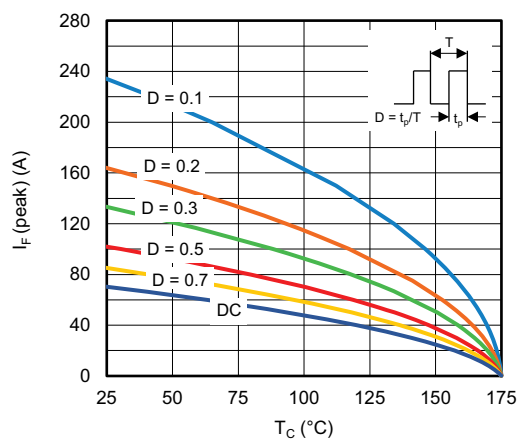

Fig. 5 - Typical Thermal Impedance  $Z_{thJC}$  - Characteristics


Fig. 6 - Peak Forward Current vs. Maximum Allowable Case Temperature

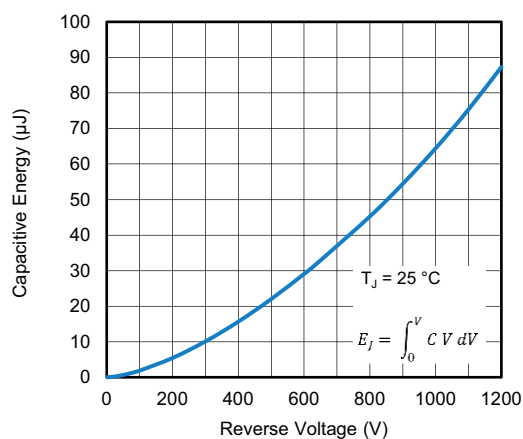


Fig. 8 - Typical Capacitive Energy vs. Reverse Voltage

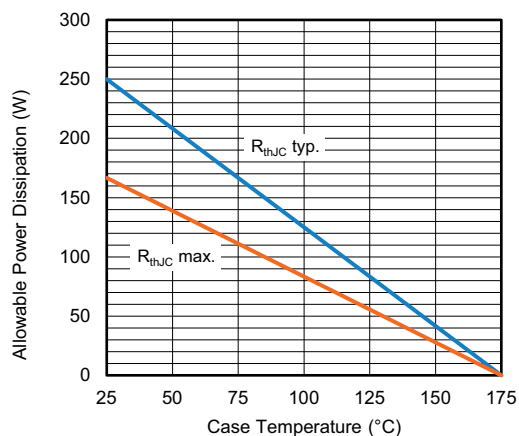


Fig. 7 - Forward Power Loss Characteristics

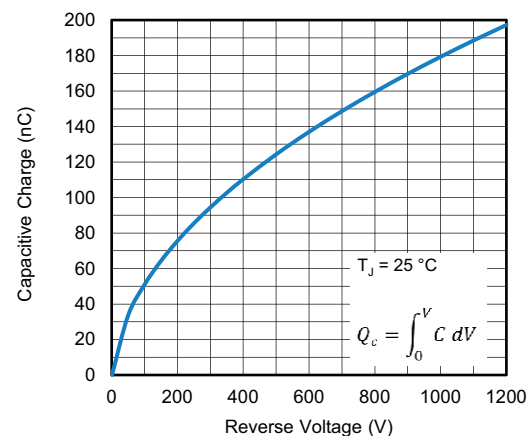


Fig. 9 - Typical Capacitive Charge vs. Reverse Voltage

**ORDERING INFORMATION TABLE**

| Device code | VS-                                                                                       | 4C | 30 | E | T | 12 | S | 2 | L | H  | M3 |
|-------------|-------------------------------------------------------------------------------------------|----|----|---|---|----|---|---|---|----|----|
|             | 1                                                                                         | 2  | 3  | 4 | 5 | 6  | 7 | 8 | 9 | 10 | 11 |
| 1           | Vishay Semiconductors product                                                             |    |    |   |   |    |   |   |   |    |    |
| 2           | 4C = SiC diode, generation 4                                                              |    |    |   |   |    |   |   |   |    |    |
| 3           | Current rating (30 = 30 A)                                                                |    |    |   |   |    |   |   |   |    |    |
| 4           | E = single diode                                                                          |    |    |   |   |    |   |   |   |    |    |
| 5           | T = D <sup>2</sup> PAK package                                                            |    |    |   |   |    |   |   |   |    |    |
| 6           | Voltage rating: (12 = 1200 V)                                                             |    |    |   |   |    |   |   |   |    |    |
| 7           | S = surface mountable                                                                     |    |    |   |   |    |   |   |   |    |    |
| 8           | 2 = true 2 pin                                                                            |    |    |   |   |    |   |   |   |    |    |
| 9           | H = AEC-Q101 qualified                                                                    |    |    |   |   |    |   |   |   |    |    |
| 10          | L = tape and reel (left oriented)                                                         |    |    |   |   |    |   |   |   |    |    |
| 11          | Environmental digit:<br>M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free |    |    |   |   |    |   |   |   |    |    |

**ORDERING INFORMATION**

| PREFERRED P/N     | UNIT WEIGHT | BASE QUANTITY | PACKAGING DESCRIPTION |
|-------------------|-------------|---------------|-----------------------|
| VS-4C30ET12S2LHM3 | 2 g         | 800 per reel  | 13" diameter reel     |

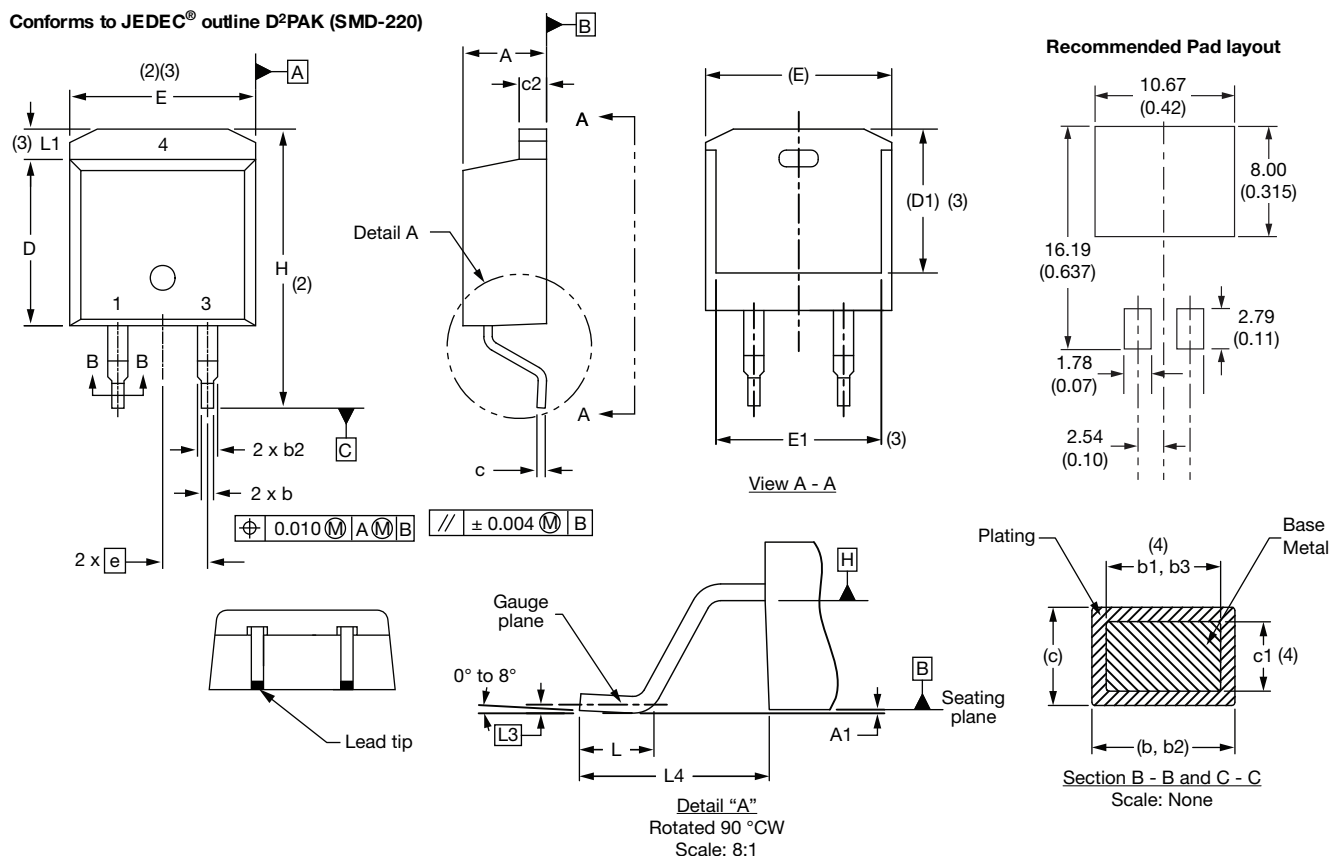
**LINKS TO RELATED DOCUMENTS**

|                          |                                                                        |
|--------------------------|------------------------------------------------------------------------|
| Dimensions               | <a href="http://www.vishay.com/doc?96683">www.vishay.com/doc?96683</a> |
| Part marking information | <a href="http://www.vishay.com/doc?96693">www.vishay.com/doc?96693</a> |
| Packaging information    | <a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a> |

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

#### 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     |
| 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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