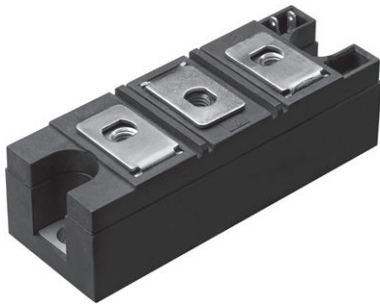


INT-A-PAK Power Module Thyristor/Diode, 300 A


INT-A-PAK

FEATURES

- Electrically isolated base plate
- 3000 V_{RMS} isolating voltage
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL approved file E78996
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

APPLICATIONS

- Battery chargers
- Welders
- Power converters
- Alternators

PRODUCT SUMMARY

| | |
|-------------|---|
| $I_{T(AV)}$ | 300 A |
| Type | Modules - Thyristor, Standard |
| Package | INT-A-PAK |
| Circuit | SCR/diode doubler circuit, negative control |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------------|-----------------|------------|--------------------|
| V_{DRM}/V_{RRM} | | 800 | V |
| $I_{T(AV)}$ | 53 °C | 300 | A |
| I_{TSM} | 50 Hz | 6500 | A |
| | 60 Hz | 6900 | |
| I^2t | 50 Hz | 214 | kA ² s |
| | 60 Hz | 195 | |
| $I^2\sqrt{t}$ | | 2140 | kA ² √s |
| T_J | Range | -40 to 140 | °C |

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

| TYPE NUMBER | V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V | V_{RSM}/V_{DSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM}/I_{DRM} AT 125 °C mA |
|------------------|--|--|-----------------------------------|
| VS-VSKL300/08PbF | 800 | 900 | 50 |



| ON-STATE CONDUCTION | | | | | |
|--|---------------|---|----------------------------|--------|--------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average on-state current at case temperature | $I_{T(AV)}$ | 180° conduction half sine wave | | 300 | A |
| | | | | 53 | °C |
| Maximum RMS on-state current | $I_{T(RMS)}$ | As AC switch | | 116 | A |
| Maximum peak, one-cycle on-state, non-repetitive surge current | I_{TSM} | t = 10 ms | No voltage reappplied | 6600 | |
| | | t = 8.3 ms | | 6900 | |
| | | t = 10 ms | 100 % V_{RRM} reappplied | 5500 | |
| | | t = 8.3 ms | | 5800 | |
| Maximum I^2t for fusing | I^2t | t = 10 ms | No voltage reappplied | 214 | |
| | | t = 8.3 ms | | 195 | |
| | | t = 10 ms | 100 % V_{RRM} reappplied | 151 | |
| | | t = 8.3 ms | | 138 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reappplied | | 2140 | kA ² √s |
| Low level value of threshold voltage | $V_{T(TO)1}$ | (16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), T_J maximum | | 0.796 | V |
| High level value of threshold voltage | $V_{T(TO)2}$ | (I > $\pi \times I_{T(AV)}$), T_J maximum | | 0.868 | |
| Low level value on-state slope resistance | r_{t1} | (16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), T_J maximum | | 0.972 | mΩ |
| High level value on-state slope resistance | r_{t2} | (I > $\pi \times I_{T(AV)}$), T_J maximum | | 0.88 | |
| Maximum on-state voltage drop | V_{TM} | $T_J = 25\text{ °C}$, 500 A I_{pk} | SCR | 1.35 | V |
| | V_{FM} | | DIODE | 1.20 | |

| SWITCHING | | | | | |
|-----------------------|--------|---|--|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Typical delay time | t_d | Gate current 1 A, $dI_g/dt = 1\text{ A}/\mu\text{s}$ $V_d = 0.67\% V_{DRM}$, $T_J = 25\text{ °C}$ | | 1.0 | μs |
| Typical turn-off time | t_q | $I_{TM} = 300\text{ A}$, $T_J = T_J$ maximum, $dI/dt = 20\text{ A}/\mu\text{s}$, $V_R = 50\text{ V}$ $dV/dt = 20\text{ V}/\mu\text{s}$, Gate 0 V 100 Ω, $t_p = 500\text{ μs}$ | | 100 | |

| BLOCKING | | | | | |
|--|--------------------------|---|--|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum critical rate of rise of off-state voltage | dV/dt | $T_J = T_J$ maximum linear to 67 % rated V_{DRM} | | 500 | V/μs |
| Maximum peak reverse and off-state leakage current | I_{DRM} , I_{RRM} | $T_J = T_J$ maximum, rated V_{DRM}/V_{RRM} applied | | 50 | mA |
| RMS insulation voltage | V_{INS} | 50 Hz, circuit to base, all terminal shorted, t = 1 s | | 3000 | V |



| TRIGGERING | | | | |
|--|-------------|---|--------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum peak gate power | P_{GM} | $T_J = T_J$ maximum, $t_p \leq 5$ ms | 10.0 | W |
| Maximum average gate power | $P_{G(AV)}$ | $T_J = T_J$ maximum, $f = 50$ Hz, $d\% = 50$ | 2.0 | |
| Maximum peak positive gate current | I_{GM} | $T_J = T_J$ maximum, $t_p \leq 5$ ms | 3.0 | A |
| Maximum required DC gate voltage to trigger | V_{GT} | $T_J = 25$ °C Anode supply: 12 V resistive load | 3 | V |
| Maximum required DC gate current to trigger | I_{GT} | | 200 | mA |
| Maximum holding current | I_H | | 600 | |
| Maximum peak positive gate voltage | $+V_{GM}$ | $T_J = T_J$ maximum, $t_p \leq 5$ ms | 20 | V |
| Maximum peak negative gate voltage | $-V_{GM}$ | | 5.0 | |
| DC gate voltage not to trigger | V_{GD} | $T_J = T_J$ maximum Maximum gate current/voltage not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode to cathode applied | 0.30 | V |
| DC gate current not to trigger | I_{GD} | | 10 | mA |
| Maximum non-repetitive rate of rise of turned-on current | di/dt | Gate drive 20 V, 20 Ω , $t_r \leq 1$ μ s $T_J = T_J$ maximum, anode voltage $\leq 80\%$ V_{DRM} | 1000 | A/ μ s |

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | |
|---|-----------------|--|------------|-----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum junction operating temperature range | T_J | | -40 to 140 | °C |
| Maximum storage temperature range | T_{Stg} | | -40 to 150 | |
| Maximum thermal resistance, junction to case per junction | R_{thJC} | DC operation | 0.19 | K/W |
| Maximum thermal resistance, case to heatsink per module | R_{thCS} | Mounting surface smooth, flat and greased | 0.035 | |
| Mounting torque $\pm 10\%$ | IAP to heatsink | A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads. | 4 to 6 | Nm |
| | busbar to IAP | | | |
| Approximate weight | | | 500 | g |
| | | | 17.8 | oz. |
| Case style | | | | INT-A-PAK |

| ΔR CONDUCTION PER JUNCTION | | | | | | | | | | | |
|--|--|-------|-------|-------|-------|---|-------|-------|-------|-------|-------|
| DEVICES | SINUSOIDAL CONDUCTION AT T_J MAXIMUM | | | | | RECTANGULAR CONDUCTION AT T_J MAXIMUM | | | | | UNITS |
| | 180° | 120° | 90° | 60° | 30° | 180° | 120° | 90° | 60° | 30° | |
| VSKL300 | 0.019 | 0.022 | 0.028 | 0.041 | 0.068 | 0.013 | 0.023 | 0.031 | 0.043 | 0.069 | K/W |

Note

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

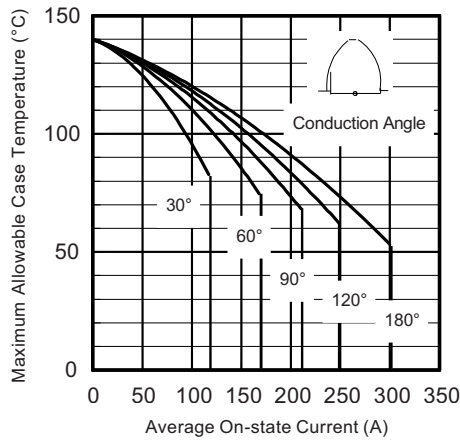


Fig. 1 - Current Ratings Characteristics

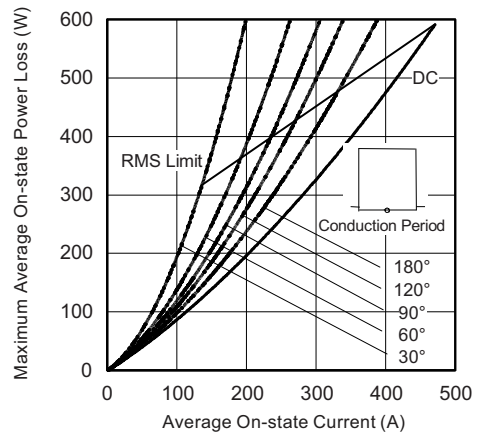


Fig. 4 - On-State Power Loss Characteristics

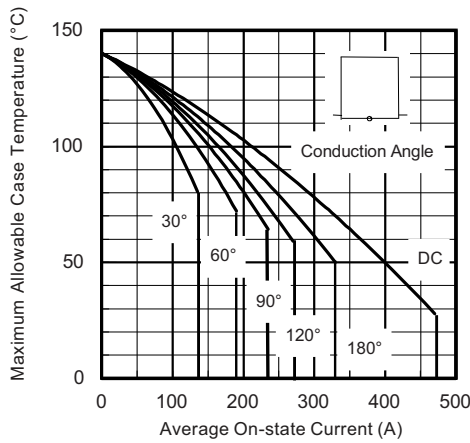


Fig. 2 - Current Ratings Characteristics

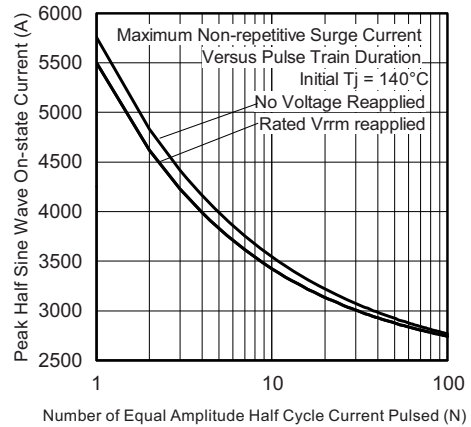


Fig. 5 - Maximum Non-Repetitive Surge Current

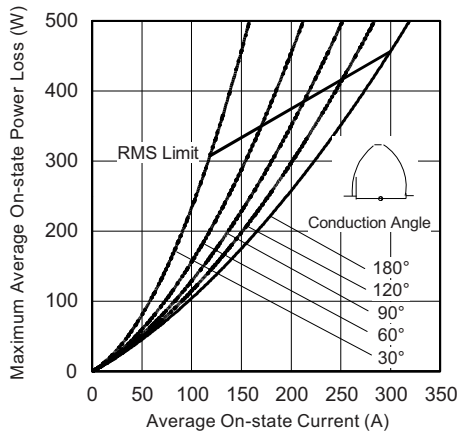


Fig. 3 - On-State Power Loss Characteristics

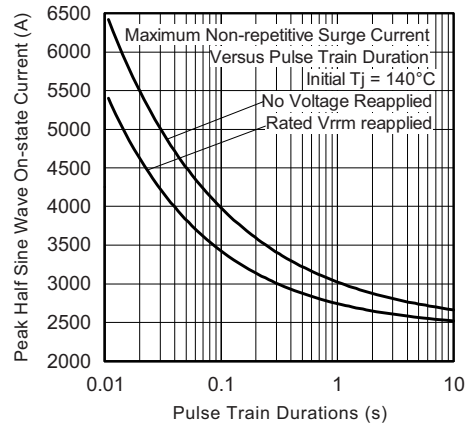


Fig. 6 - Maximum Non-Repetitive Surge Current

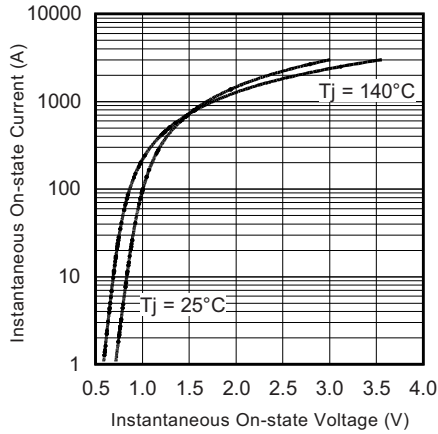


Fig. 7 - On-State Voltage Drop Characteristics (SCR)

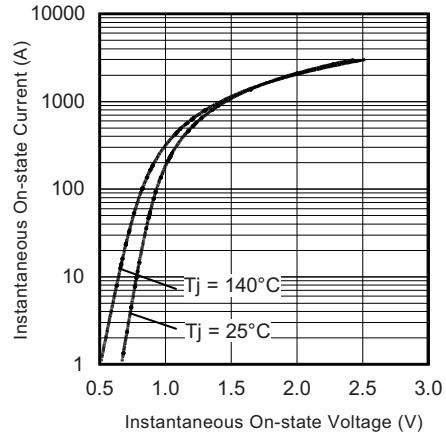


Fig. 8 - On-State Voltage Drop Characteristics (Diode)

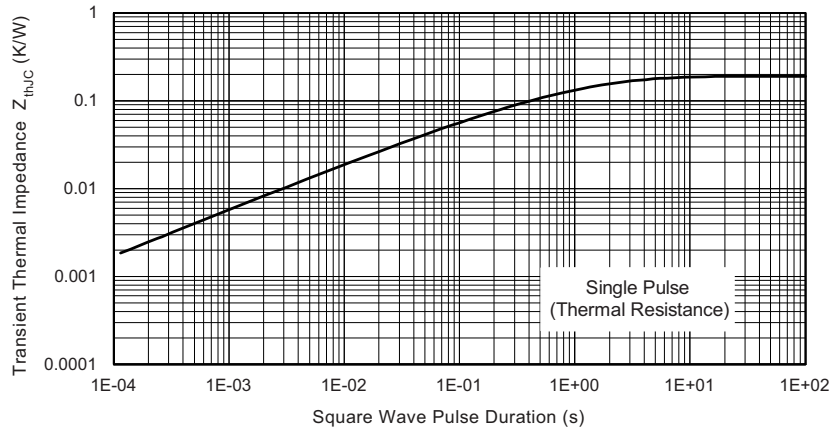


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

| | | | | | |
|-------------|-------------------------------|-----------------------|------------------------------|-----------------------------|----------------------|
| Device code | VS-VS | KL | 300 | 08 | PbF |
| | ① | ② | ③ | ④ | ⑤ |
| | 1 | 2 | 3 | 4 | 5 |
| | - | - | - | - | - |
| | Vishay Semiconductors product | Circuit configuration | Current rating (300 = 300 A) | Voltage rating (08 = 800 V) | PbF = Lead (Pb)-free |

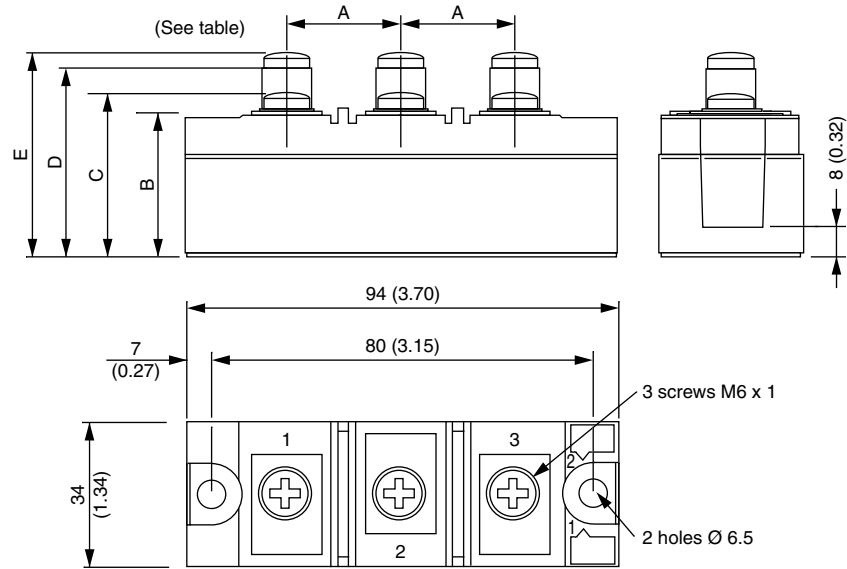


| CIRCUIT CONFIGURATION | | |
|---|----------------------------|-----------------|
| CIRCUIT DESCRIPTION | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| SCR/diode doubler circuit, negative control | L | |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95010 |

INT-A-PAK Diode

DIMENSIONS in millimeters (inches)



| A | B | C | D | E |
|-----------|-----------|-----------|---|---|
| 23 (0.91) | 30 (1.18) | 36 (1.42) | - | - |



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