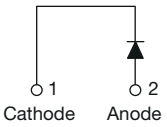
# High Voltage, Input Rectifier Diode, 20 A

2L TO-220 FullPAK




## 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
- Fully isolated package ($V_{INS}$ = 2500 $V_{RMS}$)
- UL pending
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

## 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).

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 20 A |
| $V_R$ | 800 V, 1200 V |
| $V_F$ at $I_F$ | 1.1 V |
| $I_{FSM}$ | 300 A |
| $T_J$ max. | 150 °C |
| Package | 2L TO-220 FullPAK |
| Circuit configuration | Single |

| OUTPUT CURRENT IN TYPICAL APPLICATIONS | | | |
|---|---|---|---|
| APPLICATIONS | SINGLE-PHASE BRIDGE | THREE-PHASE BRIDGE | UNITS |
| Capacitive input filter $T_A$ = 55 °C, $T_J$ = 125 °C common heatsink of 1 °C/W | 18 | 22 | A |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Sinusoidal waveform | 20 | A |
| $V_{RRM}$ | Range | 800, 1200 | V |
| $I_{FSM}$ | | 300 | A |
| $V_F$ | 10 A, $T_J$ = 25 °C | 1.0 | V |
| $T_J$ | | -40 to +150 | °C |

| VOLTAGE RATINGS | | | |
|---|---|---|---|
| PART NUMBER | $V_{RRM}$, MAXIMUM PEAK REVERSE VOLTAGE V | $V_{RSM}$, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | $I_{RRM}$ AT 150 °C mA |
| VS-20ETS08FP-M3 | 800 | 900 | 1 |
| VS-20ETS12FP-M3 | 1200 | 1300 | |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| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **VALUES** | **UNITS** |
| Maximum average forward current | $I_{F(AV)}$ | $T_C$ = 51 °C, 180° conduction half sine wave | 20 | A |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$ | 10 ms sine pulse, rated $V_{RRM}$ applied | 250 | |
| | | 10 ms sine pulse, no voltage reapplied | 300 | |
| Maximum $I^2t$ for fusing | $I^2t$ | 10 ms sine pulse, rated $V_{RRM}$ applied | 316 | $A^2s$ |
| | | 10 ms sine pulse, no voltage reapplied | 442 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reapplied | 4420 | $A^2\sqrt{s}$ |

| ELECTRICAL SPECIFICATIONS | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **VALUES** | **UNITS** |
| Maximum forward voltage drop | $V_{FM}$ | 20 A, $T_J$ = 25 °C | | 1.1 | V |
| Forward slope resistance | $r_t$ | $T_J$ = 150 °C | | 10.4 | mΩ |
| Threshold voltage | $V_{F(TO)}$ | | | 0.85 | V |
| Maximum reverse leakage current | $I_{RM}$ | $T_J$ = 25 °C | $V_R$ = Rated $V_{RRM}$ | 0.1 | mA |
| | | $T_J$ = 150 °C | | 1.0 | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | | **SYMBOL** | **TEST CONDITIONS** | **VALUES** | **UNITS** |
| Maximum junction and storage temperature range | | $T_J$, $T_{Stg}$ | | -40 to +150 | °C |
| Maximum thermal resistance, junction to case | | $R_{thJC}$ | DC operation | 2.8 | °C/W |
| Maximum thermal resistance, junction to ambient | | $R_{thJA}$ | | 62 | |
| Typical thermal resistance, case to heatsink | | $R_{thCS}$ | Mounting surface, smooth, and greased | 0.5 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | | 6.0 (5.0) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | | Case style 2L TO-220 FullPAK | 20ETS08FP | |
| | | | | 20ETS12FP | |


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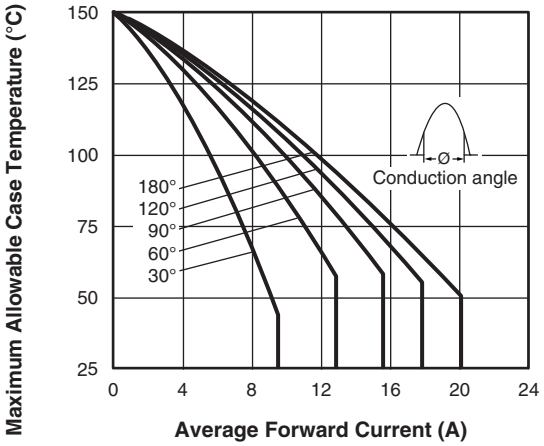


Fig. 1 - Current Rating Characteristics

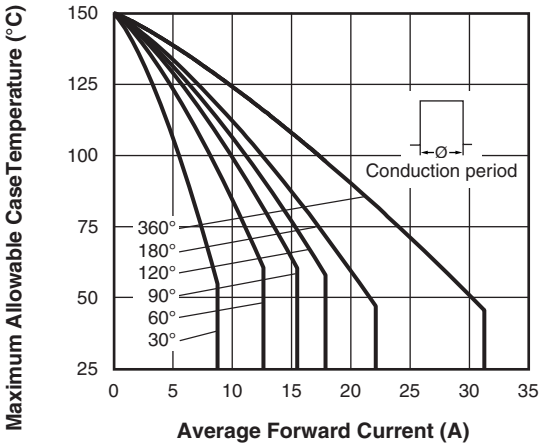


Fig. 2 - Current Rating Characteristics

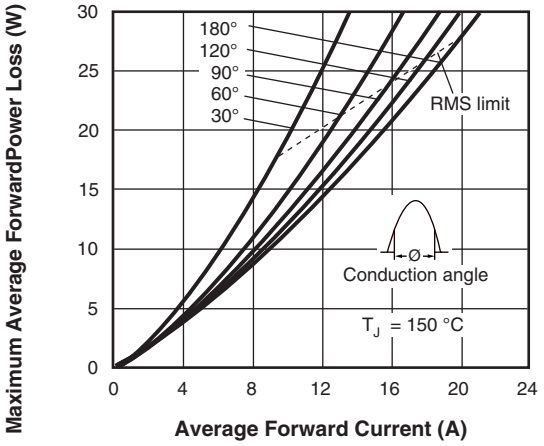


Fig. 3 - Forward Power Loss Characteristics

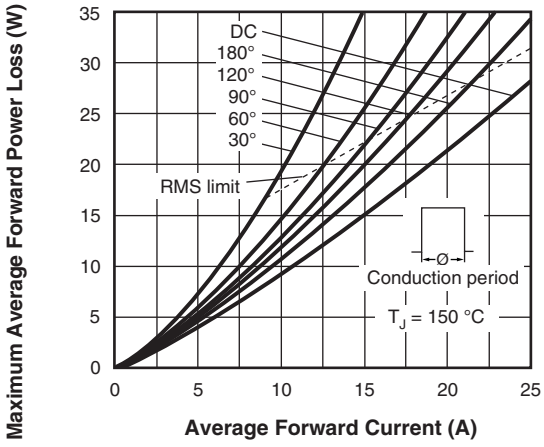


Fig. 4 - Forward Power Loss Characteristics

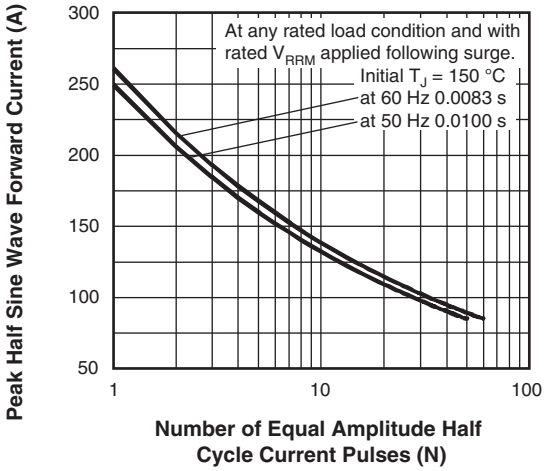


Fig. 5 - Maximum Non-Repetitive Surge Current

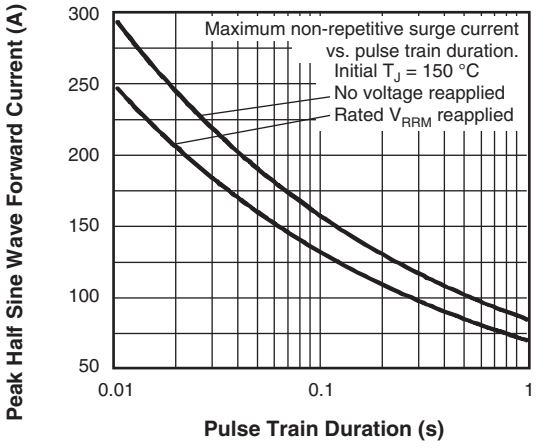


Fig. 6 - Maximum Non-Repetitive Surge Current


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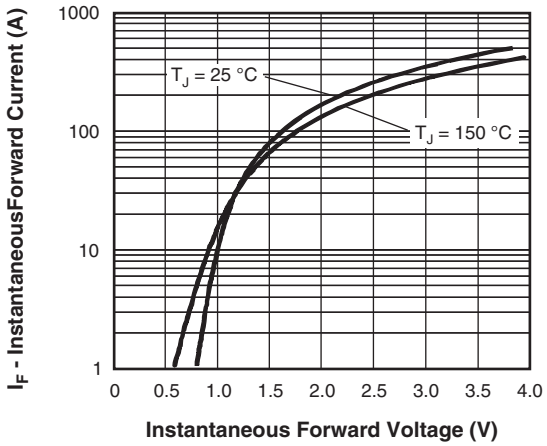


Fig. 7 - Forward Voltage Drop Characteristics

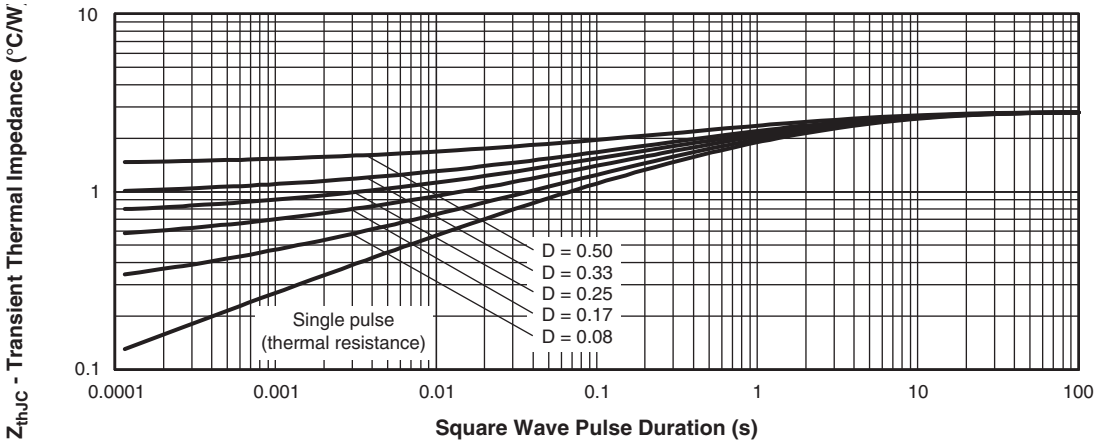


Fig. 8 - Thermal Impedance $Z_{thJC}$ Characteristics


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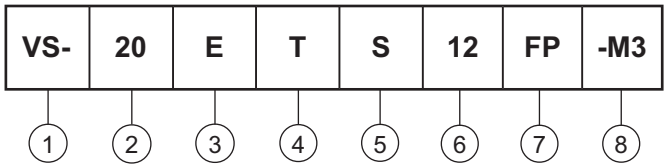
## ORDERING INFORMATION TABLE

Device code




1 - Vishay Semiconductors product
2 - Current rating (20 = 20 A)
3 - Circuit configuration:
E = single diode
4 - Package:
T = TO-220
5 - Type of silicon:
S = standard recovery rectifier
6 - Voltage ratings (08 = 800 V, 12 = 1200 V)
7 - FullPAK
8 - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

| **ORDERING INFORMATION** (Example) | | | |
|---|---|---|---|
| **PREFERRED P/N** | **QUANTITY PER T/R** | **MINIMUM ORDER QUANTITY** | **PACKAGING DESCRIPTION** |
| VS-20ETS08FP-M3 | 50 | 1000 | Antistatic plastic tubes |
| VS-20ETS12FP-M3 | 50 | 1000 | Antistatic plastic tubes |

| **LINKS TO RELATED DOCUMENTS** | |
|---|---|
| Dimensions | www.vishay.com/doc?96157 |
| Part marking information | www.vishay.com/doc?95392 |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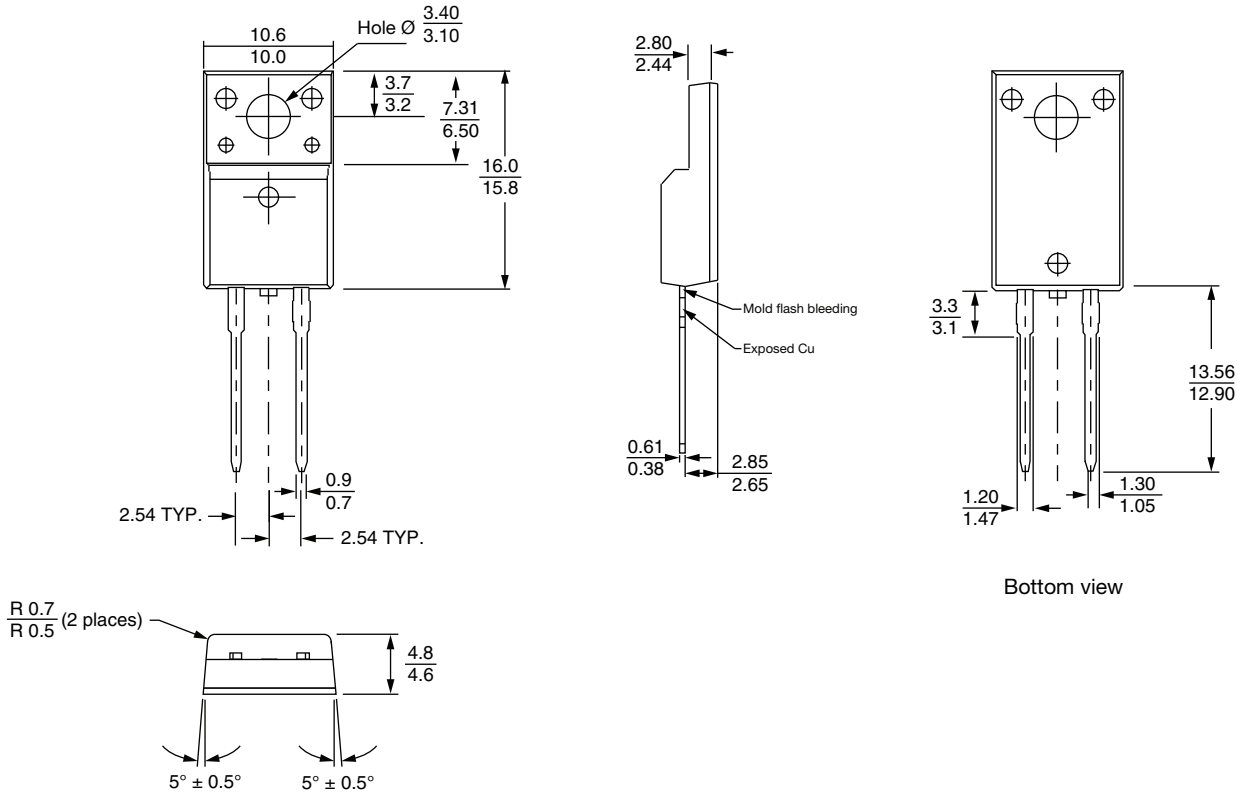
# 2L TO-220 FullPAK

**DIMENSIONS** in millimeters




Bottom view



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