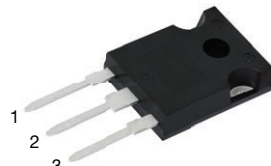
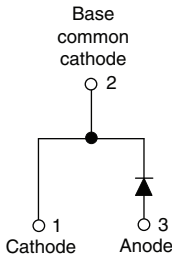
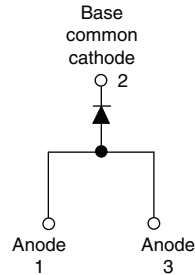


Ultrafast Soft Recovery Diode, 60 A FRED Pt®



RoHS
COMPLIANT
HALOGEN
FREE


TO-247AC 2L

TO-247AC 3L

VS-60EPU06-N3

VS-60APU06-N3

FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- 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 | 600 V |
| V_F at I_F | 1.11 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 | MAX. | UNITS |
|---|-------------------|---|-------------|-------|
| Cathode to anode voltage | V_R | | 600 | V |
| Continuous forward current | $I_{F(AV)}$ | $T_C = 116\text{ °C}$ | 60 | A |
| Single pulse forward current | I_{FSM} | $T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$ | 600 | |
| 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 | $I_R = 100\text{ }\mu\text{A}$ | 600 | - | - | V |
| Forward voltage | V_F | $I_F = 60\text{ A}$ | - | 1.35 | 1.68 | |
| | | $I_F = 60\text{ A}$, $T_J = 125\text{ °C}$ | - | 1.20 | 1.42 | |
| | | $I_F = 60\text{ A}$, $T_J = 175\text{ °C}$ | - | 1.11 | 1.30 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated | - | - | 50 | μA |
| | | $T_J = 150\text{ °C}$, $V_R = V_R$ rated | - | - | 500 | |
| Junction capacitance | C_T | $V_R = 600\text{ V}$ | - | 39 | - | pF |



| DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|---|-----------|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time | t_{rr} | $I_F = 1\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | 34 | 45 | ns |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 81 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 164 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | - | 7.4 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 17.0 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | - | 300 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 1394 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|------------|---|---------|------|------|---------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Thermal resistance, junction to case | R_{thJC} | | - | - | 0.63 | K/W |
| Thermal resistance, junction to ambient per leg | R_{thJA} | Typical socket mount | - | - | 40 | $^\circ\text{C}/\text{W}$ |
| 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 | - | 2.4 | N · m |
| | | | 10 | - | 20 | lbf · in |
| Marking device | | Case style TO-247AC 2L | 60EPU06 | | | |
| | | Case style TO-247AC 3L | 60APU06 | | | |

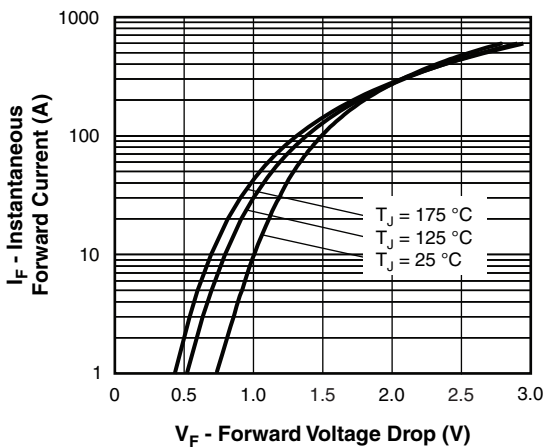


Fig. 1 - Typical Forward Voltage Drop Characteristics

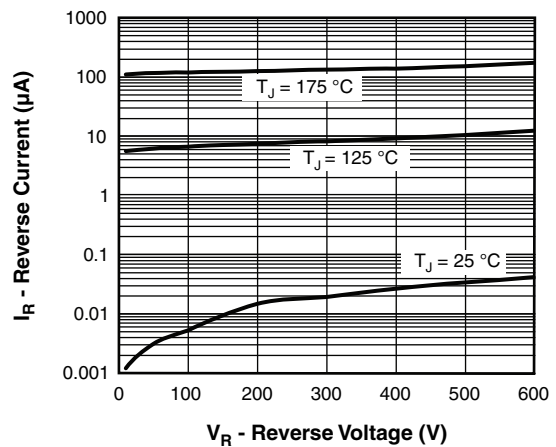


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

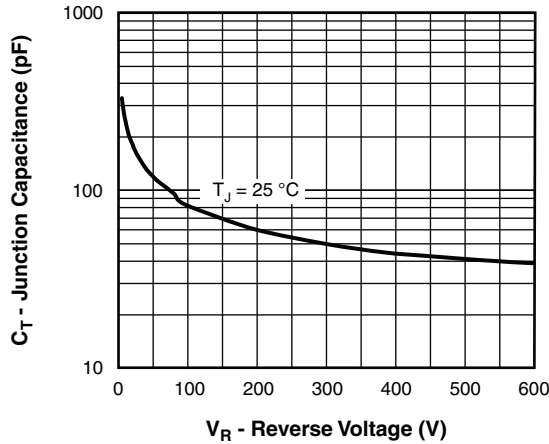


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

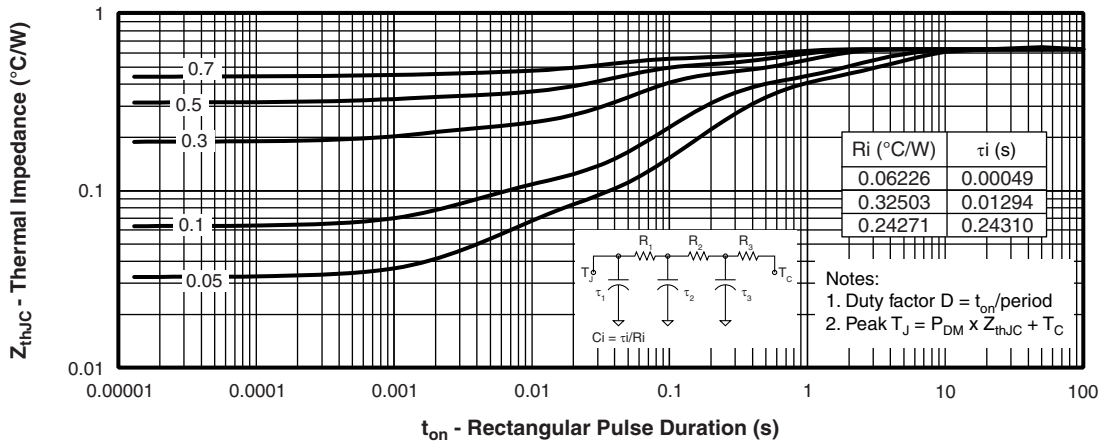


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

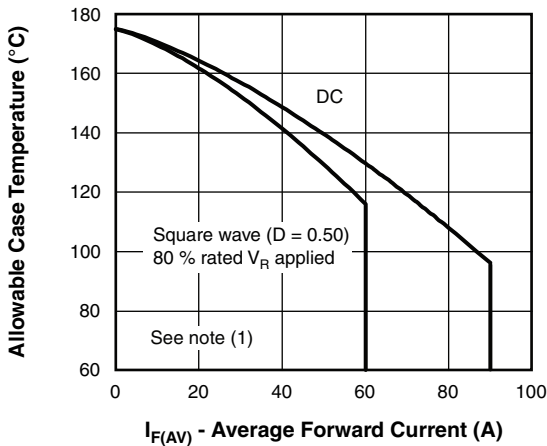


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

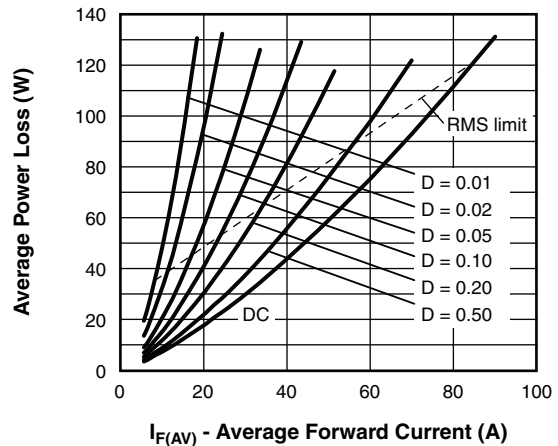


Fig. 6 - Forward Power Loss Characteristics

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

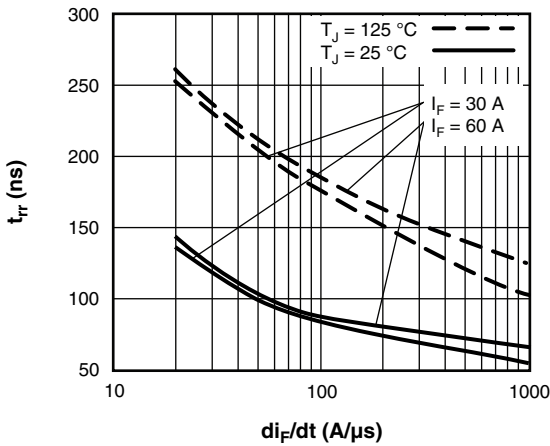


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

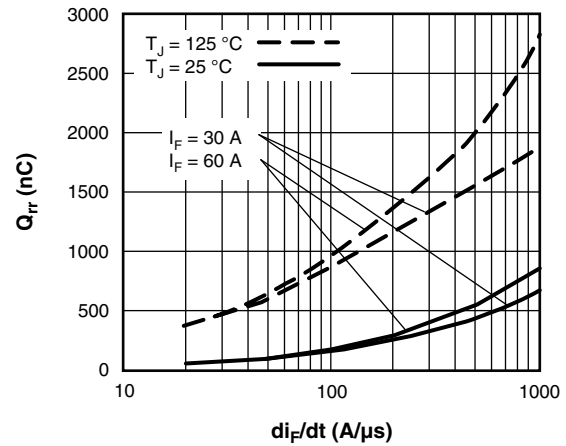


Fig. 8 - Typical Stored Charge vs. di_F/dt

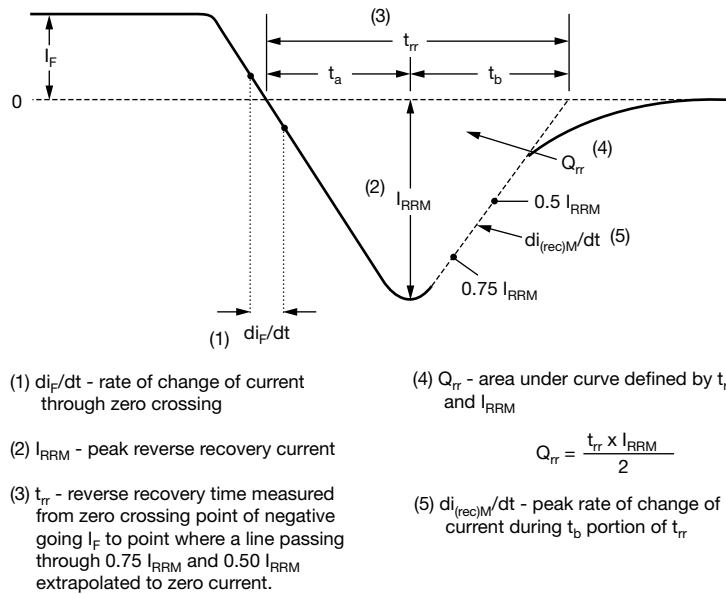
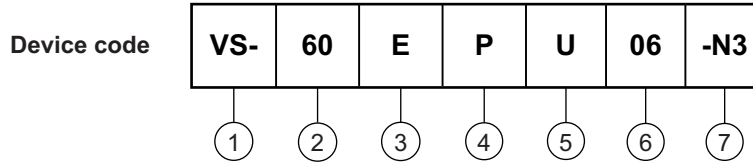


Fig. 9 - Reverse Recovery Waveform and Definitions



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 (06 = 600 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-60EPU06-N3 | 25 | 500 | Antistatic plastic tube |
| VS-60APU06-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 | www.vishay.com/doc?95648 |
| | TO-247AC 3L | www.vishay.com/doc?95007 |



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