



A3L:90TD.XXI

VOLTAGE RATINGS

| Part Number | V _{RRM} , V _R (V) Max. rep. peak reverse voltage | | V _{RSM} , V _R (V) Max. non-rep. peak reverse voltage |
|--------------|--|-----------------------------|--|
| | T _J = 0 to 125°C | T _J = -40 to 0°C | T _J = 25 to 125°C |
| | A3L:90TD.02I | 200 | 200 |
| A3L:90TD.04I | 400 | 400 | 500 |
| A3L:90TD.06I | 600 | 600 | 700 |
| A3L:90TD.08I | 800 | 800 | 900 |
| A3L:90TD.10I | 1000 | 1000 | 1100 |
| A3L:90TD.12I | 1200 | 1200 | 1300 |
| A3L:90TD.14I | 1400 | 1330 | 1500 |
| A3L:90TD.16I | 1600 | 1520 | 1700 |

MAXIMUM ALLOWABLE RATINGS

| PARAMETER | VALUE | UNITS | NOTES |
|---|------------|----------------------------------|---|
| T _J Junction Temperature | -40 to 125 | °C | - |
| T _{stg} Storage Temperature | -40 to 150 | °C | - |
| I _{F(AV)} Max. Av. current @ Max. T _C | 90 | A | 180° half sine wave |
| | 85 | °C | |
| I _{F(RMS)} Nom. RMS current | 200 | A | - |
| I _{FSM} Max. Peak non-rep. surge current | 1.61 | kA | 50 Hz half cycle sine wave Initial T _J = 125°C, rated V _{RRM} applied after surge. |
| | 1.75 | | 60 Hz half cycle sine wave |
| | 1.72 | | 50 Hz half cycle sine wave Initial T _J = 125°C, no voltage applied after surge. |
| | 1.87 | | 60 Hz half cycle sine wave |
| I ² t Max. I ² t capability | 9.48 | kA ² s | t = 10ms Initial T _J = 125°C, rated V _{RRM} applied after surge. |
| | 10.33 | | t = 8.3 ms |
| | 13.32 | | t = 10ms Initial T _J = 125°C, no voltage applied after surge. |
| | 14.52 | | t = 8.3 ms |
| I ² t ^{1/2} Max. I ² t ^{1/2} capability | 159.1 | kA ² s ^{1/2} | Initial T _J = 125°C, no voltage applied after surge. [†] t for time t _x = I ² t ^{1/2} * t _x ^{1/2} . (0.1 < t _x < 10ms). |
| di/dt Max. Non-repetitive rate-of-rise current | 150 | A/μs | T _J = 125°C, V _D = V _{DRM} , I _{TM} = 1600A. Gate pulse: 20V, 20Ω, 10μs, 0.5μs rise time, Max. repetitive di/dt is approximately 40% of non-repetitive value. |
| P _{GM} Max. Peak gate power | 12 | W | tp < 5 ms |
| P _{G(AV)} Max. Av. gate power | 3 | W | - |
| +I _{GM} Max. Peak gate current | 150 | mA | tp < 5 ms |
| -V _{GM} Max. Peak negative gate voltage | 2 | V | - |
| F Mounting Force | 3(5) | N.m | Upper connectors(Heatsink) |



A3L:90TD.XXI

CHARACTERISTICS

| PARAMETER | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|--|----------|--------|-------|---------------------------|--|
| V_{TM} peak on-state voltage | --- | --- | 1.63 | V | Initial $T_J = 25^\circ\text{C}$, 50-60Hz half sine, $I_{peak} = 282\text{A}$. |
| $V_{T(To)}$ Threshold voltage | --- | --- | 0.89 | V | $T_J = 125^\circ\text{C}$ Av. power = $V_{T(To)} * I_{T(AV)} + r_T * [I_{T(RMS)}]^2$, 180 Half Sine. |
| r_T Slope resistance | --- | --- | 2.42 | $m\Omega$ | Use low values for $I_{TM} < \pi$ rated $I_{T(AV)}$ |
| I_L Latching current | --- | --- | 400 | mA | $T_C = 125^\circ\text{C}$, 12V anode. Gate pulse: 10V, 20 Ω , 100 μs . |
| I_H Holding current | --- | --- | 200 | mA | $T_C = 25^\circ\text{C}$, 12V anode. Initial $I_T = 15\text{A}$. |
| t_d Delay time | --- | 0.7 | 1.5 | μs | $T_C = 25^\circ\text{C}$, $V_D = V_{DRM}$, 50A resistive load. Gate pulse: 10V, 20 Ω , 10 μs , 1 μs rise time. |
| t_q Turn-off time | --- | 125 | 200 | μs | $T_J = 125^\circ\text{C}$, $I_{TM} = 500\text{A}$, $di/dt = 25\text{A}/\mu\text{s}$, $V_R = 50\text{V}$. $dv/dt = 20\text{V}/\mu\text{s}$ lin. to rated V_{DRM} . Gate: 0V, 100 Ω . |
| dv/dt Critical rate-of-rise of off-state voltage | 80 | 140 | 500 | $\text{V}/\mu\text{s}$ | $T_J = 125^\circ\text{C}$. Exp. to 100% or lin. Higher dv/dt values available. To 80% V_{DRM} , gate open. |
| I_{RM} , I_{DM} Peak reverse and off-state current | --- | 10 | 20 | mA | $T_J = 125^\circ\text{C}$, Rated V_{RRM} and V_{DRM} , gate open. |
| I_{GT} DC gate current to trigger | --- | --- | 300 | mA | $T_C = -40^\circ\text{C}$ |
| V_{GT} DC gate voltage to trigger | 4 | --- | --- | V | $T_C = 25^\circ\text{C}$ +12V anode-to-cathode. For recommended gate drive see "Gate Characteristics" figure. |
| V_{GD} DC gate voltage not to trigger | --- | --- | 0.25 | V | $T_C = 25^\circ\text{C}$, Max. Value which will not trigger with rated V_{DRM} anode. |
| R_{thJC} Thermal resistance, junction-to-case | --- | --- | 0.145 | $^\circ\text{C}/\text{W}$ | DC operation, single side cooled. |
| | --- | --- | 0.155 | $^\circ\text{C}/\text{W}$ | 180 sine wave, single side cooled. |
| | --- | --- | 0.162 | $^\circ\text{C}/\text{W}$ | 120 rectangular wave, single side cooled. |
| R_{thCS} Thermal resistance, case-to-sink | --- | --- | 0.1 | $^\circ\text{C}/\text{W}$ | Mtg. Surface smooth, flat and greased. Single side cooled. |
| wt Weight | --- | 110(4) | --- | g(oz.) | --- |
| Case Style | TO-240AA | | JEDEC | --- | --- |

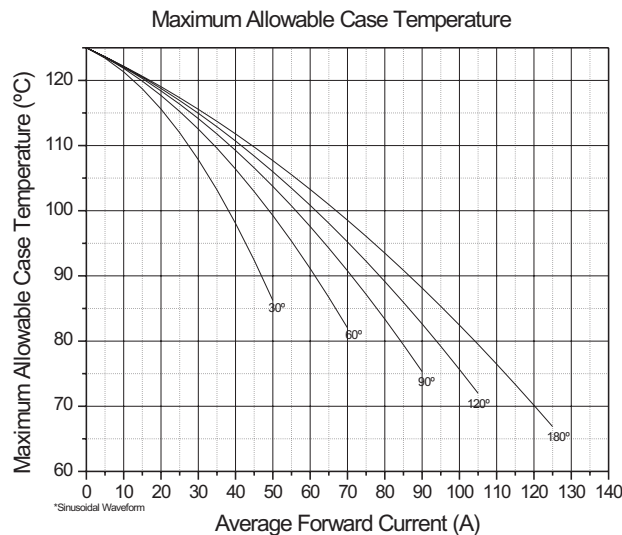


Fig. 1 - Current Ratings Characteristics

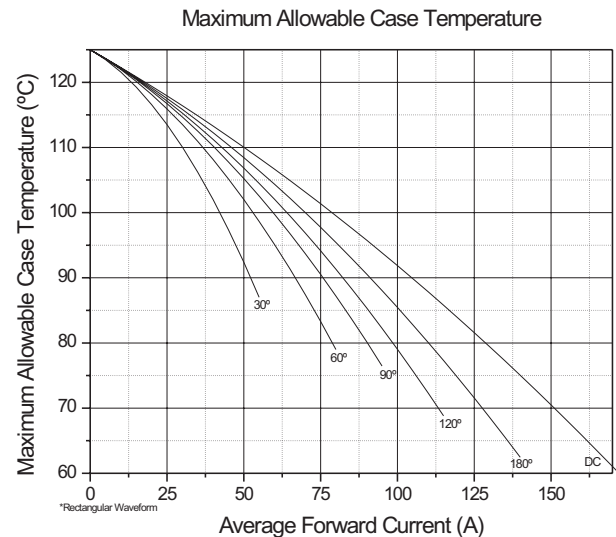


Fig. 2 - Current Ratings Characteristics



A3L:90TD.XXI

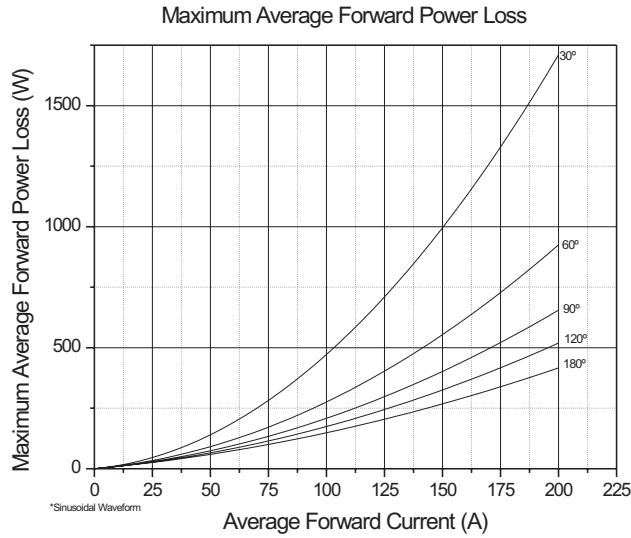


Fig.3 -Forward Power Loss Characteristics

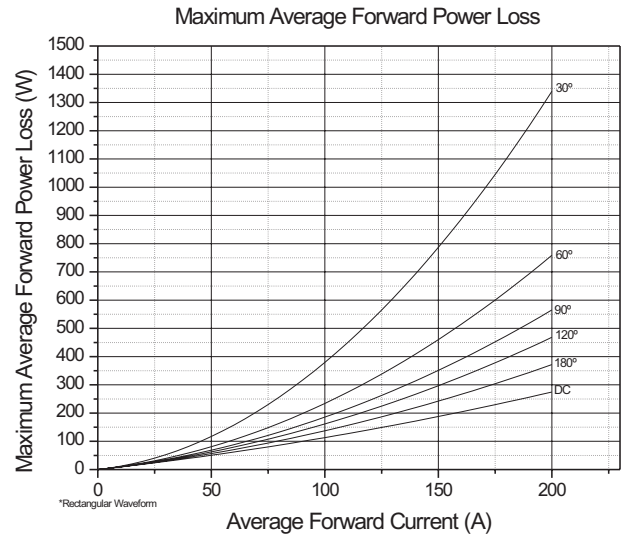


Fig. 4 - Forward Power Loss Characteristics

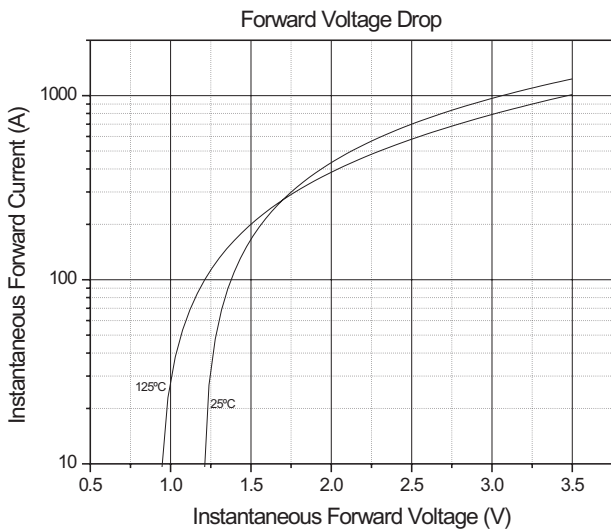


Fig. 5 - Forward Voltage Drop Characteristics

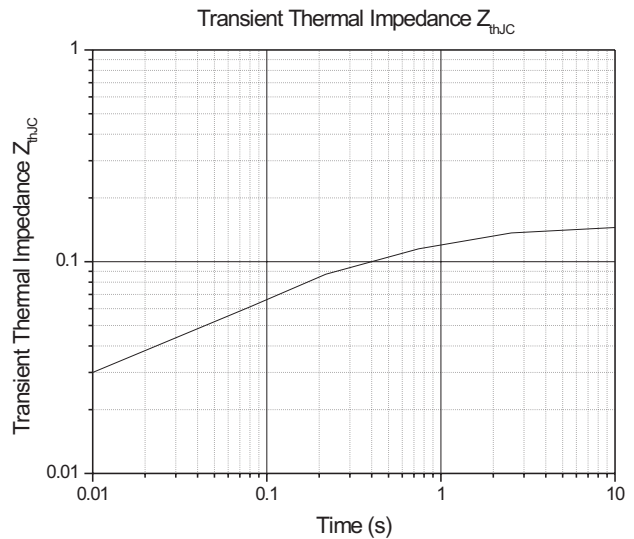


Fig. 6 - Transient Thermal Impedance



A3L:90TD.XXI

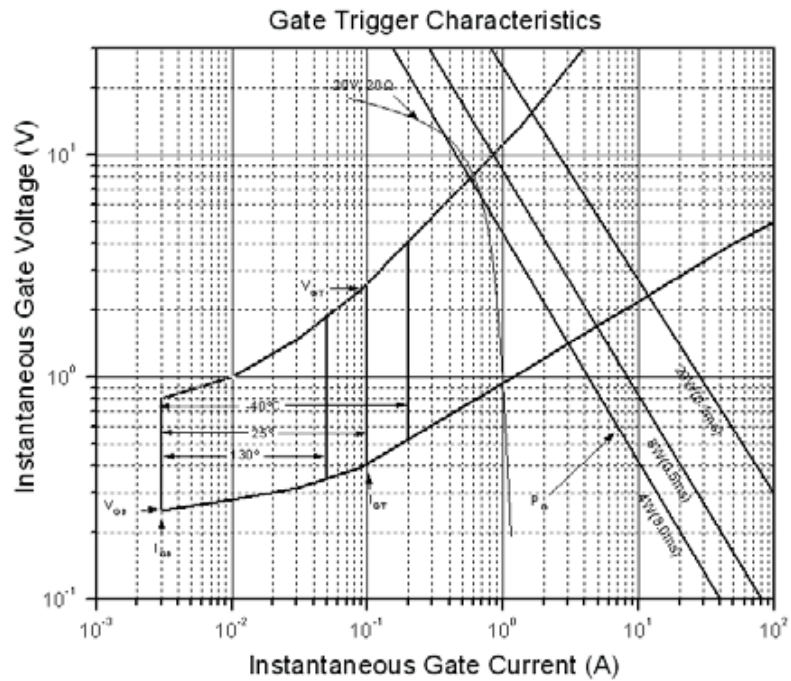


Fig. 7 - Gate Trigger Characteristics

TO-240AA

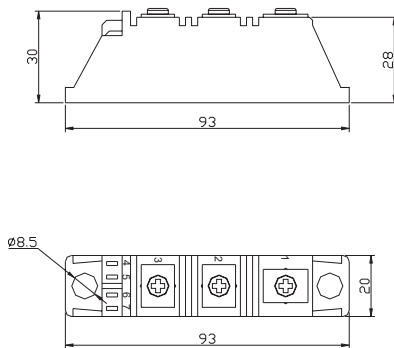


Fig. 8 - Outline Characteristics

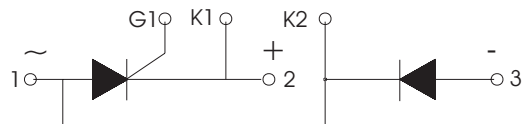


Fig. 9 - Circuit Layout