

# High Voltage Standard Rectifier

$$V_{RRM} = 2200\text{ V}$$

$$I_{FAV} = 30\text{ A}$$

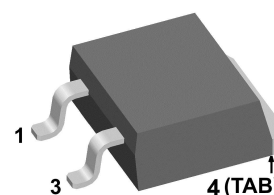
$$V_F = 1.24\text{ V}$$

Single Diode

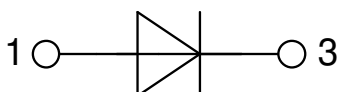
Part number

**DNA30E2200PZ**

Marking on Product: DNA30E2200PZ



Backside: anode



## 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: TO-263 (D2Pak-HV)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

## Disclaimer Notice

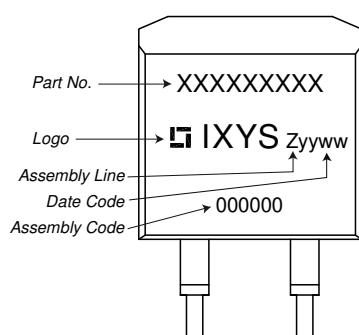
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| Rectifier  |                                              |                                            |                                           | Ratings                        |      |      |                  |
|------------|----------------------------------------------|--------------------------------------------|-------------------------------------------|--------------------------------|------|------|------------------|
| 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                         | $I_F = 30\text{ A}$                        | $T_{VJ} = 25^{\circ}\text{C}$             |                                |      | 1.26 | V                |
|            |                                              | $I_F = 60\text{ A}$                        |                                           |                                |      | 1.53 | V                |
|            |                                              | $I_F = 30\text{ A}$                        | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 1.24 | V                |
|            |                                              | $I_F = 60\text{ A}$                        |                                           |                                |      | 1.63 | V                |
| $I_{FAV}$  | average forward current                      | $T_C = 140^{\circ}\text{C}$<br>rectangular | $T_{VJ} = 175^{\circ}\text{C}$<br>d = 0.5 |                                |      | 30   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only          |                                           | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.83 | V                |
| $r_F$      | slope resistance                             |                                            |                                           |                                |      | 13.4 | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                            |                                           |                                |      | 0.7  | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                            |                                           |                                | 0.25 |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                 |                                           |                                |      | 210  | 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                  | $V_R = 0\text{ V}$                        |                                |      | 400  | A                |
|            |                                              | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 315  | A                |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 340  | A                |
| $I^2t$     | value for fusing                             | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 45^{\circ}\text{C}$             |                                |      | 685  | A <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 665  | A <sup>2</sup> s |
|            |                                              | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 495  | A <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), 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 TO-263 (D2Pak-HV) |                                                              |                      | Ratings |      |      |      |
|---------------------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol                    | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$                 | RMS current                                                  | per terminal         |         |      | 35   | A    |
| $T_{VJ}$                  | virtual junction temperature                                 |                      | -55     |      | 175  | °C   |
| $T_{op}$                  | operation temperature                                        |                      | -55     |      | 150  | °C   |
| $T_{stg}$                 | storage temperature                                          |                      | -55     |      | 150  | °C   |
| Weight                    |                                                              |                      |         | 1.5  |      | g    |
| $F_C$                     | mounting force with clip                                     |                      | 20      |      | 60   | N    |
| $d_{Spp/App}$             | creepage distance on surface / striking distance through air | terminal to terminal | 4.2     |      |      | mm   |
| $d_{Spb/Apb}$             |                                                              | terminal to backside | 4.7     |      |      | mm   |

### Product Marking



### Part description

D = Diode  
 N = High Voltage Standard Rectifier  
 A = ( $\geq 2000V$ )  
 30 = Current Rating [A]  
 E = Single Diode  
 2200 = Reverse Voltage [V]  
 PZ = TO-263AB (D2Pak) (2HV)

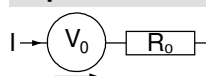
| Ordering    | Ordering Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|------------------|--------------------|---------------|----------|----------|
| Standard    | DNA30E2200PZ-TRL | DNA30E2200PZ       | Tape & Reel   | 800      | 514460   |
| Alternative | DNA30E2200PZ-TUB | DNA30E2200PZ       | Tube          | 50       | 525361   |

| Similar Part  | Package                | Voltage class |
|---------------|------------------------|---------------|
| DNA30EM2200PZ | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30E2200PA  | TO-220AC               | 2200          |
| DNA30E2200FE  | i4-Pac (2HV)           | 2200          |
| DNA30E2200IY  | TO-262 (I2Pak) (2HV)   | 2200          |

### Equivalent Circuits for Simulation

\* on die level

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



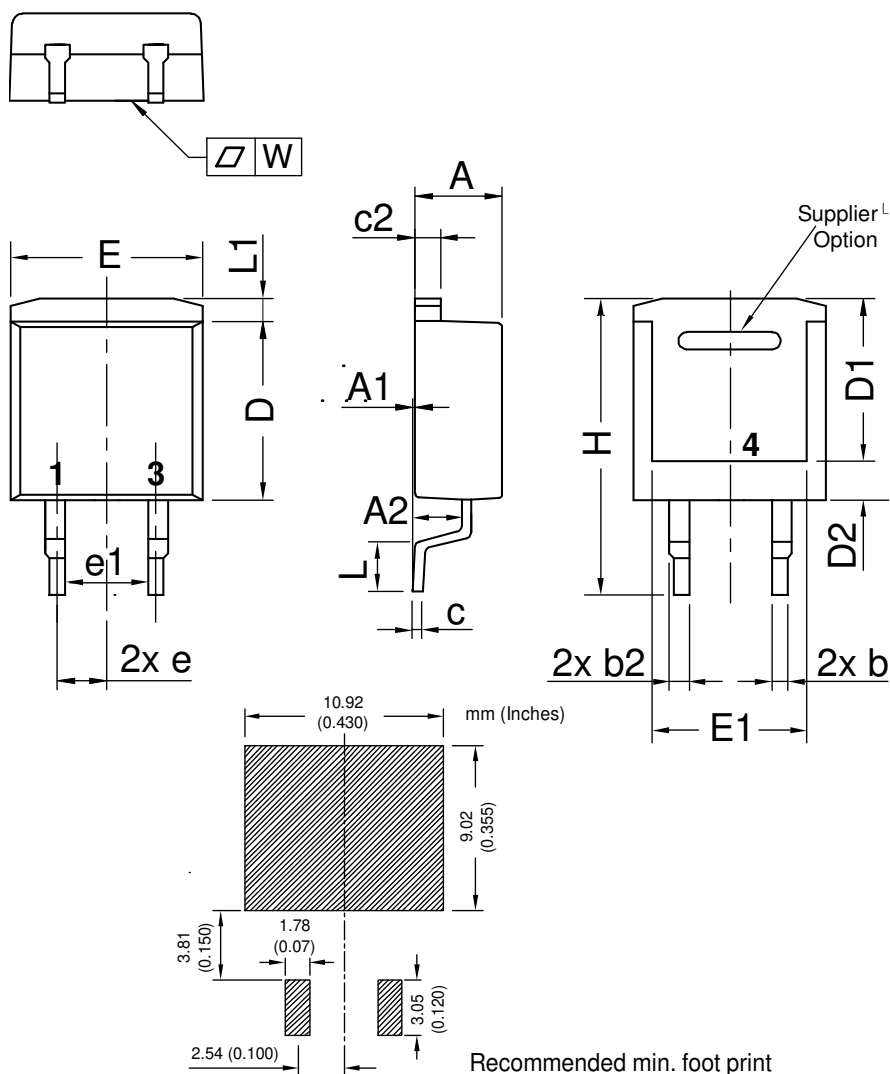
Rectifier

$V_{0\ max}$  threshold voltage 0.83

$R_{0\ max}$  slope resistance \* 10.2

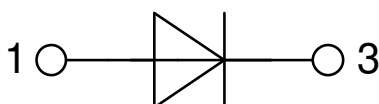
V

mΩ

**Outlines TO-263 (D2Pak-HV)**


| Dim. | Millimeter |       | Inches      |       |
|------|------------|-------|-------------|-------|
|      | min        | max   | min         | max   |
| A    | 4.06       | 4.83  | 0.160       | 0.190 |
| A1   | typ. 0.10  |       | typ. 0.004  |       |
| A2   | 2.41       |       | 0.095       |       |
| b    | 0.51       | 0.99  | 0.020       | 0.039 |
| b2   | 1.14       | 1.40  | 0.045       | 0.055 |
| c    | 0.40       | 0.74  | 0.016       | 0.029 |
| c2   | 1.14       | 1.40  | 0.045       | 0.055 |
| D    | 8.38       | 9.40  | 0.330       | 0.370 |
| D1   | 8.00       | 8.89  | 0.315       | 0.350 |
| D2   | 2.3        |       | 0.091       |       |
| E    | 9.65       | 10.41 | 0.380       | 0.410 |
| E1   | 6.22       | 8.50  | 0.245       | 0.335 |
| e    | 2,54 BSC   |       | 0,100 BSC   |       |
| e1   | 4.28       |       | 0.169       |       |
| H    | 14.61      | 15.88 | 0.575       | 0.625 |
| L    | 1.78       | 2.79  | 0.070       | 0.110 |
| L1   | 1.02       | 1.68  | 0.040       | 0.066 |
| W    | typ. 0.02  | 0.040 | typ. 0.0008 | 0.002 |

All dimensions conform with and/or within JEDEC standard.



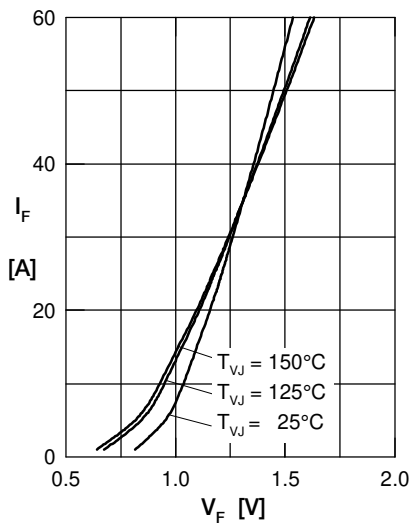
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

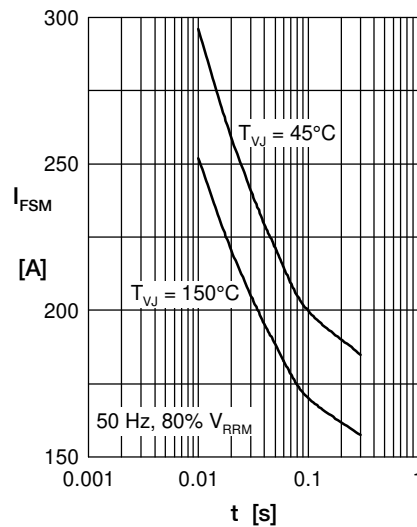


Fig. 2 Surge overload current

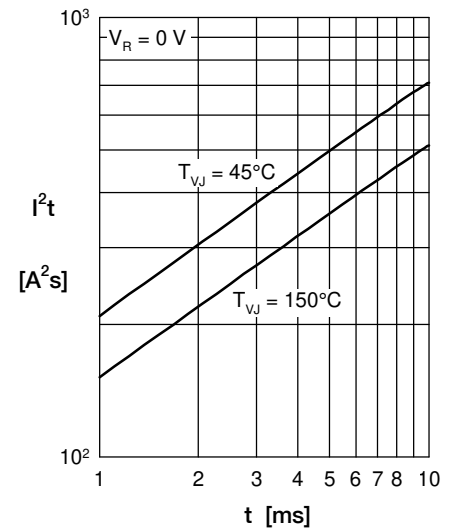
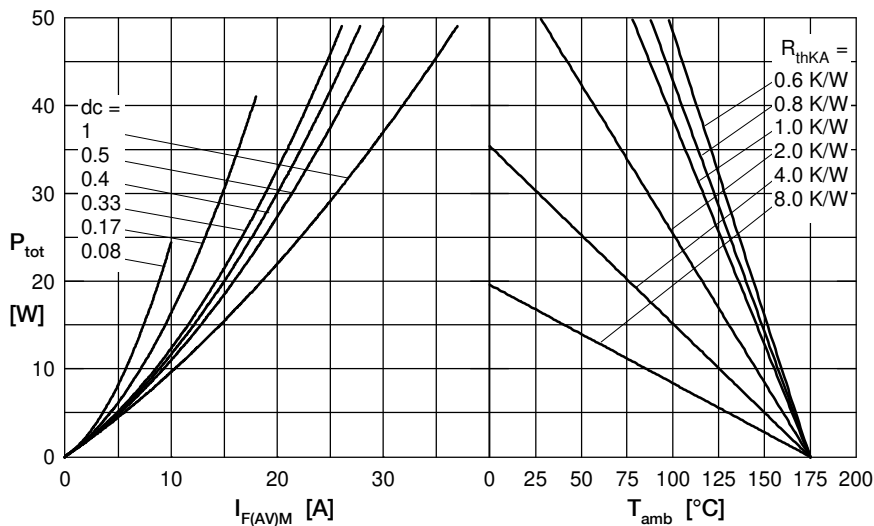

 Fig. 3  $I^2t$  versus time per diode


Fig. 4 Power dissipation vs. direct output current &amp; ambient temperature

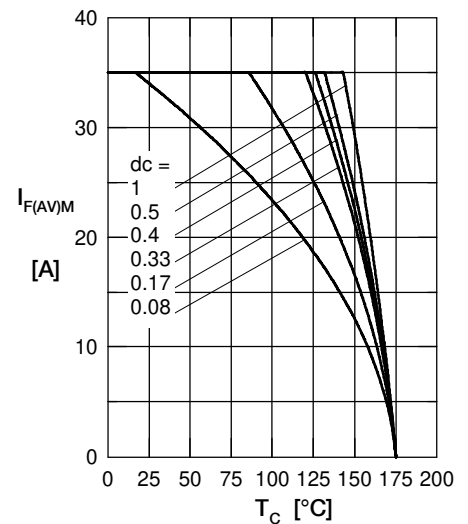


Fig. 5 Max. forward current versus case temperature

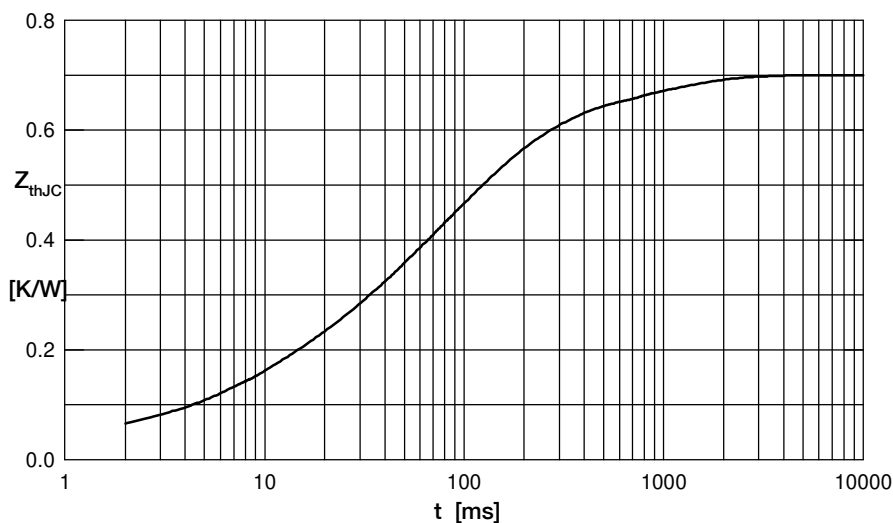


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.03            | 0.0003    |
| 2 | 0.072           | 0.0065    |
| 3 | 0.131           | 0.027     |
| 4 | 0.367           | 0.105     |
| 5 | 0.1             | 0.8       |