

## High Voltage Standard Rectifier

$$V_{RRM} = 2200V$$

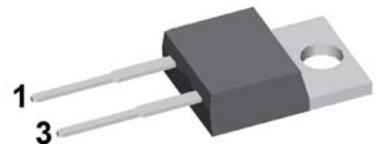
$$I_{FAV} = 30A$$

$$V_F = 1.24V$$

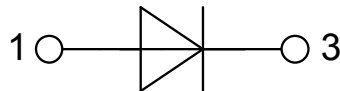
Single Diode

Part number

DNA30E2200PA



Backside: anode



### Features / Advantages:

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

### Applications:

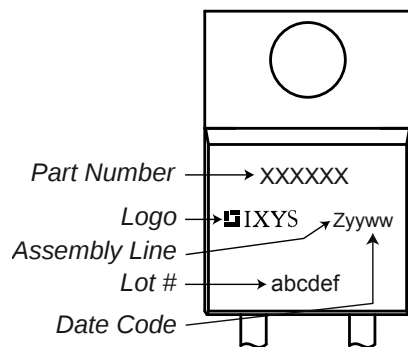
- Diode for main rectification
- For single and three phase bridge configurations

### Package: TO-220

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

| 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                |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                    |                                |         |      | 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          |                                                      |                                |         | 0.50 |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |         |      | 210  | W                |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 370  | A                |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |         |      | 400  | A                |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 315  | A                |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |         |      | 340  | A                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 685  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |         |      | 665  | A <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 495  | A <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |         |      | 480  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 700\text{ V; } f = 1\text{ MHz}$              |                                |         | 7    |      | pF               |

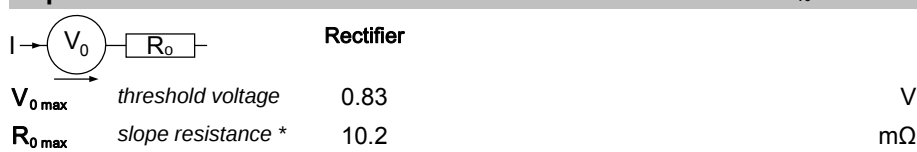
| Package TO-220 |                              |              | Ratings |      |      |      |
|----------------|------------------------------|--------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$      | 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         |                              |              |         | 2    |      | g    |
| $M_D$          | mounting torque              |              | 0.4     |      | 0.6  | Nm   |
| $F_C$          | mounting force with clip     |              | 20      |      | 60   | N    |

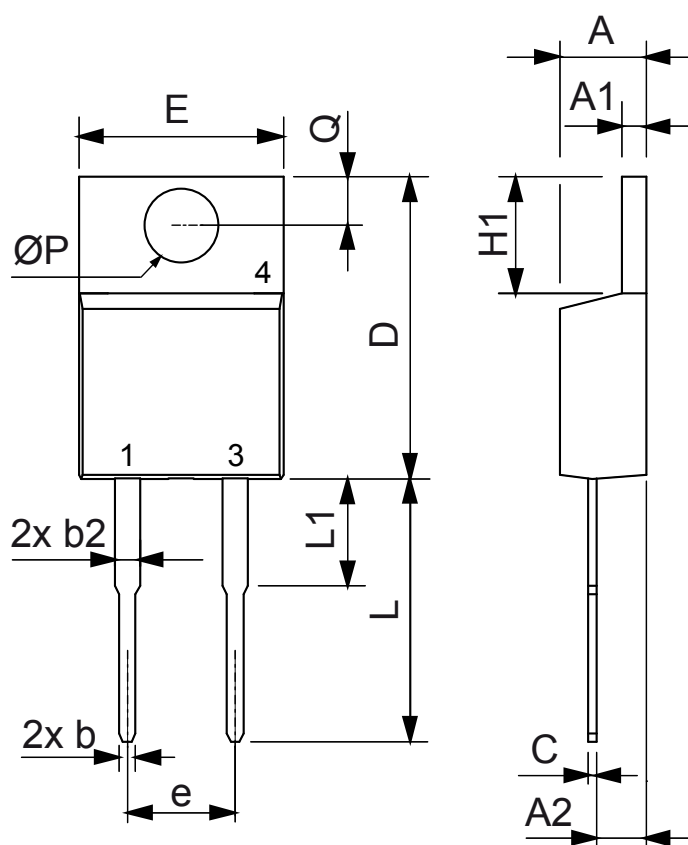
**Product Marking**

**Part number**

D = Diode  
 N = High Voltage Standard Rectifier  
 A = ( $\geq 2000V$ )  
 30 = Current Rating [A]  
 E = Single Diode  
 2200 = Reverse Voltage [V]  
 PA = TO-220AC (2)

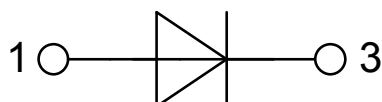
| Ordering | Part Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|--------------|--------------------|---------------|----------|----------|
| Standard | DNA30E2200PA | DNA30E2200PA       | Tube          | 50       | 507762   |

| Similar Part  | Package                | Voltage class |
|---------------|------------------------|---------------|
| DNA30E2200PZ  | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30EM2200PZ | TO-263AB (D2Pak) (2HV) | 2200          |
| DNA30E2200FE  | i4-Pac (2HV)           | 2200          |
| DNA30E2200IY  | TO-262 (2HV) (I2PAK)   | 2200          |

**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{VJ} = 175^\circ C$ 


**Outlines TO-220**


| Dim.            | Millimeter |       | Inches |       |
|-----------------|------------|-------|--------|-------|
|                 | Min.       | Max.  | Min.   | Max.  |
| A               | 4.32       | 4.82  | 0.170  | 0.190 |
| A1              | 1.14       | 1.39  | 0.045  | 0.055 |
| A2              | 2.29       | 2.79  | 0.090  | 0.110 |
| b               | 0.64       | 1.01  | 0.025  | 0.040 |
| b2              | 1.15       | 1.65  | 0.045  | 0.065 |
| C               | 0.35       | 0.56  | 0.014  | 0.022 |
| D               | 14.73      | 16.00 | 0.580  | 0.630 |
| E               | 9.91       | 10.66 | 0.390  | 0.420 |
| e               | 5.08       | BSC   | 0.200  | BSC   |
| H1              | 5.85       | 6.85  | 0.230  | 0.270 |
| L               | 12.70      | 13.97 | 0.500  | 0.550 |
| L1              | 2.79       | 5.84  | 0.110  | 0.230 |
| $\varnothing P$ | 3.54       | 4.08  | 0.139  | 0.161 |
| Q               | 2.54       | 3.18  | 0.100  | 0.125 |



## Rectifier

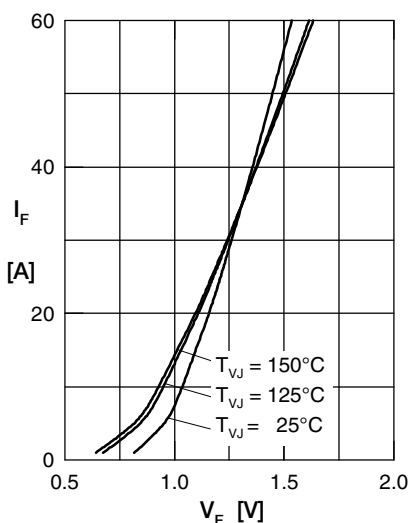


Fig. 1 Forward current versus voltage drop per diode

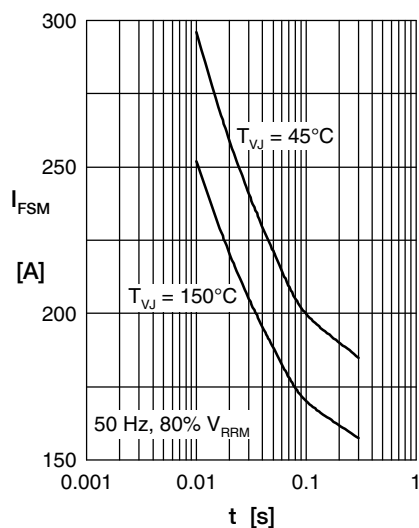


Fig. 2 Surge overload current

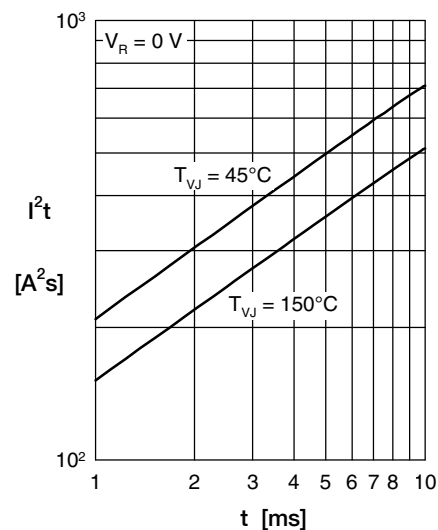


Fig. 3  $I^2t$  versus time per diode

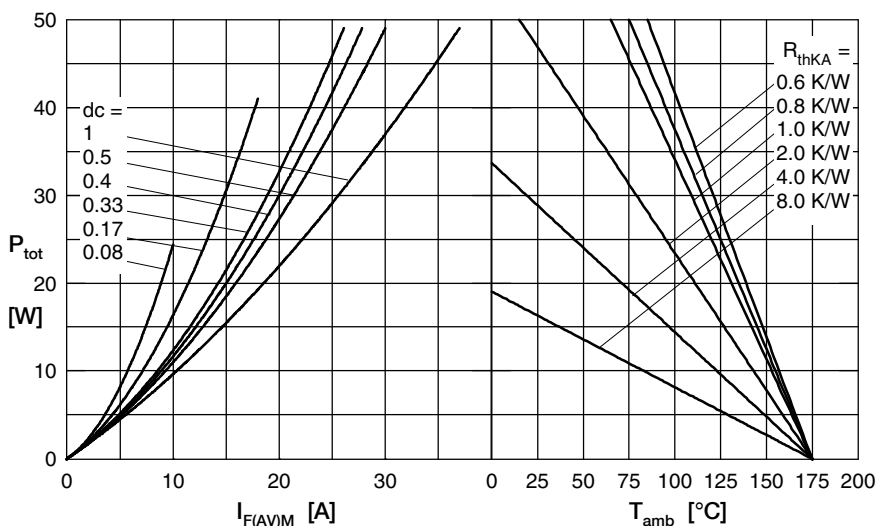


Fig. 4 Power dissipation versus direct output current and ambient temperature

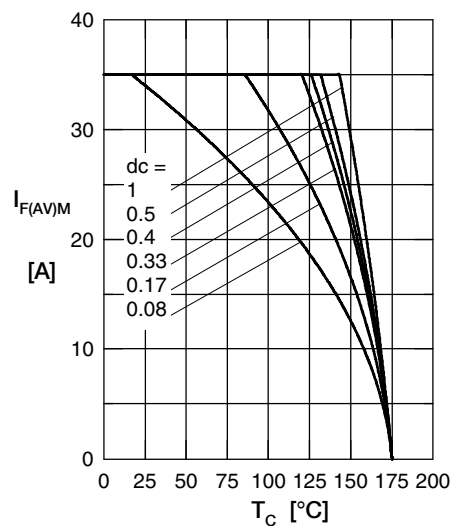


Fig. 5 Max. forward current versus case temperature

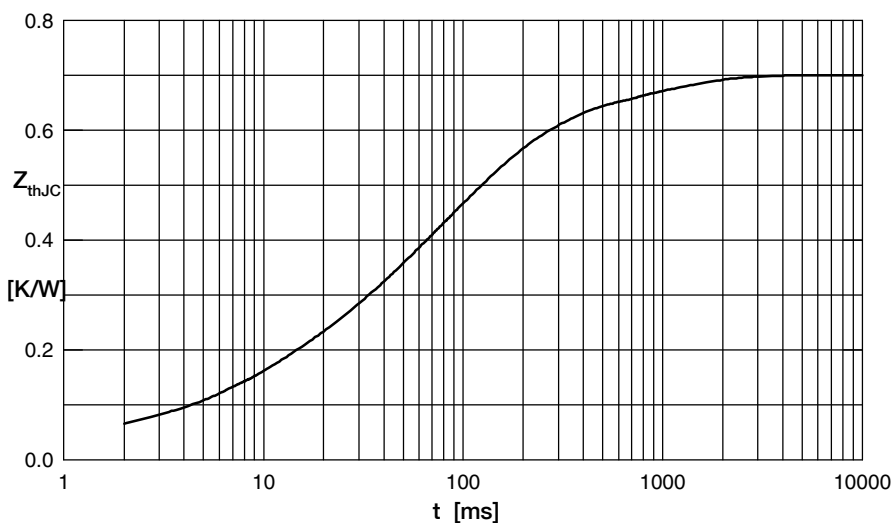


Fig. 6 Transient thermal impedance junction to case

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       |

# AMEYA360

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