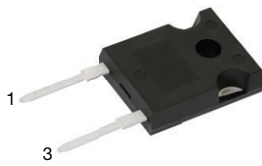
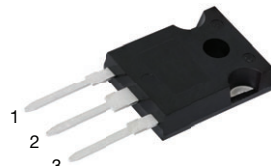
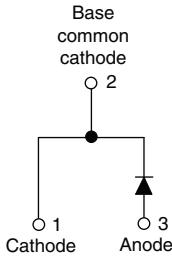
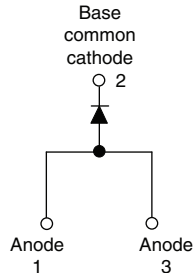


Ultrafast Soft Recovery Diode, 60 A FRED Pt[®]



RoHS
COMPLIANT
HALOGEN
FREE


TO-247AC 2L

TO-247AC 3L

VS-60EPU02-N3

VS-60APU02-N3

FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Output rectification
- Designed and qualified according to JEDEC[®]-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION / APPLICATIONS

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems.

The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

PRIMARY CHARACTERISTICS

| | |
|-----------------------|--------------------------|
| $I_{F(AV)}$ | 60 A |
| V_R | 200 V |
| V_F at I_F | 0.81 V |
| t_{rr} typ. | See Recovery table |
| T_J max. | 175 °C |
| Package | TO-247AC 2L, TO-247AC 3L |
| Circuit configuration | Single |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|----------------|--|-------------|-------|
| Cathode to anode voltage | V_R | | 200 | V |
| Continuous forward current | $I_{F(AV)}$ | $T_C = 127\text{ °C}$ | 60 | A |
| Single pulse forward current | I_{FSM} | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$ | 800 | |
| Maximum repetitive forward current | I_{FRM} | Square wave, 20 kHz | 120 | |
| Operating junction and storage temperatures | T_J, T_{Stg} | | -55 to +175 | °C |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------|---------------|--|------|------|------|-------|
| Breakdown voltage, blocking voltage | V_{BR}, V_R | $I_R = 100\text{ }\mu\text{A}$ | 200 | - | - | V |
| | | $I_F = 60\text{ A}$ | - | 0.98 | 1.08 | |
| Forward voltage | V_F | $I_F = 60\text{ A}, T_J = 175\text{ °C}$ | - | 0.81 | 0.88 | |
| | | $V_R = V_R$ rated | - | - | 50 | |
| Reverse leakage current | I_R | $T_J = 150\text{ °C}, V_R = V_R$ rated | - | - | 2 | mA |
| | | | - | 87 | - | pF |
| Junction capacitance | C_T | $V_R = 200\text{ V}$ | - | 87 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8.0 | - | nH |



| DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified) | | | | | | |
|--|------------------|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time | t _{rr} | I _F = 1.0 A, dI _F /dt = 200 A/μs, V _R = 30 V | - | - | 35 | ns |
| | | T _J = 25 °C | - | 28 | - | |
| | | T _J = 125 °C | - | 50 | - | |
| Peak recovery current | I _{RRM} | T _J = 25 °C | - | 4 | - | A |
| | | T _J = 125 °C | - | 8 | - | |
| Reverse recovery charge | Q _{rr} | T _J = 25 °C | - | 59 | - | nC |
| | | T _J = 125 °C | - | 220 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|-------------------|---|---------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Thermal resistance, junction to case | R _{thJC} | | - | - | 0.70 | K/W |
| Thermal resistance, junction to ambient per leg | R _{thJA} | Typical socket mount | - | - | 40 | °C/W |
| Thermal resistance, case to heatsink | R _{thCS} | Mounting surface, flat, smooth, and greased | - | 0.2 | - | K/W |
| Weight | | | - | 5.5 | - | g |
| | | | - | 0.2 | - | oz. |
| Mounting torque | | | - | - | 1.2 | N · m |
| Marking device | | Case style TO-247AC 2L | 60EPU02 | | | |
| | | Case style TO-247AC 3L | 60APU02 | | | |

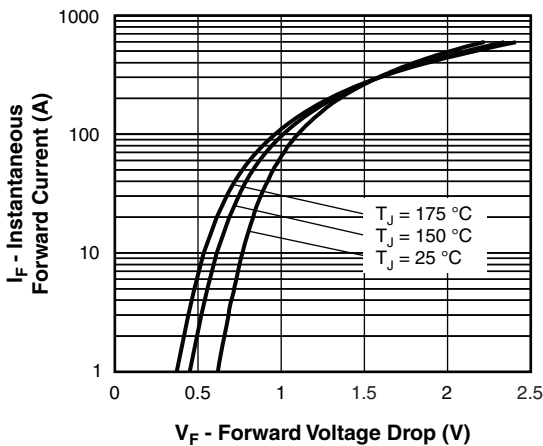


Fig. 1 - Typical Forward Voltage Drop Characteristics

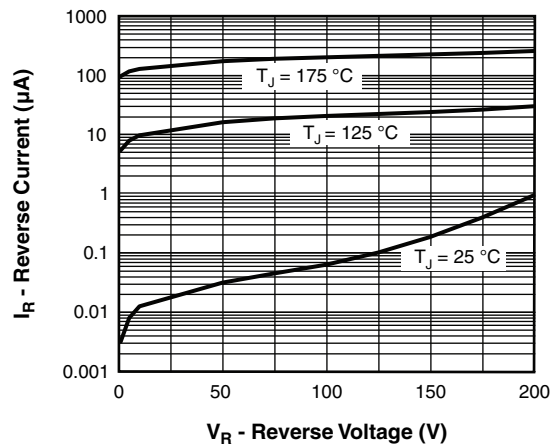


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

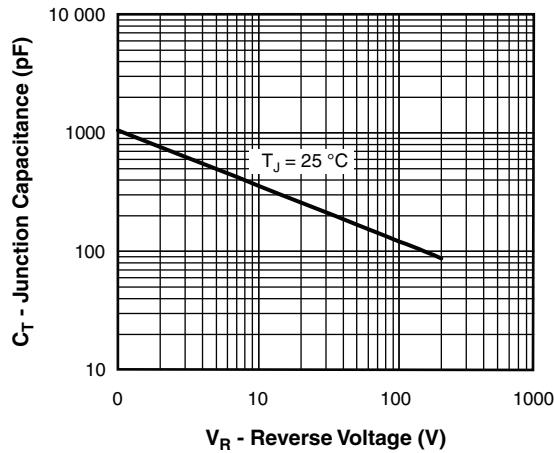


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

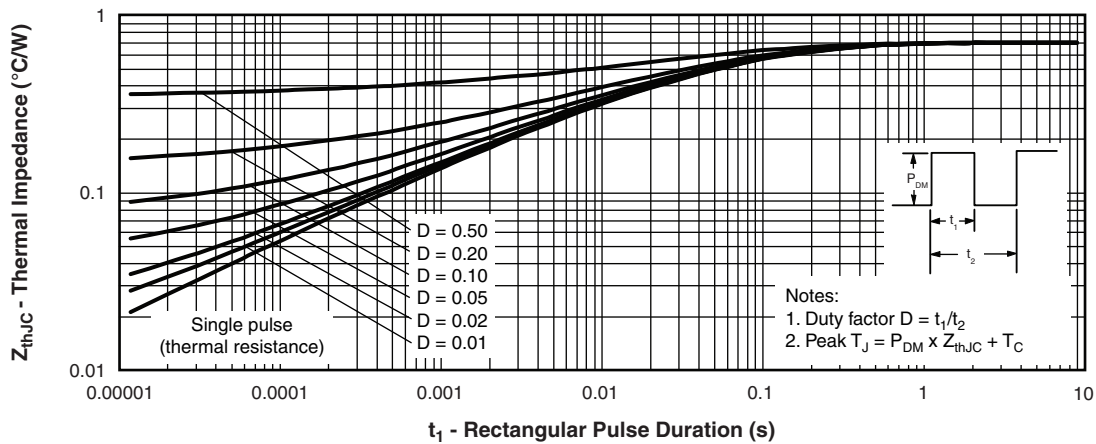


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

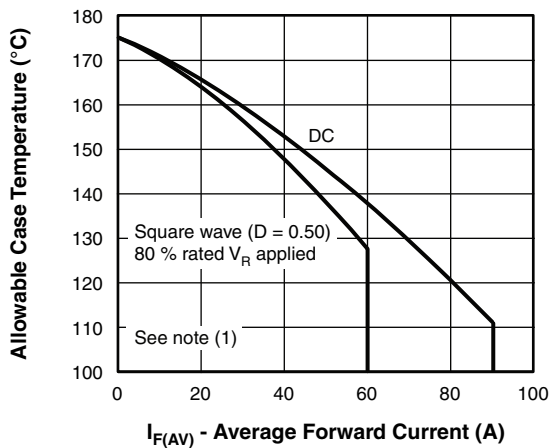


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

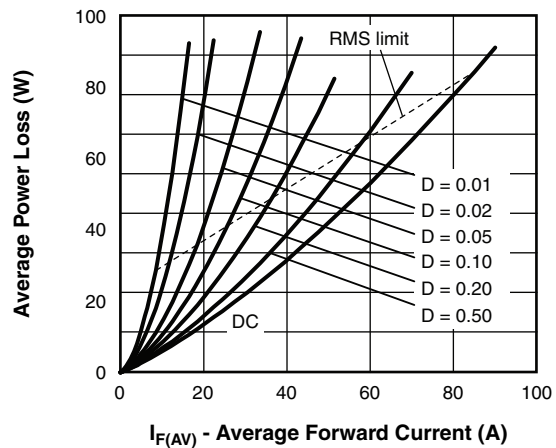


Fig. 6 - Forward Power Loss Characteristics

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 80\%$ rated V_R

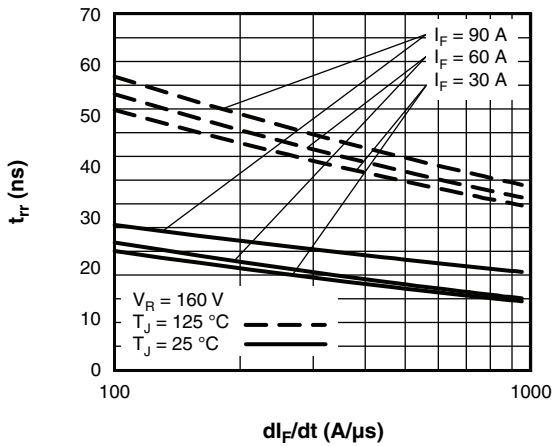


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

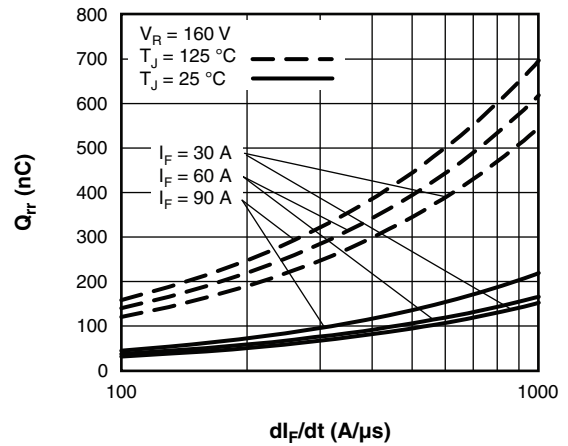


Fig. 8 - Typical Stored Charge vs. di_F/dt

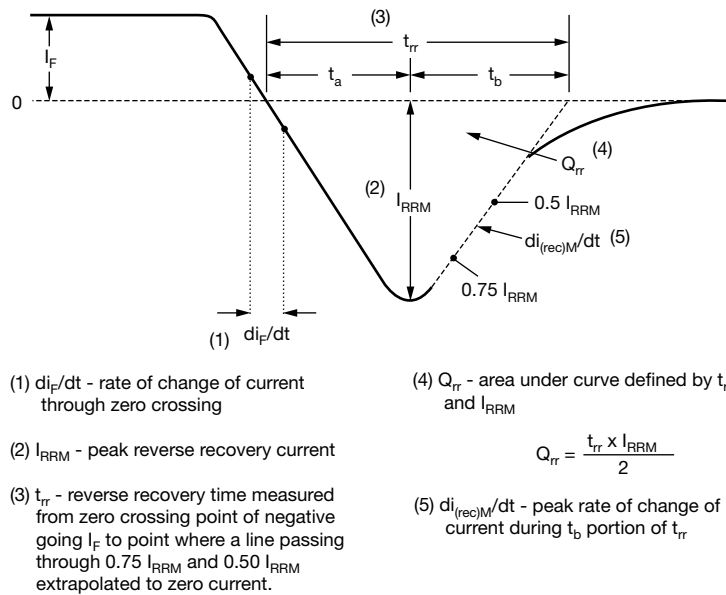
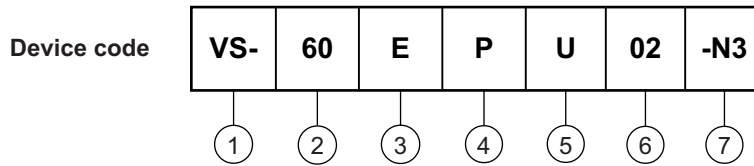


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (60 = 60 A)
- 3** - Circuit configuration:
 - E = single diode, 2 pins
 - A = single diode, 3 pins
- 4** - Package:
 - P = TO-247AC
- 5** - Type of silicon:
 - U = ultrafast recovery
- 6** - Voltage rating (02 = 200 V)
- 7** - Environmental digit:
 - N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-60EPU02-N3 | 25 | 500 | Antistatic plastic tube |
| VS-60APU02-N3 | 25 | 500 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | | | |
|----------------------------|-----------------|--|--|
| Dimensions | TO-247AC 2L | www.vishay.com/doc?96144 | |
| | TO-247AC 3L | www.vishay.com/doc?96138 | |
| Part marking information | TO-247AC 2L -N3 | www.vishay.com/doc?95648 | |
| | TO-247AC 3L -N3 | www.vishay.com/doc?95007 | |
| SPICE model | | www.vishay.com/doc?96049 | |



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