

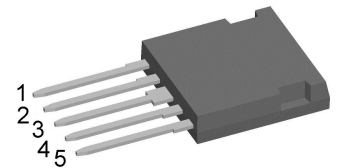
HiPerFRED

$V_{RRM} = 1200\text{ V}$
 $I_{DAV} = 30\text{ A}$
 $t_{rr} = 40\text{ ns}$

High Performance Fast Recovery Diode
 Low Loss and Soft Recovery
 3~ Rectifier Bridge

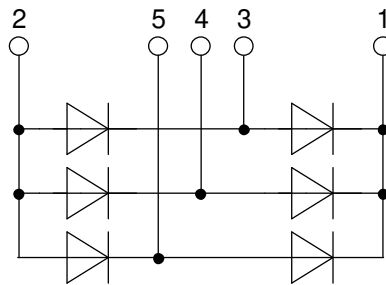
Part number

FUE30-12N1



Backside: isolated

 E72873



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low I_{rm} -values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low I_{rm} reduces:
 - Power dissipation within the diode
 - Turn-on loss in the commutating switch

Applications:

- Rectifiers in switch mode power supplies (SMPS)

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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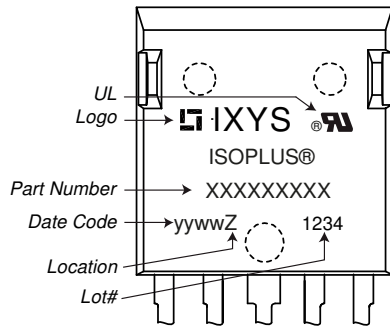


| Fast Diode | | | | Ratings | | | |
|------------|--|--|-------------------------|---------|------|------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V | |
| I_R | reverse current, drain current | $V_R = 1200\text{ V}$ | $T_{VJ} = 25^{\circ}C$ | | 100 | μA | |
| | | $V_R = 1200\text{ V}$ | $T_{VJ} = 150^{\circ}C$ | | 0.5 | mA | |
| V_F | forward voltage drop | $I_F = 10\text{ A}$ | $T_{VJ} = 25^{\circ}C$ | | 2.37 | V | |
| | | $I_F = 30\text{ A}$ | | | 3.17 | V | |
| | | $I_F = 10\text{ A}$ | $T_{VJ} = 150^{\circ}C$ | | 1.60 | V | |
| | | $I_F = 30\text{ A}$ | | | 2.54 | V | |
| I_{DAV} | bridge output current | $T_C = 120^{\circ}C$ rectangular $d = \frac{1}{3}$ | $T_{VJ} = 175^{\circ}C$ | | 30 | A | |
| V_{FO} | threshold voltage | } for power loss calculation only | $T_{VJ} = 175^{\circ}C$ | | 0.97 | V | |
| r_F | slope resistance | | | | 48 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 2.3 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.2 | | K/W | |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 65 | W | |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | $T_{VJ} = 45^{\circ}C$ | | 90 | A | |
| C_J | junction capacitance | $V_R = 600\text{ V}$ $f = 1\text{ MHz}$ | $T_{VJ} = 25^{\circ}C$ | | 5 | pF | |
| I_{RM} | max. reverse recovery current | } $I_F = 15\text{ A}; V_R = 600\text{ V}$ $-di_F/dt = 200\text{ A}/\mu s$ | $T_{VJ} = 25^{\circ}C$ | | 6 | A | |
| | | | $T_{VJ} = 100^{\circ}C$ | | 9 | A | |
| t_{rr} | reverse recovery time | | $T_{VJ} = 25^{\circ}C$ | | 50 | ns | |
| | | | $T_{VJ} = 100^{\circ}C$ | | 140 | ns | |



| Package i4-Pac | | Ratings | | | | |
|----------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 50 | A |
| T_{VJ} | virtual junction temperature | | -55 | | 175 | °C |
| T_{op} | operation temperature | | -55 | | 150 | °C |
| T_{stg} | storage temperature | | -55 | | 150 | °C |
| Weight | | | | 6 | | g |
| F_C | mounting force with clip | | 20 | | 120 | N |
| $d_{Spp/ App}$ | creepage distance on surface striking distance through air | terminal to terminal | 1.7 | | | mm |
| $d_{Spb/ Apb}$ | | terminal to backside | 5.1 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 3000 | | | V |
| | | t = 1 minute | 2500 | | | V |

Product Marking



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | FUE30-12N1 | FUE30-12N1 | Tube | 25 | 488690 |

Equivalent Circuits for Simulation

* on die level

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



Fast Diode

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.97 | V |
| $R_{0\ max}$ | slope resistance * | 46 | mΩ |

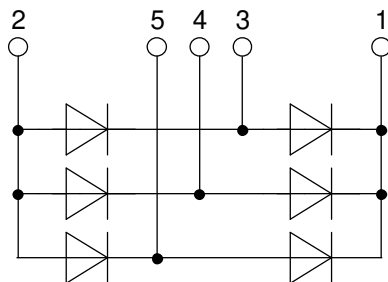


Outlines i4-Pac



| 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 |
| b4 | 2.54 | 2.79 | 0.100 | 0.110 |
| 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 | 3.81 BSC | | 0.150 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



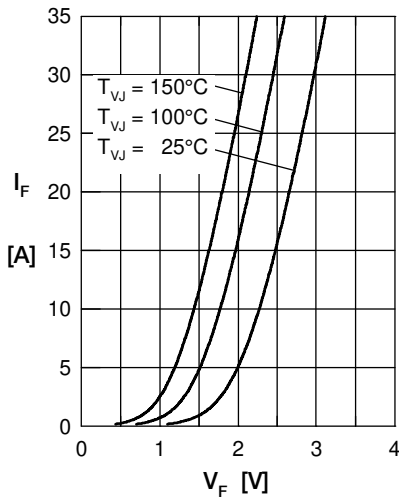
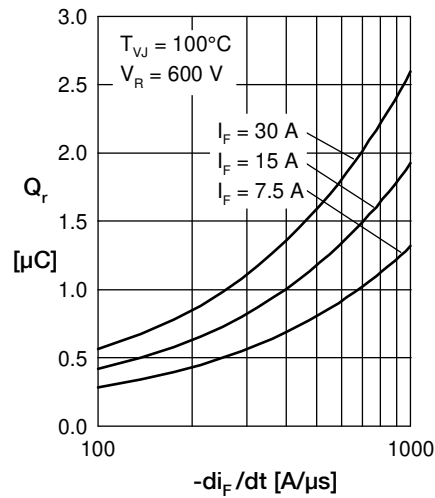
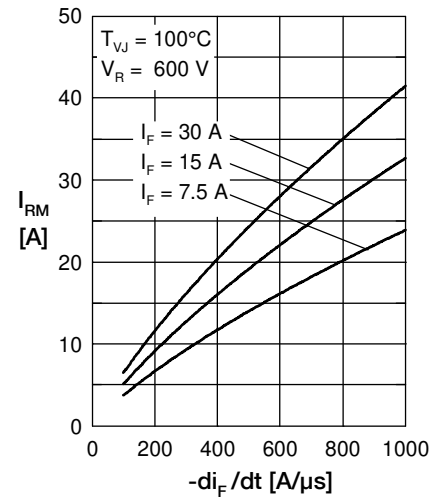
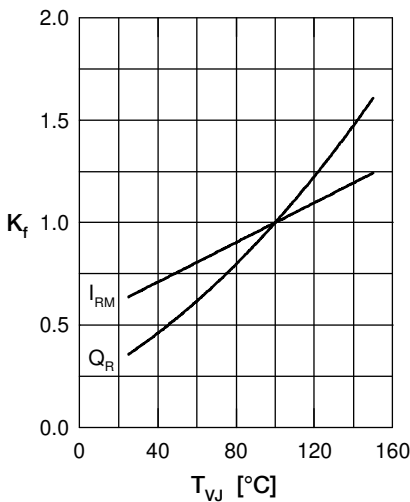
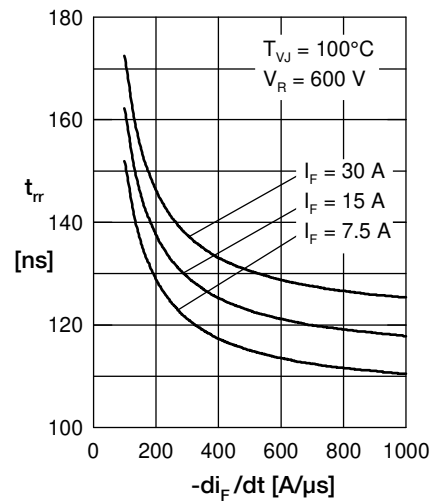
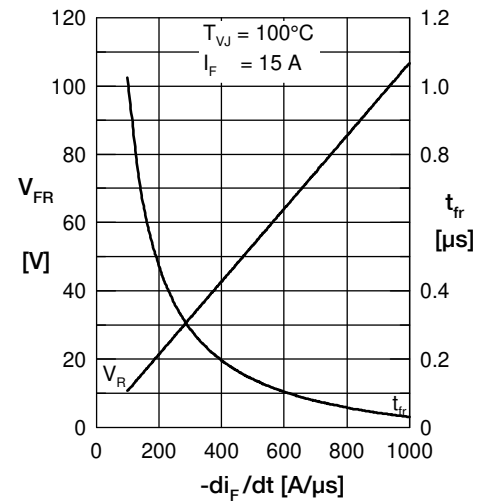
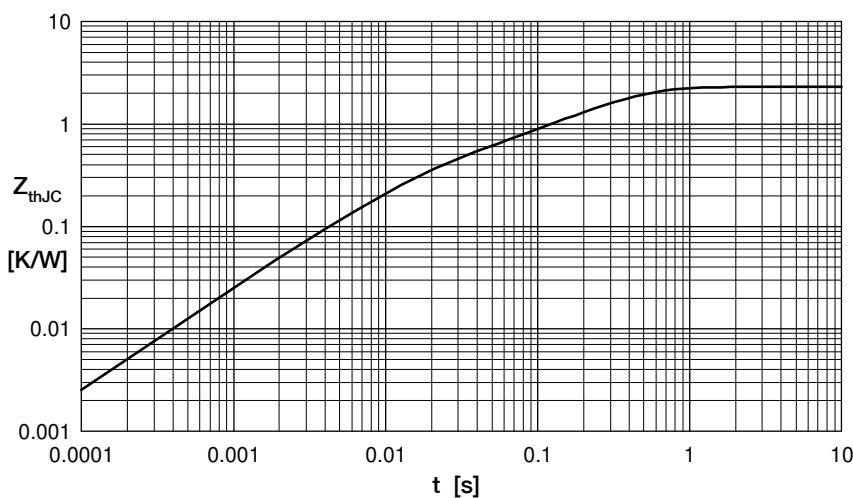
Fast Diode

 Fig. 1 Forward current I_F versus V_F

 Fig. 2 Reverse recovery charge Q_r versus $-di_F/dt$

 Fig. 3 Peak reverse current I_{RM} versus $-di_F/dt$

 Fig. 4 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

 Fig. 5 Recovery time t_{rr} versus $-di_F/dt$

 Fig. 6 Peak forward voltage V_{FR} and t_{fr} versus $-di_F/dt$


Fig. 7 Transient thermal resistance junction to case

 Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.78545 | 0.0052 |
| 2 | 0.30245 | 0.0003 |
| 3 | 0.0621 | 0.0004 |
| 4 | 1.15 | 0.0092 |