

HiPerFRED

$$V_{RRM} = 1200\text{ V}$$

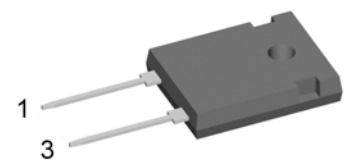
$$I_{FAV} = 60\text{ A}$$

$$t_{rr} = 40\text{ ns}$$

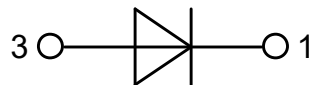
High Performance Fast Recovery Diode
 Low Loss and Soft Recovery
 Single Diode

Part number

DSEP60-12A



Backside: cathode



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:

- 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

Disclaimer Notice

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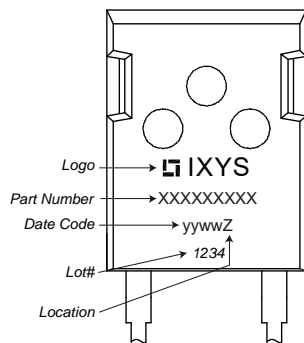


| Fast Diode | | | | Ratings | | | |
|------------|--|--|------------------------------|------------------------------|------|------|---------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 1200 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 1200 | V |
| I_R | reverse current, drain current | $V_R = 1200\text{ V}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 650 | μA |
| | | $V_R = 1200\text{ V}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 2,5 | mA |
| V_F | forward voltage drop | $I_F = 60\text{ A}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 2,66 | V |
| | | | | $I_F = 120\text{ A}$ | | | 3,18 |
| | | $I_F = 60\text{ A}$ | $T_{VJ} = 150^\circ\text{C}$ | | | | 1,81 |
| | | | | $I_F = 120\text{ A}$ | | | 2,40 |
| I_{FAV} | average forward current | $T_c = 115^\circ\text{C}$ rectangular $d = 0.5$ | $T_{VJ} = 175^\circ\text{C}$ | | | | 60 |
| V_{F0} | threshold voltage | } for power loss calculation only | | $T_{VJ} = 175^\circ\text{C}$ | | 1,08 | V |
| r_F | slope resistance | | | | | 9,4 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 0,45 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0,25 | | K/W |
| P_{tot} | total power dissipation | | | $T_c = 25^\circ\text{C}$ | | 330 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | | $T_{VJ} = 45^\circ\text{C}$ | | 500 | A |
| C_J | junction capacitance | $V_R = 600\text{ V}$ $f = 1\text{ MHz}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 30 | pF |
| I_{RM} | max. reverse recovery current | } $I_F = 60\text{ A}; V_R = 600\text{ V}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 13 | A |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 20 | A |
| t_{rr} | reverse recovery time | } $-di_F/dt = 200\text{ A}/\mu\text{s}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 80 | ns |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 220 | ns |



| Package TO-247 | | | 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 | | | | 6 | | g |
| M_D | mounting torque | | 0,8 | | 1,2 | Nm |
| F_C | mounting force with clip | | 20 | | 120 | N |

Product Marking



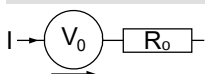
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP60-12A | DSEP60-12A | Tube | 30 | 477133 |

| Similar Part | Package | Voltage class |
|--------------|----------------|---------------|
| DSEP60-12B | TO-247AD (2) | 1200 |
| DSEP60-12AR | ISOPLUS247 (2) | 1200 |
| DHG60I1200HA | TO-247AD (2) | 1200 |

Equivalent Circuits for Simulation

* on die level

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

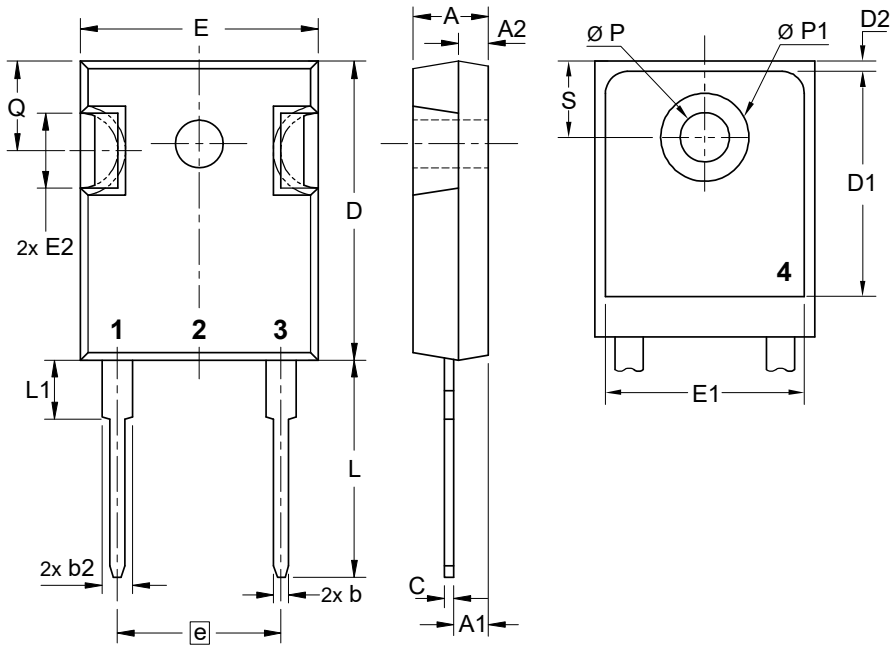


Fast Diode

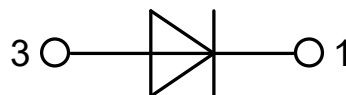
| | | | |
|--------------|--------------------|------|----|
| $V_{0 \max}$ | threshold voltage | 1,08 | V |
| $R_{0 \max}$ | slope resistance * | 6,8 | mΩ |



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 | 0.430 BSC | | 10.92 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 |



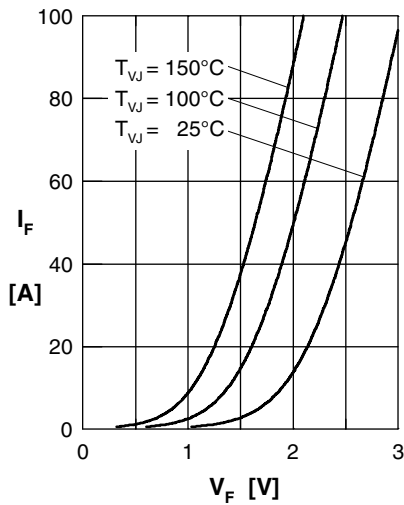
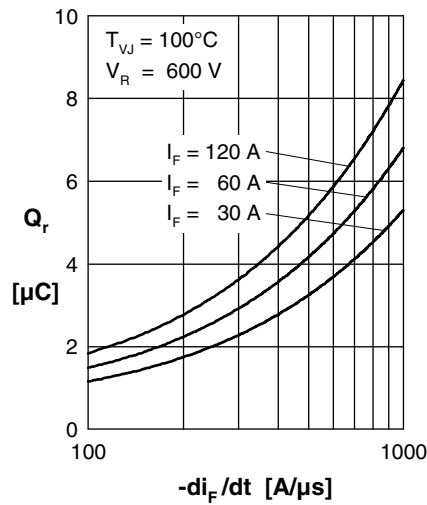
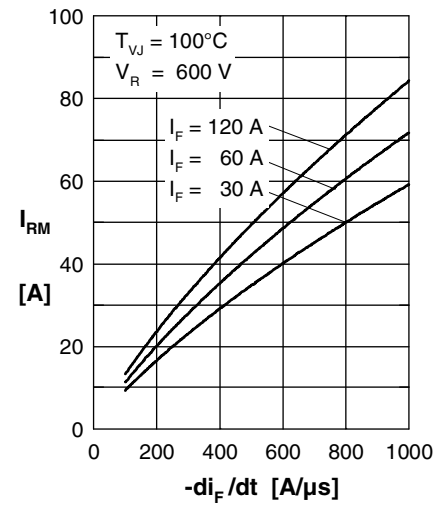
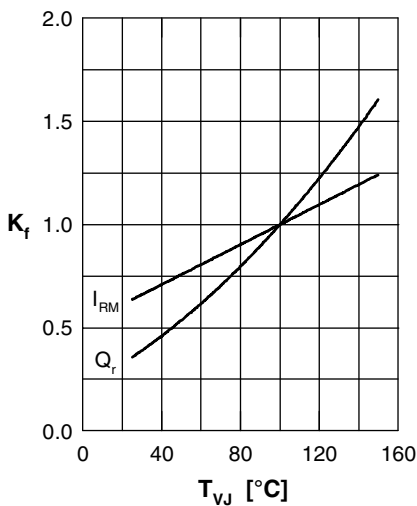
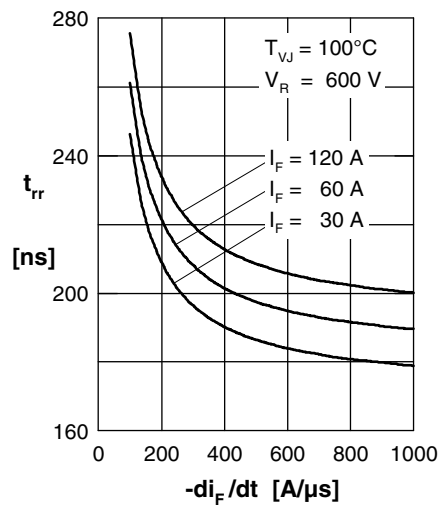
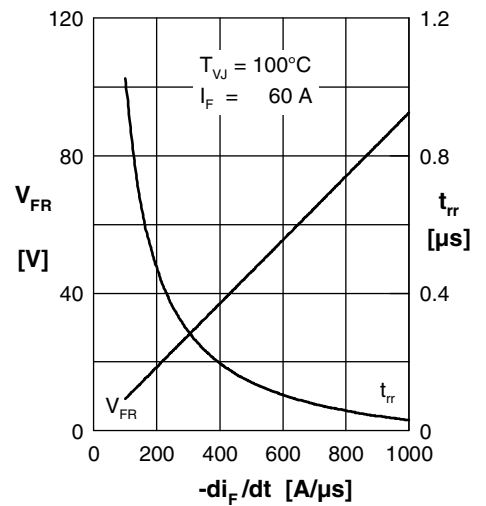
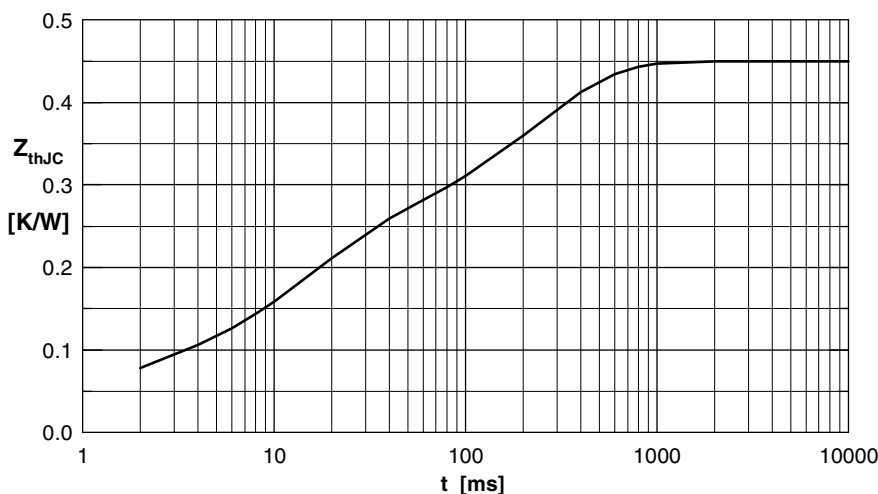
Fast Diode

 Fig. 1 Forward current I_F versus V_F

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

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

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

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

 Fig. 6 Typ. peak forward voltage V_{FR} and t_{rr} 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 | 0.0050 | 0.0001 |
| 2 | 0.0550 | 0.0010 |
| 3 | 0.1750 | 0.0140 |
| 4 | 0.2150 | 0.2300 |