

High Voltage Standard Rectifier

| | |
|-------------------------|----------|
| 3~ Rectifier | |
| V_{RRM} | = 2200 V |
| I_{DAV} | = 90 A |
| I_{FSM} | = 370 A |

Half 3~ Bridge, Common Anode

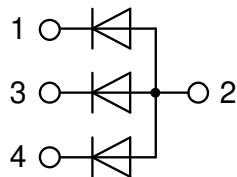
Part number

DNA90YA2200NA



Backside: isolated

 E72873



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

Applications:

- Diode for main rectification
- For single and three phase bridge configurations

Package: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

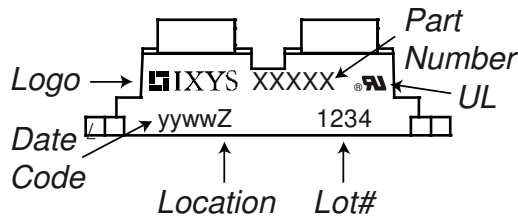


| Rectifier | | | | Ratings | | | |
|------------|--|-----------------------------|-------------------|------------------------------|------|-----------------------------------|------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 2300 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 2200 | V |
| I_R | reverse current | $V_R = 2200$ V | | $T_{VJ} = 25^\circ\text{C}$ | | 100 | μA |
| | | $V_R = 2200$ V | | $T_{VJ} = 150^\circ\text{C}$ | | 1.5 | mA |
| V_F | forward voltage drop | $I_F = 30$ A | | $T_{VJ} = 25^\circ\text{C}$ | | 1.23 | V |
| | | $I_F = 90$ A | | | | 1.70 | V |
| | | $I_F = 30$ A | | $T_{VJ} = 125^\circ\text{C}$ | | 1.21 | V |
| | | $I_F = 90$ A | | | | 1.85 | V |
| I_{DAV} | bridge output current | $T_C = 85^\circ\text{C}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 90 | A |
| | | rectangular | $d = \frac{1}{3}$ | | | | |
| V_{FO} | threshold voltage | | | $T_{VJ} = 150^\circ\text{C}$ | | 0.86 | V |
| r_F | slope resistance | | | | | 11.4 | m Ω |
| | | | | | | } for power loss calculation only | |
| R_{thJC} | thermal resistance junction to case | | | | | 1.2 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.1 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 100 | W |
| I_{FSM} | max. forward surge current | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 370 | A |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 400 | A |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 315 | A |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 340 | A |
| I^2t | value for fusing | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 685 | A ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 665 | A ² s |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 495 | A ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 480 | A ² s |
| C_J | junction capacitance | $V_R = 700$ V; $f = 1$ MHz | | $T_{VJ} = 25^\circ\text{C}$ | | 7 | pF |



| Package SOT-227B (minibloc) | | Ratings | | | | |
|-----------------------------|--|----------------------|-------------------------------------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 150 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 150 | °C |
| Weight | | | | 30 | | g |
| M_D | mounting torque | | 1.1 | | 1.5 | Nm |
| M_T | terminal torque | | 1.1 | | 1.5 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 10.5 | 3.2 | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 8.6 | 6.8 | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3000 | | V |
| | | t = 1 minute | | 2500 | | V |

Product Marking



Part description

- D = Diode
- N = High Voltage Standard Rectifier
- A = (>= 2000V)
- 90 = Current Rating [A]
- YA = Half 3~ Bridge, Common Anode
- 2200 = Reverse Voltage [V]
- NA = SOT-227B (minibloc)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DNA90YA2200NA | DNA90YA2200NA | Tube | 10 | 513730 |

| Similar Part | Package | Voltage class |
|---------------|---------------------|---------------|
| DNA90YC2200NA | SOT-227B (minibloc) | 2200 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^{\circ}C$



Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.86 | V |
| $R_{0\ max}$ | slope resistance * | 9.5 | mΩ |



Outlines SOT-227B (minibloc)



| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|-------|
| | min | max | min | max |
| A | 31.50 | 31.88 | 1.240 | 1.255 |
| B | 7.80 | 8.20 | 0.307 | 0.323 |
| C | 4.09 | 4.29 | 0.161 | 0.169 |
| D | 4.09 | 4.29 | 0.161 | 0.169 |
| E | 4.09 | 4.29 | 0.161 | 0.169 |
| F | 14.91 | 15.11 | 0.587 | 0.595 |
| G | 30.12 | 30.30 | 1.186 | 1.193 |
| H | 37.80 | 38.23 | 1.488 | 1.505 |
| J | 11.68 | 12.22 | 0.460 | 0.481 |
| K | 8.92 | 9.60 | 0.351 | 0.378 |
| L | 0.74 | 0.84 | 0.029 | 0.033 |
| M | 12.50 | 13.10 | 0.492 | 0.516 |
| N | 25.15 | 25.42 | 0.990 | 1.001 |
| O | 1.95 | 2.13 | 0.077 | 0.084 |
| P | 4.95 | 6.20 | 0.195 | 0.244 |
| Q | 26.54 | 26.90 | 1.045 | 1.059 |
| R | 3.94 | 4.42 | 0.155 | 0.167 |
| S | 4.55 | 4.85 | 0.179 | 0.191 |
| T | 24.59 | 25.25 | 0.968 | 0.994 |
| U | -0.05 | 0.10 | -0.002 | 0.004 |
| V | 3.20 | 5.50 | 0.126 | 0.217 |
| W | 19.81 | 21.08 | 0.780 | 0.830 |
| Z | 2.50 | 2.70 | 0.098 | 0.106 |



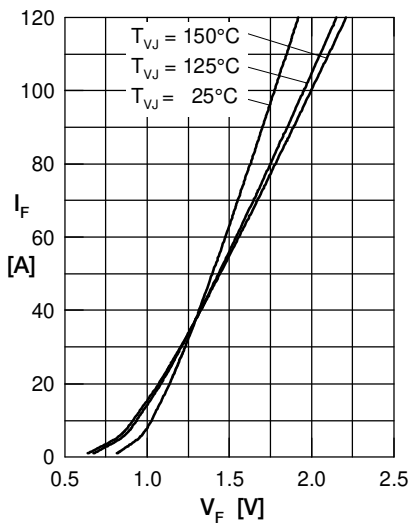
Rectifier


Fig. 1 Forward current versus voltage drop per diode

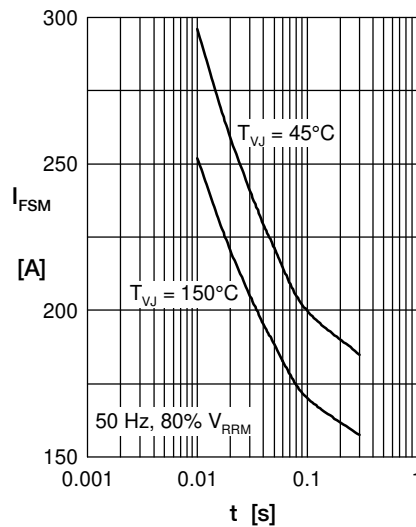


Fig. 2 Surge overload current

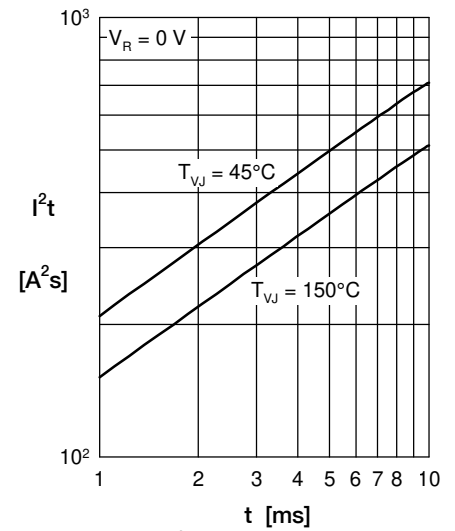
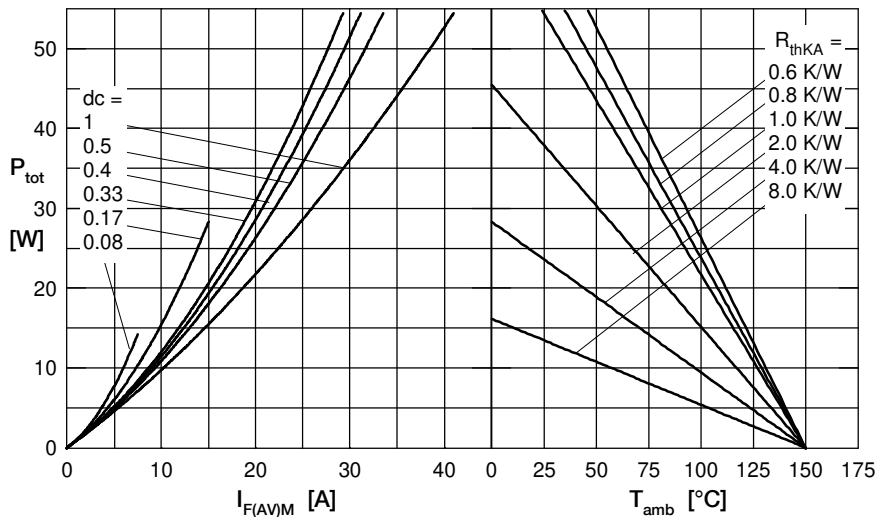

 Fig. 3 I^2t versus time per diode


Fig. 4 Power dissipation versus direct output current and ambient temperature

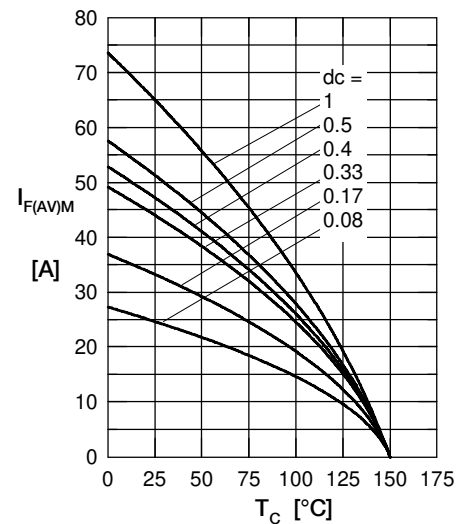


Fig. 5 Max. forward current versus case temperature

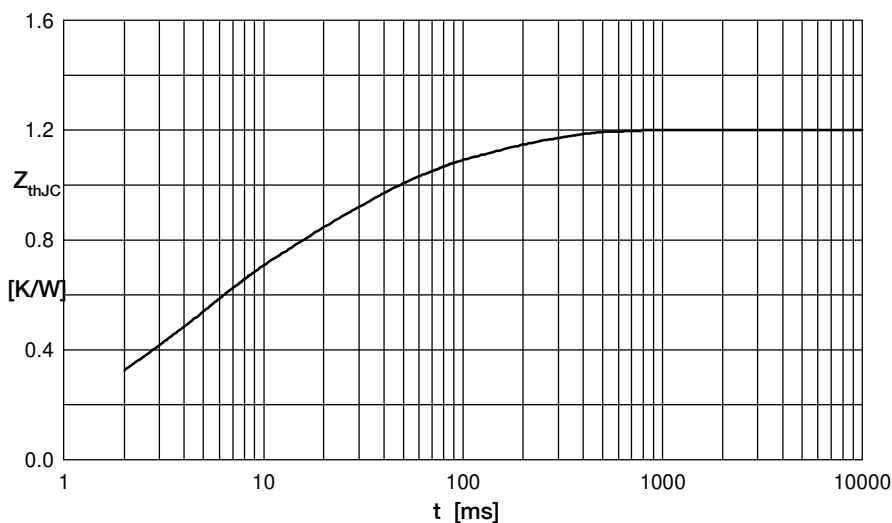


Fig. 6 Transient thermal impedance junction to case

 Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.06 | 0.0004 |
| 2 | 0.2 | 0.00265 |
| 3 | 0.34 | 0.0045 |
| 4 | 0.4 | 0.0242 |
| 5 | 0.2 | 0.15 |