

## High Voltage Standard Rectifier

$$V_{RRM} = 2200V$$

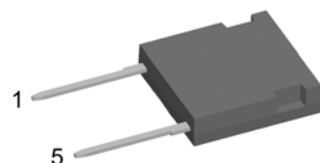
$$I_{FAV} = 30A$$

$$V_F = 1.22V$$

Single Diode

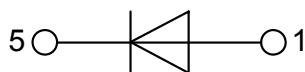
Part number

DNA30E2200FE



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

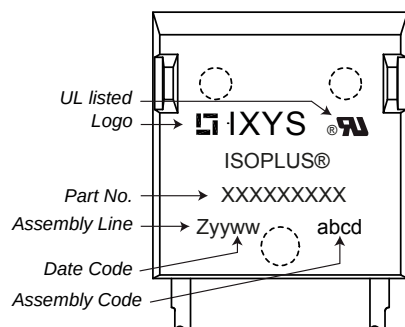
### Package: i4-Pac

- Isolation Voltage: 3000 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

| Rectifier  |                                              |                                                      |                                | Ratings                        |      |      |                  |
|------------|----------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                           |                                | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 2300 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 2200 | V                |
| $I_R$      | reverse current                              | $V_R = 2200\text{ V}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 40   | $\mu\text{A}$    |
|            |                                              | $V_R = 2200\text{ V}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.5  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 30\text{ A}$                                  | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.25 | V                |
|            |                                              | $I_F = 60\text{ A}$                                  |                                |                                |      | 1.50 | V                |
|            |                                              | $I_F = 30\text{ A}$                                  | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.22 | V                |
|            |                                              | $I_F = 60\text{ A}$                                  |                                |                                |      | 1.59 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 110^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 30   | A                |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                    |                                | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.83 | V                |
| $r_F$      | slope resistance                             |                                                      |                                |                                |      | 12.8 | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                                      |                                |                                |      | 1.35 | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                      |                                |                                | 0.20 |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 110  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 370  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 400  | A                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 315  | A                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 340  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 685  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 665  | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 495  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 480  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 700\text{ V}; f = 1\text{ MHz}$               |                                |                                | 7    |      | pF               |

| Package i4-Pac |                                                              |                      | Ratings |      |      |      |
|----------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol         | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                                                  | per terminal         |         |      | 70   | A    |
| $T_{VJ}$       | virtual junction temperature                                 |                      | -55     |      | 175  | °C   |
| $T_{op}$       | operation temperature                                        |                      | -55     |      | 150  | °C   |
| $T_{stg}$      | storage temperature                                          |                      | -55     |      | 150  | °C   |
| Weight         |                                                              |                      |         | 9    |      | g    |
| $F_c$          | mounting force with clip                                     |                      | 20      |      | 120  | N    |
| $d_{Spp/App}$  | creepage distance on surface   striking distance through air | terminal to terminal | 13.8    |      |      | mm   |
| $d_{Spb/Abp}$  |                                                              | terminal to backside | 5.1     |      |      | mm   |
| $V_{ISOL}$     | isolation voltage                                            | t = 1 second         | 3000    |      |      | V    |
|                |                                                              | t = 1 minute         | 2500    |      |      | V    |

### Product Marking



### Part number

D = Diode  
 N = High Voltage Standard Rectifier  
 A = ( $\geq 2000V$ )  
 30 = Current Rating [A]  
 E = Single Diode  
 2200 = Reverse Voltage [V]  
 FE = i4-Pac (2HV)

| Ordering | Part Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|--------------|--------------------|---------------|----------|----------|
| Standard | DNA30E2200FE | DNA30E2200FE       | Tube          | 25       | 508861   |

| Similar Part  | Package                | Voltage class |
|---------------|------------------------|---------------|
| DNA30E2200PA  | TO-220AC               | 2200          |
| DNA30E2200PZ  | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30EM2200PZ | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30E2200IY  | TO-262 (2HV) (I2PAK)   | 2200          |

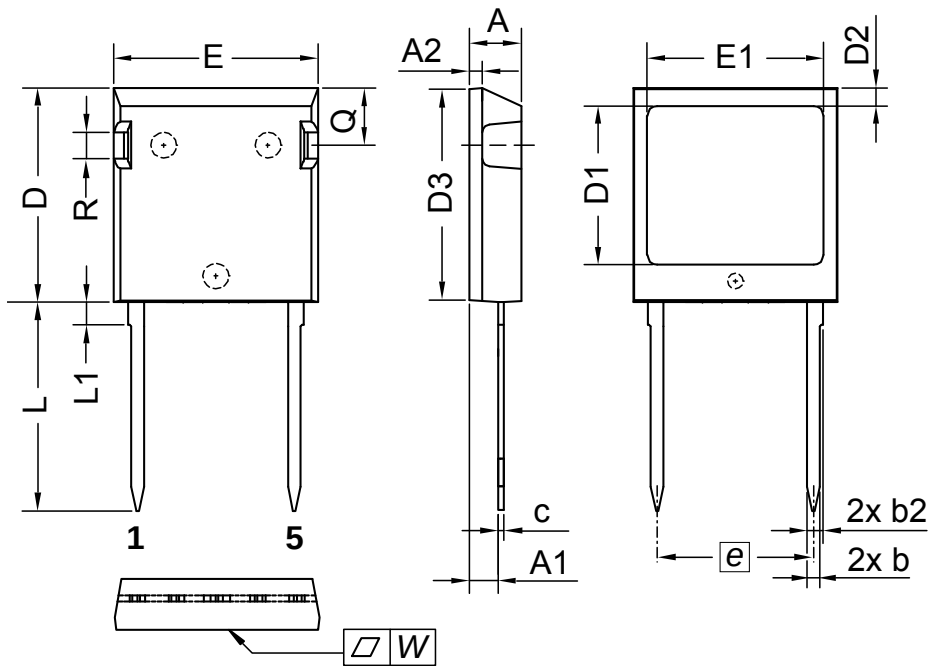
### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 175^\circ C$

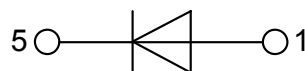
|              |                    |           |    |
|--------------|--------------------|-----------|----|
|              |                    | Rectifier |    |
| $V_{0\ max}$ | threshold voltage  | 0.83      | V  |
| $R_{0\ max}$ | slope resistance * | 10.2      | mΩ |

## Outlines i4-Pac



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | min        | max   | min    | max   |
| A    | 4.83       | 5.21  | 0.190  | 0.205 |
| A1   | 2.59       | 3.00  | 0.102  | 0.118 |
| A2   | 1.17       | 2.16  | 0.046  | 0.085 |
| b    | 1.14       | 1.40  | 0.045  | 0.055 |
| b2   | 1.47       | 1.73  | 0.058  | 0.068 |
| c    | 0.51       | 0.74  | 0.020  | 0.029 |
| D    | 20.80      | 21.34 | 0.819  | 0.840 |
| D1   | 14.99      | 15.75 | 0.590  | 0.620 |
| D2   | 1.65       | 2.03  | 0.065  | 0.080 |
| D3   | 20.30      | 20.70 | 0.799  | 0.815 |
| E    | 19.56      | 20.29 | 0.770  | 0.799 |
| E1   | 16.76      | 17.53 | 0.660  | 0.690 |
| e    | 15.24      | BSC   | 0.600  | BSC   |
| L    | 19.81      | 21.34 | 0.780  | 0.840 |
| L1   | 2.11       | 2.59  | 0.083  | 0.102 |
| Q    | 5.33       | 6.20  | 0.210  | 0.244 |
| R    | 2.54       | 4.57  | 0.100  | 0.180 |
| W    | -          | 0.10  | -      | 0.004 |

Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite  
The convexbow of substrate is typ. < 0.05 mm over plastic surface level of device bottom side



## Rectifier

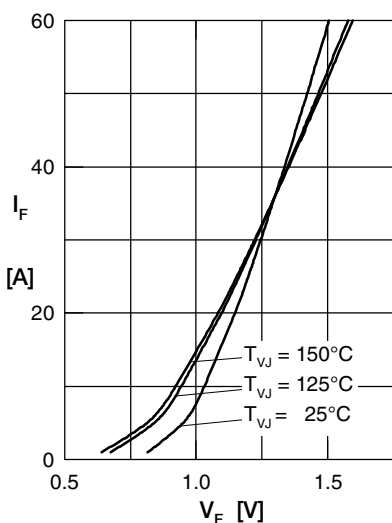


Fig. 1 Forward current versus voltage drop per diode

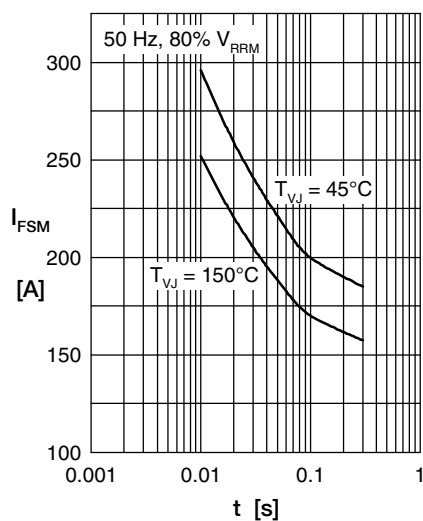


Fig. 2 Surge overload current

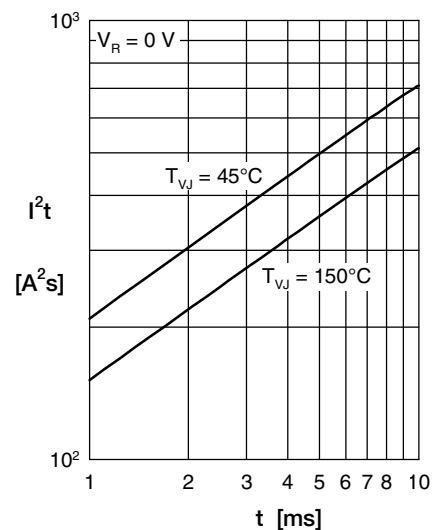


Fig. 3  $I^2t$  versus time per diode

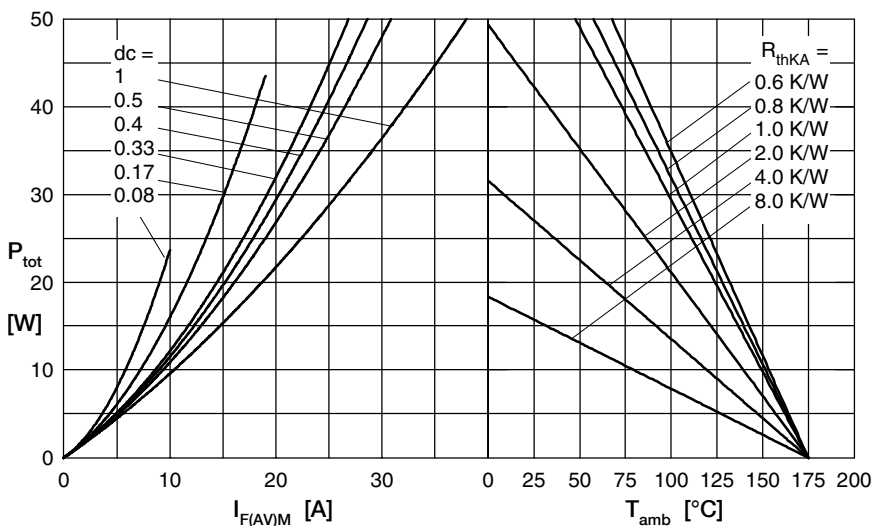


Fig. 4 Power dissipation versus direct output current & ambient temperature

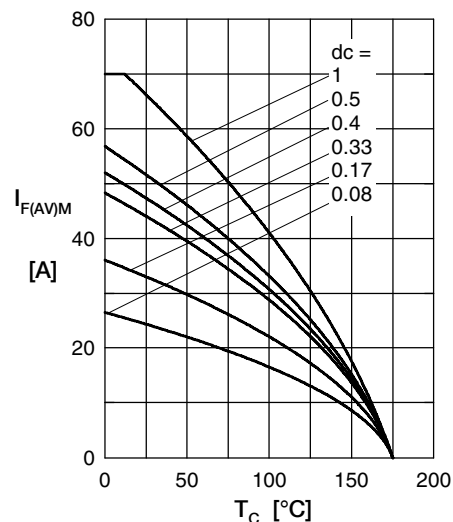


Fig. 5 Max. forward current versus case temperature

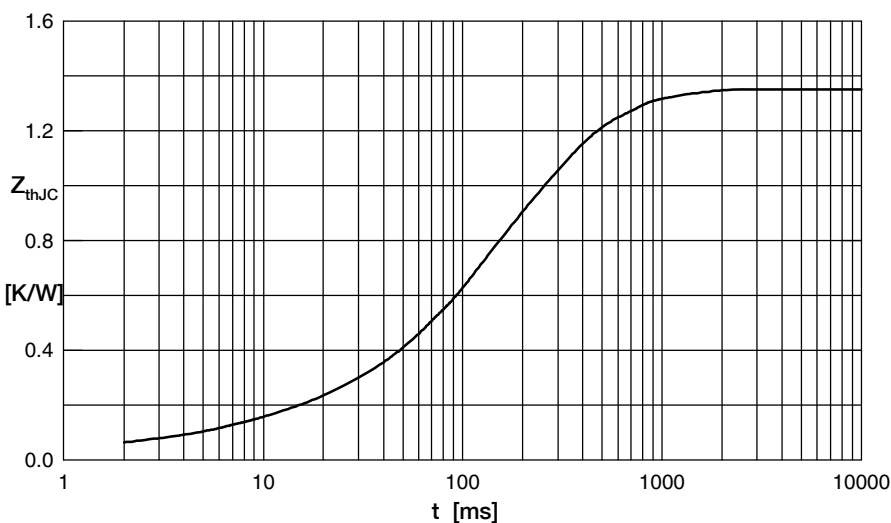


Fig. 6 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.03            | 0.0003    |
| 2 | 0.072           | 0.0065    |
| 3 | 0.122           | 0.083     |
| 4 | 0.736           | 0.152     |
| 5 | 0.39            | 0.4       |