

# High Voltage Standard Rectifier

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

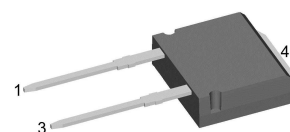
$$I_{FAV} = 30\text{ A}$$

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

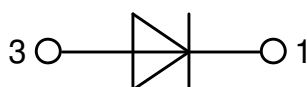
Single Diode

Part number

**DNA30ER2200IY**



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-262 (I2Pak)

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

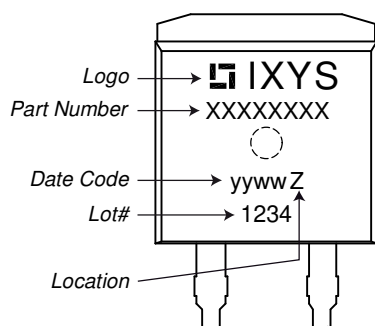
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| Rectifier  |                                              |                                                      |                                | Ratings                        |      |      |                  |
|------------|----------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|------------------|
| 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 $d = 0.5$ | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 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          |                                                      |                                |                                | 0.5  |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 210  | 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 TO-262 (I2Pak) |                                                              |                      | 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   |
| <b>Weight</b>          |                                                              |                      |         | 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 | 4.9     |      |      | mm   |

## Product Marking



## Part description

D = Diode  
 N = High Voltage Standard Rectifier  
 A = ( $\geq 2000V$ )  
 30 = Current Rating [A]  
 ER = Single Diode  
 2200 = Reverse Voltage [V]  
 IY = TO-262 (I2Pak) (2HV)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DNA30ER2200IY   | DNA30ER2200IY      | Tube          | 50       | 513702   |
|          |                 |                    |               |          | 525368   |

| Similar Part  | Package                | Voltage class |
|---------------|------------------------|---------------|
| DNA30E2200PA  | TO-220AC (2)           | 2200          |
| DNA30E2200PZ  | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30EM2200PZ | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30E2200FE  | i4-Pac (2HV)           | 2200          |

## Equivalent Circuits for Simulation

\* on die level

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



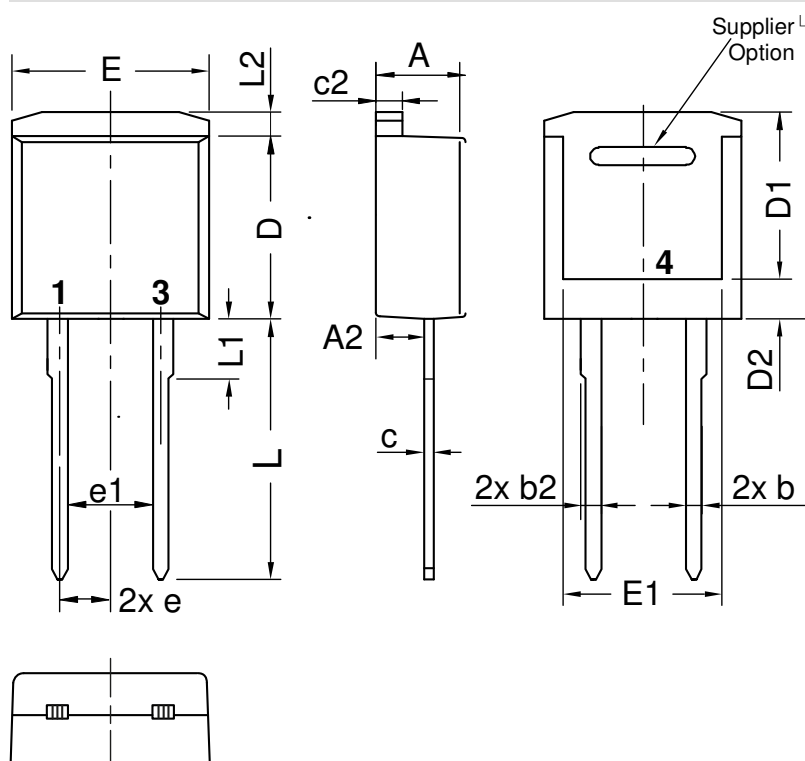
Rectifier

$V_{0\ max}$  threshold voltage 0.83

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

V

mΩ

**Outlines TO-262 (I2Pak)**


| Dim. | Millimeter |       | Inches    |       |
|------|------------|-------|-----------|-------|
|      | min        | max   | min       | max   |
| A    | 4.06       | 4.83  | 0.160     | 0.190 |
| 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   | 2.5        |       | 0.098     |       |
| 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     |       |
| L    | 13.00      | 13.60 | 0.512     | 0.535 |
| L1   | 2.90       | 3.10  | 0.114     | 0.122 |
| L2   | 1.02       | 1.68  | 0.040     | 0.066 |

*All dimensions conform with and/or within JEDEC standard.*



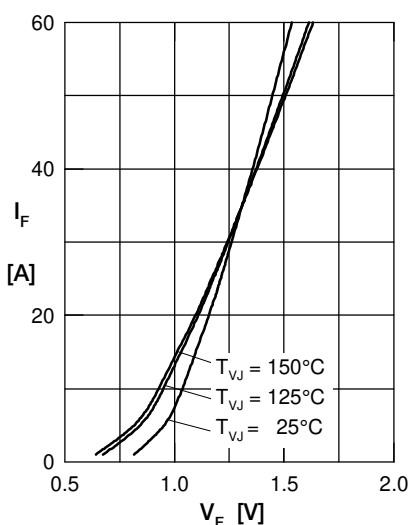
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

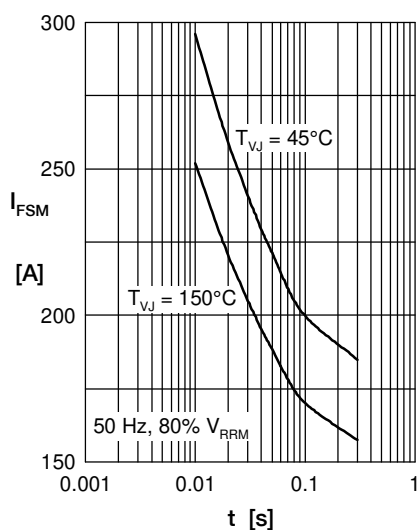


Fig. 2 Surge overload current

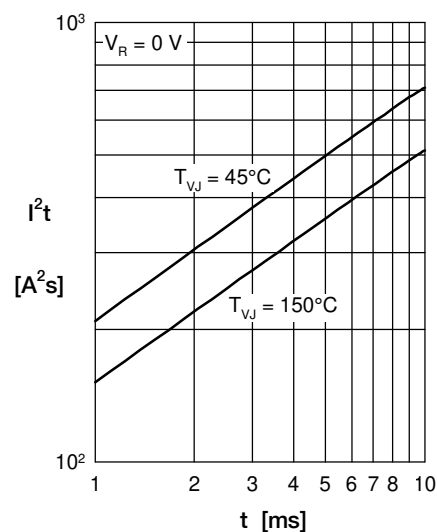
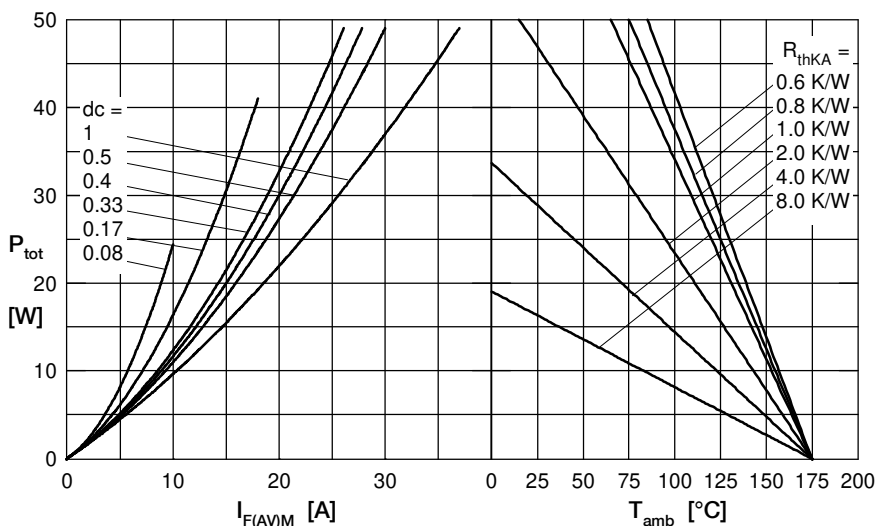

 Fig. 3  $I^2t$  versus time per diode


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

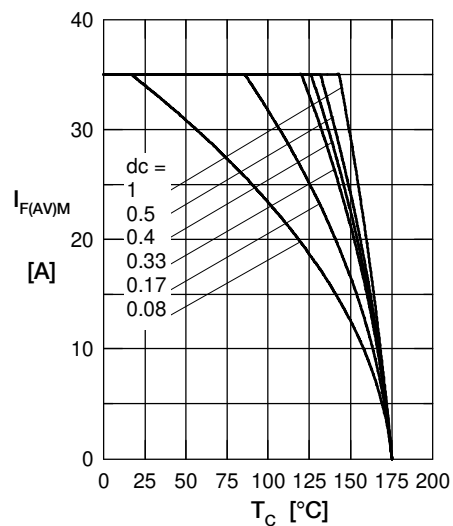


Fig. 5 Max. forward current versus case temperature

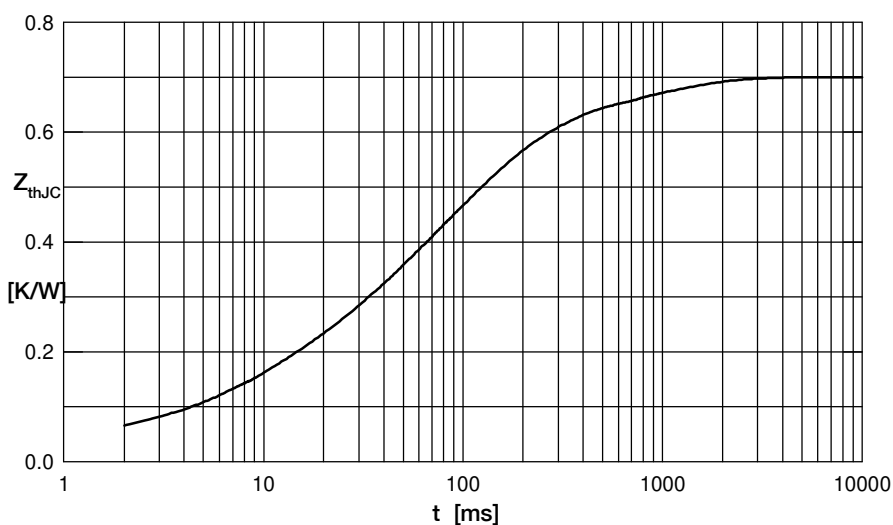


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

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