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IXYS Corporation
DSEC30-06B

For any questions, you can email us directly:
sales@integrated-circuit.com

IXYS

# DSEC30-06B

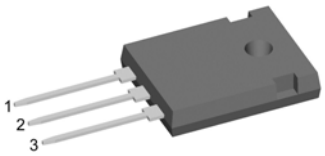
## HiPerFRED

$V_{RRM}$ = 600 V
$I_{FAV}$ = 2x 15 A
$t_{rr}$ = 25 ns

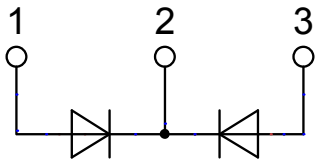
High Performance Fast Recovery Diode
Low Loss and Soft Recovery
Common Cathode

**Part number**

DSEC30-06B




Backside: cathode




**Features / Advantages:**

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

**Applications:**

- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

**Package:** TO-247

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

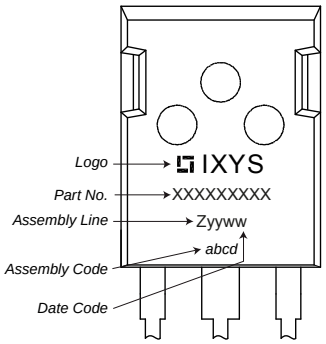
## Fast Diode

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 600 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 600 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 600 V | $T_{VJ}$ = 25°C | | | 100 | µA |
| | | $V_R$ = 600 V | $T_{VJ}$ = 150°C | | | 0.5 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 15 A | $T_{VJ}$ = 25°C | | | 2.53 | V |
| | | $I_F$ = 30 A | | | | 2.97 | V |
| | | $I_F$ = 15 A | $T_{VJ}$ = 150°C | | | 1.58 | V |
| | | $I_F$ = 30 A | | | | 2.02 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 130°C | $T_{VJ}$ = 175°C | | | 15 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0.98 | V |
| $r_F$ | *slope resistance* | | | | | 27 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.6 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.25 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 95 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 110 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 12 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25°C | | 2.5 | | A |
| | | $I_F$ = 15 A; $V_R$ = 300 V | $T_{VJ}$ = 100°C | | 4.5 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 25 | | ns |
| | | | $T_{VJ}$ = 100°C | | 70 | | ns |
| $E_{AS}$ | *non-repetitive avalanche energy* | $I_{AS}$ = 1 A L = 180 µH | $T_{VJ}$ = 25°C | | | 0.1 | mJ |
| $I_{AR}$ | *repetitive avalanche current* | $V_A = 1.5 \cdot V_R$ typ.: f = 10 kHz | | | | 0.1 | A |

# IXYS DSEC30-06B

| Package TO-247 | | | Ratings | | | |
|---|---|---|---|---|---|---|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| $I_{RMS}$ | *RMS current* | per terminal [1] | | | 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 |
| $M_D$ | *mounting torque* | | 0.8 | | 1.2 | Nm |
| $F_C$ | *mounting force with clip* | | 20 | | 120 | N |

Product Marking

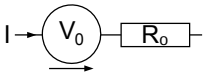



| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DSEC30-06B | DSEC30-06B | Tube | 30 | 492647 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DSEC30-06A | TO-247AD (3) | 600 |
| DSEC29-06AC | ISOPLUS220AB (3) | 600 |

## Equivalent Circuits for Simulation

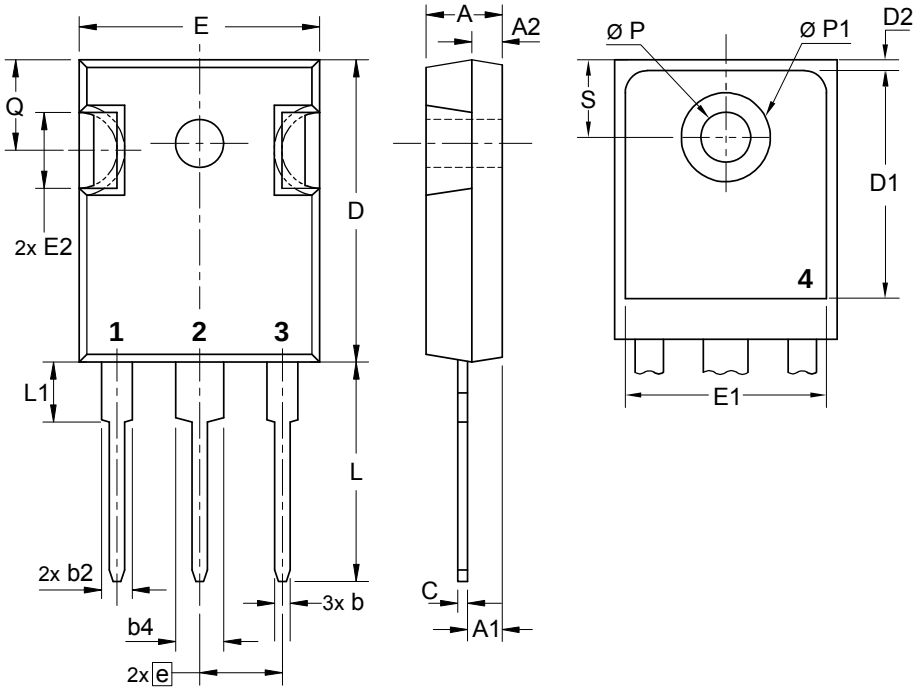
** on die level* $T_{VJ}$ = 175 °C



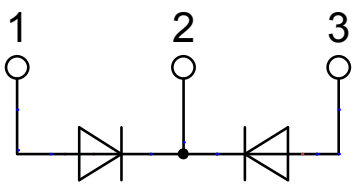

| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.98 | V |
| $R_{0\,max}$ | *slope resistance ** | 24.5 | mΩ |

# IXYS DSEC30-06B

## Outlines TO-247




| Sym. | Inches | | Millimeter | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| A | 0.185 | 0.209 | 4.70 | 5.30 |
| A1 | 0.087 | 0.102 | 2.21 | 2.59 |
| A2 | 0.059 | 0.098 | 1.50 | 2.49 |
| D | 0.819 | 0.845 | 20.79 | 21.45 |
| E | 0.610 | 0.640 | 15.48 | 16.24 |
| E2 | 0.170 | 0.216 | 4.31 | 5.48 |
| e | 0.215 BSC | | 5.46 BSC | |
| L | 0.780 | 0.800 | 19.80 | 20.30 |
| L1 | - | 0.177 | - | 4.49 |
| Ø P | 0.140 | 0.144 | 3.55 | 3.65 |
| Q | 0.212 | 0.244 | 5.38 | 6.19 |
| S | 0.242 BSC | | 6.14 BSC | |
| b | 0.039 | 0.055 | 0.99 | 1.40 |
| b2 | 0.065 | 0.094 | 1.65 | 2.39 |
| b4 | 0.102 | 0.135 | 2.59 | 3.43 |
| c | 0.015 | 0.035 | 0.38 | 0.89 |
| D1 | 0.515 | - | 13.07 | - |
| D2 | 0.020 | 0.053 | 0.51 | 1.35 |
| E1 | 0.530 | - | 13.45 | - |
| Ø P1 | - | 0.29 | - | 7.39 |



## Fast Diode

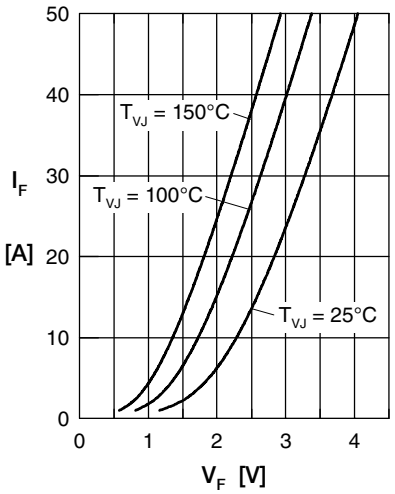



Fig. 1 Forward current $I_F$ versus $V_F$

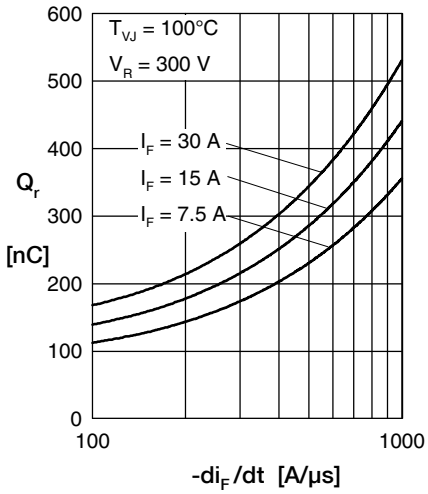



Fig. 2 Reverse recov. charge $Q_r$ versus $-di_F/dt$

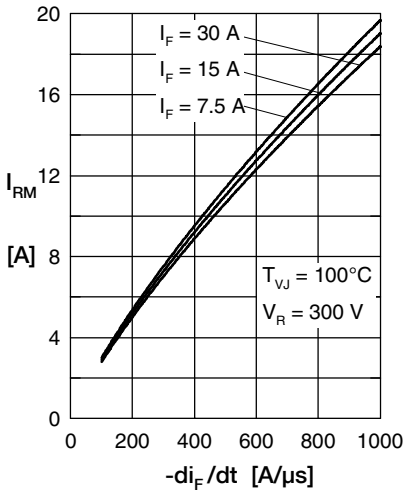



Fig. 3 Peak reverse current $I_{RM}$ versus $-di_F/dt$

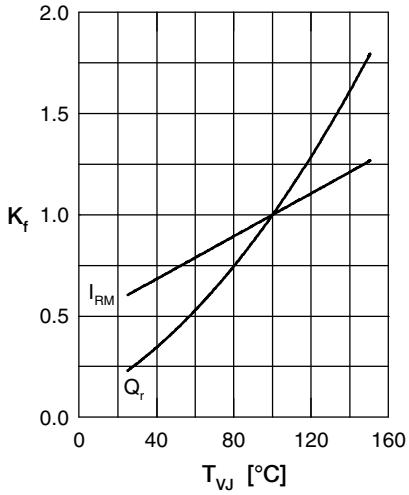



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

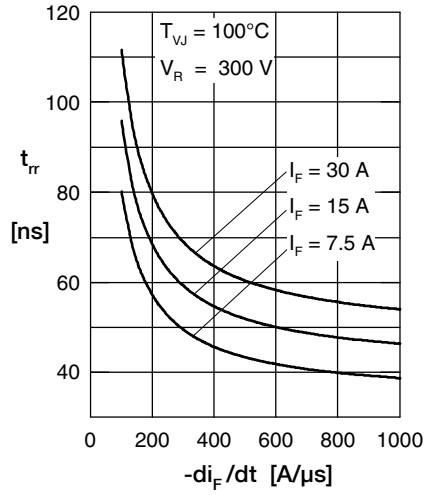



Fig. 5 Recovery time $t_{rr}$ versus $-di_F/dt$

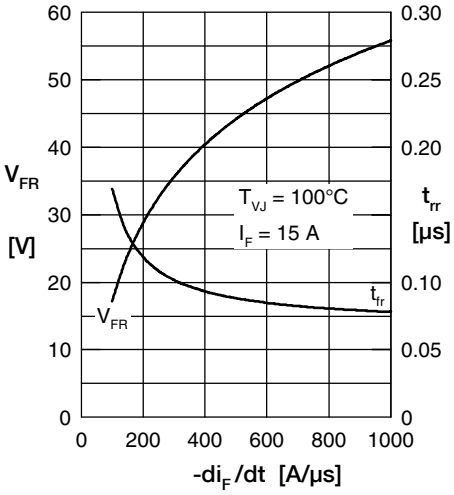



Fig. 6 Peak forward voltage $V_{FR}$ and $t_{fr}$ versus $di_F/dt$

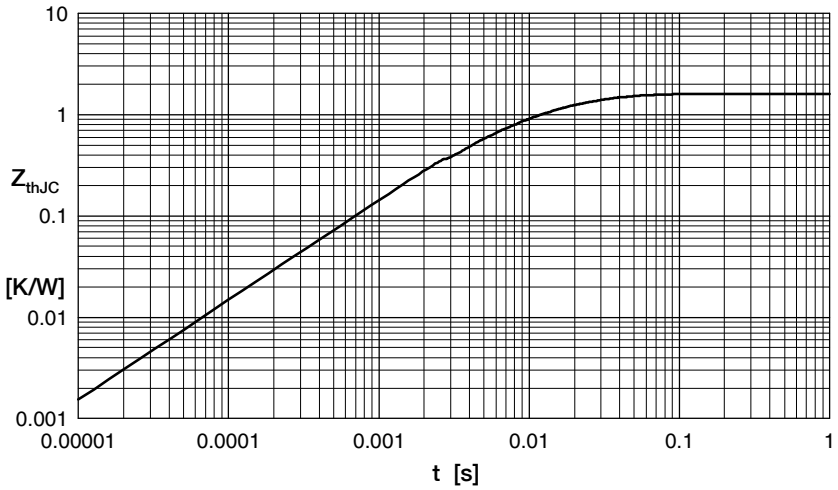



Fig. 7 Transient thermal resistance junction to case

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.908 | 0.005 |
| 2 | 0.350 | 0.0003 |
| 3 | 0.342 | 0.017 |