

High Voltage Standard Rectifier

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

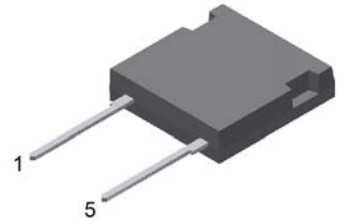
$$I_{FAV} = 30\text{ A}$$

$$V_F = 1,22\text{ V}$$

Single Diode

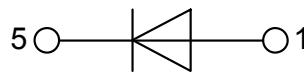
Part number

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

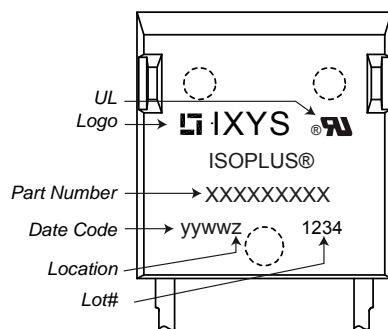
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| Rectifier | | | | Ratings | | | |
|------------|--|---|-------------------------|---------|------|------------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 2300 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 2200 | V | |
| I_R | reverse current | $V_R = 2200 V$ | $T_{VJ} = 25^{\circ}C$ | | 40 | μA | |
| | | $V_R = 2200 V$ | $T_{VJ} = 150^{\circ}C$ | | 1,5 | mA | |
| V_F | forward voltage drop | $I_F = 30 A$ | $T_{VJ} = 25^{\circ}C$ | | 1,25 | V | |
| | | $I_F = 60 A$ | | | 1,50 | V | |
| | | $I_F = 30 A$ | $T_{VJ} = 150^{\circ}C$ | | 1,22 | V | |
| | | $I_F = 60 A$ | | | 1,59 | V | |
| I_{FAV} | average forward current | $T_C = 110^{\circ}C$ rectangular $d = 0.5$ | $T_{VJ} = 175^{\circ}C$ | | 30 | A | |
| V_{F0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 175^{\circ}C$ | | 0,83 | V | |
| r_F | slope resistance | | | | 12,8 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 1,35 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0,2 | | K/W | |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 110 | W | |
| I_{FSM} | max. forward surge current | $t = 10 ms; (50 Hz), sine$ | $T_{VJ} = 45^{\circ}C$ | | 370 | A | |
| | | $t = 8,3 ms; (60 Hz), sine$ | $V_R = 0 V$ | | 400 | A | |
| | | $t = 10 ms; (50 Hz), sine$ | $T_{VJ} = 150^{\circ}C$ | | 315 | A | |
| | | $t = 8,3 ms; (60 Hz), sine$ | $V_R = 0 V$ | | 340 | A | |
| I^2t | value for fusing | $t = 10 ms; (50 Hz), sine$ | $T_{VJ} = 45^{\circ}C$ | | 685 | A ² s | |
| | | $t = 8,3 ms; (60 Hz), sine$ | $V_R = 0 V$ | | 665 | A ² s | |
| | | $t = 10 ms; (50 Hz), sine$ | $T_{VJ} = 150^{\circ}C$ | | 495 | A ² s | |
| | | $t = 8,3 ms; (60 Hz), sine$ | $V_R = 0 V$ | | 480 | A ² s | |
| C_J | junction capacitance | $V_R = 700 V; f = 1 MHz$ | $T_{VJ} = 25^{\circ}C$ | | 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 | | | | 5,5 | | 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 |
| $d_{Spb/Apb}$ | | terminal to backside | 5,1 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second t = 1 minute 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3000 | | | V |
| | | | 2500 | | | V |

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]
 FE = i4-Pac (2HV)

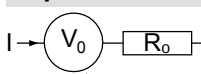
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DNA30E2200FE | DNA30E2200FE | Tube | 25 | 508861 |

| 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

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

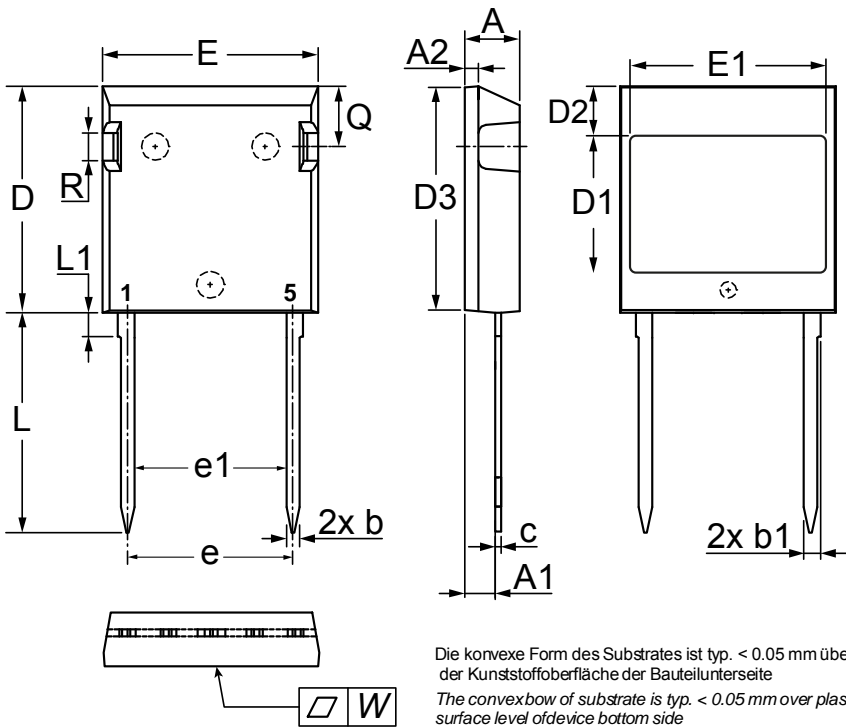


Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0,83 | V |
| $R_{0\ max}$ | slope resistance * | 10,2 | mΩ |

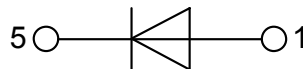


Outlines i4-Pac



Die konvexe Form des Substrates ist typ. <math>< 0.05\text{ mm}</math> über der Kunststoffoberfläche der Bauteilunterseite
The convexbow of substrate is typ. <math>< 0.05\text{ mm}</math> over plastic surface level of device bottom side

| 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 |
| b1 | 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 | 11.70 | 12.30 | 0.460 | 0.484 |
| D2 | 5.50 | 6.10 | 0.216 | 0.240 |
| D3 | 20.30 | 20.70 | 0.799 | 0.815 |
| E | 19.56 | 20.29 | 0.770 | 0.799 |
| E1 | 17.50 | 18.10 | 0.689 | 0.712 |
| e | 15.24 | BSC | 0.600 | BSC |
| e1 | 14.10 | BSC | 0.555 | 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 |



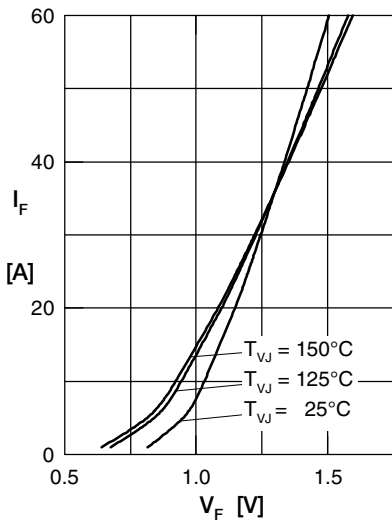
Rectifier


Fig. 1 Forward current versus voltage drop per diode

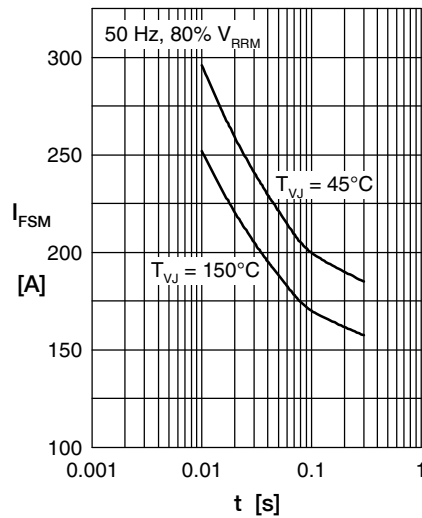


Fig. 2 Surge overload current

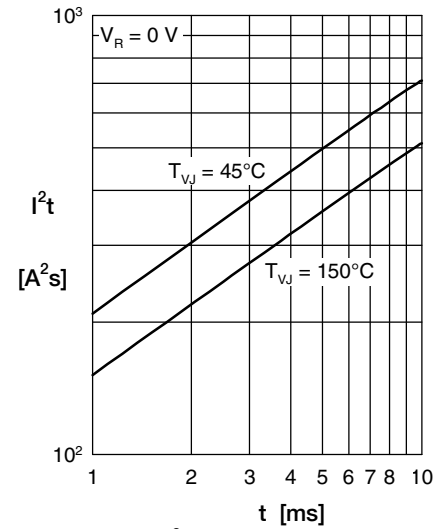
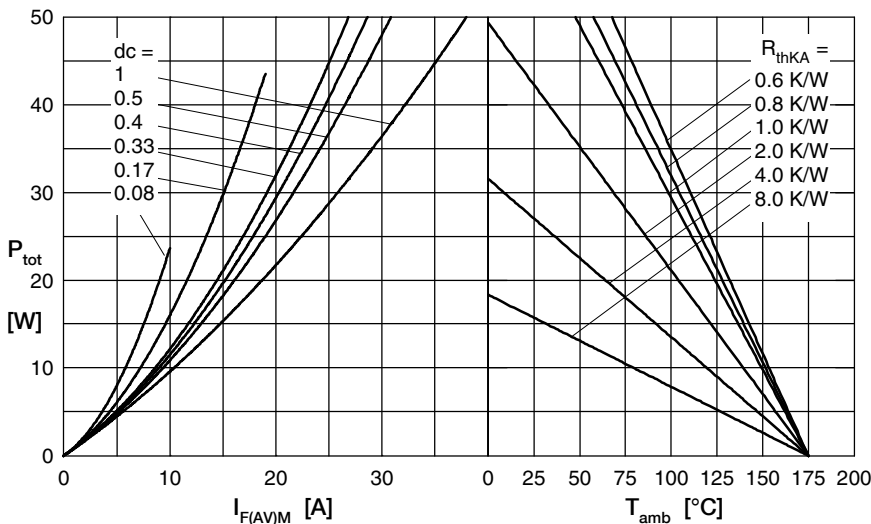

 Fig. 3 I^2t versus time per diode


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

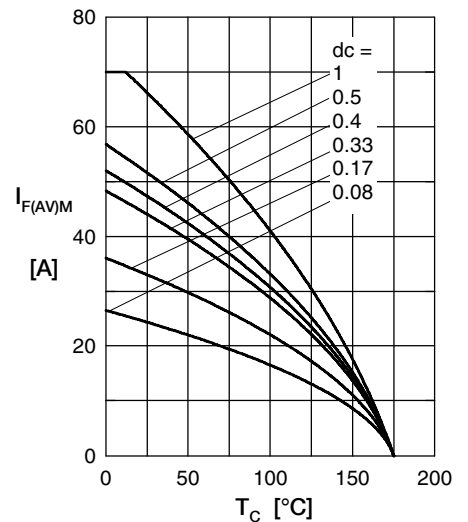


Fig. 5 Max. forward current versus case temperature

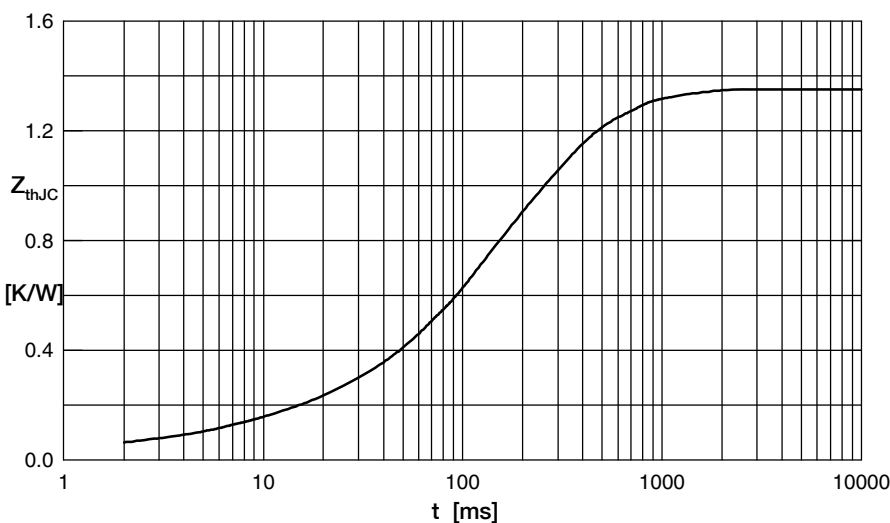


Fig. 6 Transient thermal impedance junction to case

 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 |