



Standard Recovery Diodes, (Stud Version), 300 A



DO-9 (DO-205AB)

FEATURES

- Wide current range
- High voltage rating up to 2500 V
- High surge current capabilities
- Stud cathode and stud anode version
- High resistance to acceleration
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

TYPICAL APPLICATIONS

- Converters
- Power supplies
- Machine tool controls
- High power drives
- Medium traction applications

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-----------------|
| $I_{F(AV)}$ | 300 A |
| Package | DO-9 (DO-205AB) |
| Circuit configuration | Single |

MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER | TEST CONDITIONS | 301U(R) | | UNITS |
|--------------|-----------------|--------------|-------------|-------------------|
| | | 160 TO 200 | 250 | |
| $I_{F(AV)}$ | | 330 | 300 | A |
| | T_C | 120 | 120 | °C |
| $I_{F(RMS)}$ | | 520 | 470 | A |
| I_{FSM} | 50 Hz | 8250 | 6050 | A |
| | 60 Hz | 8640 | 6335 | |
| I^2t | 50 Hz | 340 | 183 | kA ² s |
| | 60 Hz | 311 | 167 | |
| V_{RRM} | Range | 1600 to 2000 | 2500 | V |
| T_J | | -40 to +180 | -40 to +180 | °C |

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | V_{RRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V | V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM} MAXIMUM AT $T_J = T_J$ MAXIMUM mA |
|--------------------------|--------------|--|--|--|
| VS-301U(R) VS-303U(R) | 160 | 1600 | 1700 | 15 |
| VS-305U(R) VS-307U(R) | 200 | 2000 | 2100 | |
| VS-309U(R) | 250 | 2500 | 2600 | |



| FORWARD CONDUCTION | | | | | | | |
|---|---------------|---|---------------------------|---|------|--------------------|-------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | 301U(R) | | UNITS | |
| | | | | 160 TO 200 | 250 | | |
| Maximum average forward current at case temperature | $I_{F(AV)}$ | 180° conduction, half sine wave | | 330 | 300 | A | |
| Maximum RMS forward current | $I_{F(RMS)}$ | DC at $T_C = 115\text{ °C}$ (up to 2000 V), $T_C = 102\text{ °C}$ (2500 V) | | 520 | 470 | A | |
| Maximum peak, one cycle forward, non-repetitive surge current | I_{FSM} | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial $T_J = T_J$ maximum | 8250 | 6050 | A |
| | | t = 8.3 ms | | | 8640 | 6335 | |
| | | t = 10 ms | 100 % V_{RRM} reapplied | | 6940 | 5090 | |
| | | t = 8.3 ms | | | 7270 | 5330 | |
| Maximum I^2t for fusing | I^2t | t = 10 ms | No voltage reapplied | | 340 | 183 | kA ² s |
| | | t = 8.3 ms | | | 311 | 167 | |
| | | t = 10 ms | 100 % V_{RRM} reapplied | | 241 | 129 | |
| | | t = 8.3 ms | | | 220 | 118 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied | | 3400 | 1830 | kA ² √s | |
| Low level value of threshold voltage | $V_{F(TO)1}$ | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), $T_J = T_J$ maximum | | 0.77 | 0.90 | V | |
| High level value of threshold voltage | $V_{F(TO)2}$ | (I > $\pi \times I_{F(AV)}$), $T_J = T_J$ maximum | | 0.84 | 0.97 | | |
| Low level value of forward slope resistance | r_{f1} | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), $T_J = T_J$ maximum | | 0.49 | 0.59 | mΩ | |
| High level value of forward slope resistance | r_{f2} | (I > $\pi \times I_{F(AV)}$), $T_J = T_J$ maximum | | 0.49 | 0.55 | | |
| Maximum forward voltage drop | V_{FM} | $I_{pk} = 942\text{ A}$, $T_J = T_J$ maximum, $t_p = 10\text{ ms}$ sinusoidal wave | | 1.22 | 1.46 | V | |

| SPECIAL SELECTION FORWARD VOLTAGE ($T_J = 25\text{ °C}$) | | | | | |
|--|------|------|------|------|-----------------|
| DEVICE CLASSIFICATION | BAND | MIN. | MAX. | UNIT | TEST CONDITIONS |
| VS-305U250P4 VS-307UA250P4 VS-305UR250P4 VS-307URA250P4 | P4 | 1.31 | 1.40 | V | 1000 A_{pk} |

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | |
|--|------------|---|-----------------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum junction operating temperature range | T_J | | -40 to 180 | °C |
| Maximum storage temperature range | T_{Stg} | | -40 to 200 | |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation | 0.14 | K/W |
| Maximum thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth, flat and greased | 0.08 | |
| Maximum allowed mounting torque +0 -20 % | | Not lubricated threads | 37 | N · m |
| | | Lubricated threads | 28 | |
| Weight | 301U | | 250 ± 5 | g |
| | 303U | | 152 ± 5 | |
| | 305U | | 177 ± 5 | |
| | 307U | | 197 ± 5 | |
| | 309U | | 160 ± 5 | |
| Case style | | See dimensions - link at the end of datasheet | DO-9 (DO-205AB) | |



| ΔR_{thJC} CONDUCTION | | | | | | |
|------------------------------|-----------------------|-------|------------------------|-------|---------------------|-------|
| CONDUCTION ANGLE | SINUSOIDAL CONDUCTION | | RECTANGULAR CONDUCTION | | TEST CONDITIONS | UNITS |
| | 80 TO 200 | 250 | 80 TO 200 | 250 | | |
| 180° | 0.015 | 0.015 | 0.011 | 0.011 | $T_J = T_J$ maximum | K/W |
| 120° | 0.018 | 0.018 | 0.019 | 0.019 | | |
| 90° | 0.023 | 0.023 | 0.025 | 0.025 | | |
| 60° | 0.034 | 0.034 | 0.035 | 0.035 | | |
| 30° | 0.056 | 0.056 | 0.057 | 0.057 | | |

Note

- The table above shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC



Fig. 1 - Current Ratings Characteristics



Fig. 2 - Current Ratings Characteristics



Fig. 1 - Current Ratings Characteristics



Fig. 3 - Current Ratings Characteristics



Fig. 4 - Forward Power Loss Characteristics



Fig. 5 - Forward Power Loss Characteristics



Fig. 6 - Forward Power Loss Characteristics



Fig. 7 - Forward Power Loss Characteristics



Fig. 8 - Maximum Non-Repetitive Surge Current



Fig. 10 - Maximum Non-Repetitive Surge Current



Fig. 9 - Maximum Non-Repetitive Surge Current



Fig. 11 - Maximum Non-Repetitive Surge Current



Fig. 12 - Forward Voltage Drop Characteristics



Fig. 13 - Forward Voltage Drop Characteristics



Fig. 14 - Thermal Impedance Z_{thJC} Characteristic



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - 30 = essential part number
- 3** -
 - 1 = standard device
 - 3 = top threaded version
 - 5 = type for rotating application with top threaded version 3/8 16UNC-2A
 - 7 = type for rotating application with flexible lead
 - 9 = type for rotating application with top threaded version 3/8 24UNF
- 4** -
 - U = stud normal polarity (cathode to stud)
 - UR = stud reverse polarity (anode to stud)
- 5** - A = maximum leakage selection $I_{RRM} = 2 \text{ mA}$, $T_J = 25 \text{ }^\circ\text{C}$
- 6** - Voltage code x 10 = V_{RRM} (see Voltage Ratings table)
- 7** - Refer special selection table for applicable parts

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95337 |

DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

DIMENSIONS FOR 301U(R) SERIES - DO-205AB (DO-9) in millimeters (inches)



Outline Dimensions



Vishay Semiconductors DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

DIMENSIONS FOR 307U(R) SERIES - B-60 in millimeters (inches)





Outline Dimensions

DO-205AB (DO-9), B-60, B-61, B-41, B-40 for Vishay Semiconductors
301U(R), 307U(R), 305U(R) and 309U(R) Series

DIMENSIONS FOR 305U(R) SERIES - B-61 in millimeters (inches)



DIMENSIONS FOR 309U(R) SERIES - B-41 in millimeters (inches)



Outline Dimensions



Vishay Semiconductors DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

DIMENSIONS FOR 303U(R) SERIES - B-40 in millimeters (inches)





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