



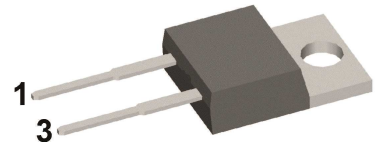
HiPerFRED

$V_{RRM} = 1200\text{ V}$
 $I_{FAV} = 12\text{ A}$
 $t_{rr} = 40\text{ ns}$

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

Part number

DSEP12-12A



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-220

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

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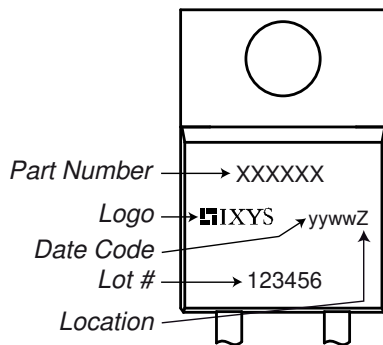


| Fast Diode | | | | Ratings | | | |
|------------|--|--|------------------------------|------------------------------|------|------|---------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 1200 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 1200 | V |
| I_R | reverse current, drain current | $V_R = 1200\text{ V}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 100 | μA |
| | | $V_R = 1200\text{ V}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 0.5 | mA |
| V_F | forward voltage drop | $I_F = 15\text{ A}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 2.62 | V |
| | | $I_F = 30\text{ A}$ | | | | 3.19 | V |
| | | $I_F = 15\text{ A}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 1.87 | V |
| | | $I_F = 30\text{ A}$ | | | | 2.56 | V |
| I_{FAV} | average forward current | $T_C = 135^\circ\text{C}$ rectangular $d = 0.5$ | $T_{VJ} = 175^\circ\text{C}$ | | | 12 | A |
| V_{FO} | threshold voltage | } for power loss calculation only | | | | 1.03 | V |
| r_F | slope resistance | | | | | 46 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 1.6 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.50 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 95 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 90 | A |
| C_J | junction capacitance | $V_R = 600\text{ V}$ $f = 1\text{ MHz}$ | $T_{VJ} = 25^\circ\text{C}$ | | 5 | | pF |
| I_{RM} | max. reverse recovery current | } $I_F = 15\text{ A}; V_R = 600\text{ V}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 6 | A |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 9 | A |
| t_{rr} | reverse recovery time | } $-di_F/dt = 200\text{ A}/\mu\text{s}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 40 | ns |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 140 | ns |



| 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



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP12-12A | DSEP12-12A | Tube | 50 | 470465 |

| Similar Part | Package | Voltage class |
|--------------|----------------|---------------|
| DSEP12-12B | TO-220AC (2) | 1200 |
| DSEP15-12CR | ISOPLUS247 (2) | 1200 |

Equivalent Circuits for Simulation

* on die level

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

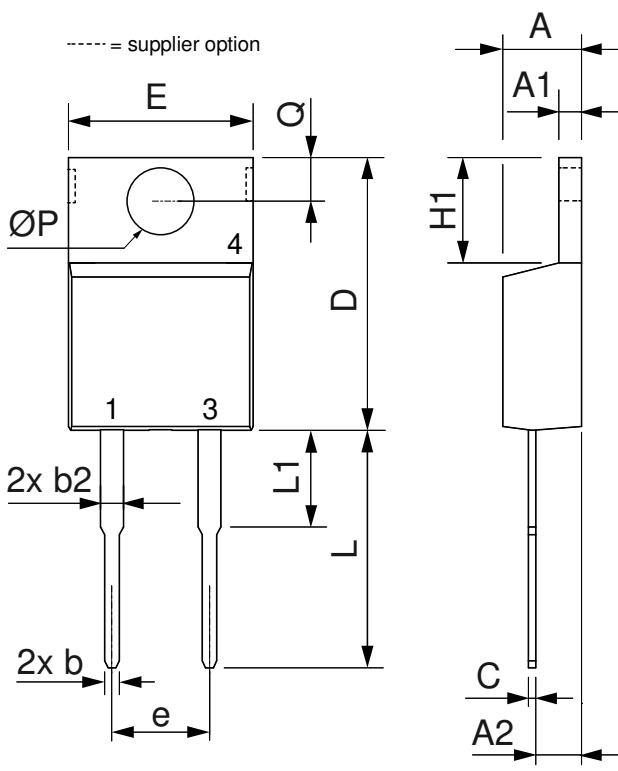


Fast Diode

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 1.03 | V |
| $R_{0\ max}$ | slope resistance * | 43 | mΩ |



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 |
| ØP | 3.54 | 4.08 | 0.139 | 0.161 |
| Q | 2.54 | 3.18 | 0.100 | 0.125 |



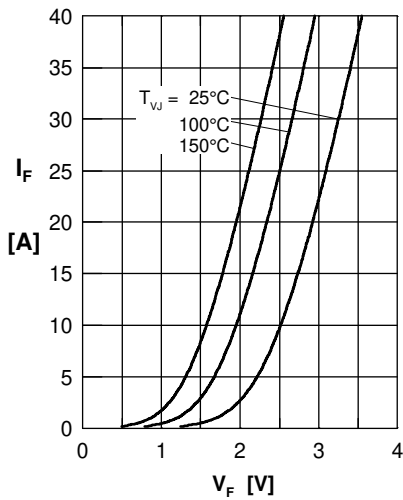
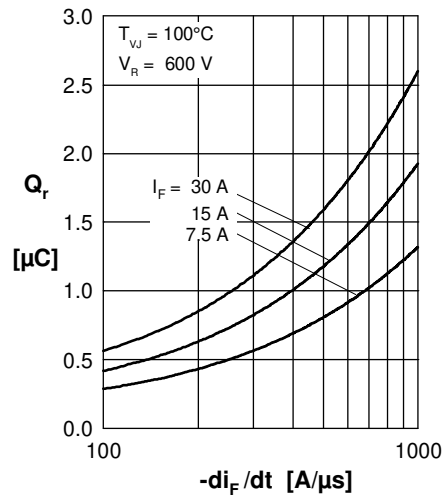
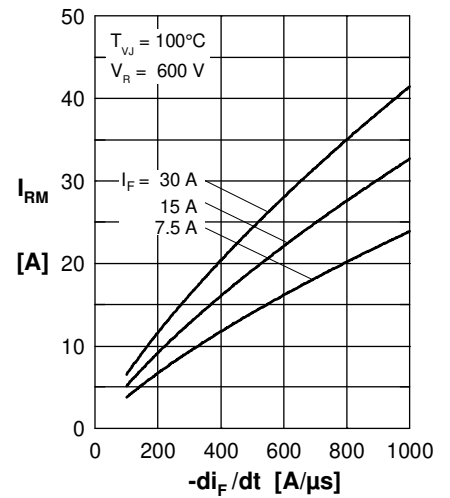
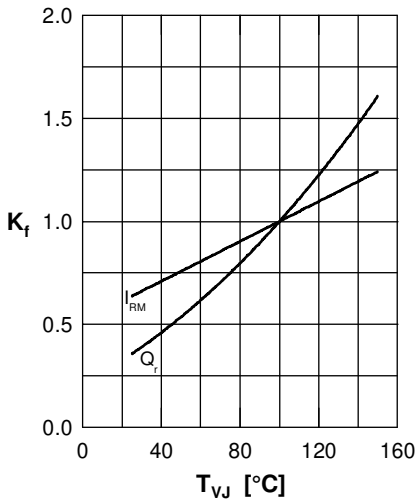
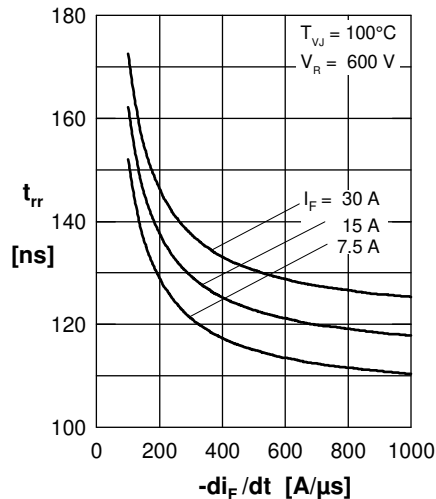
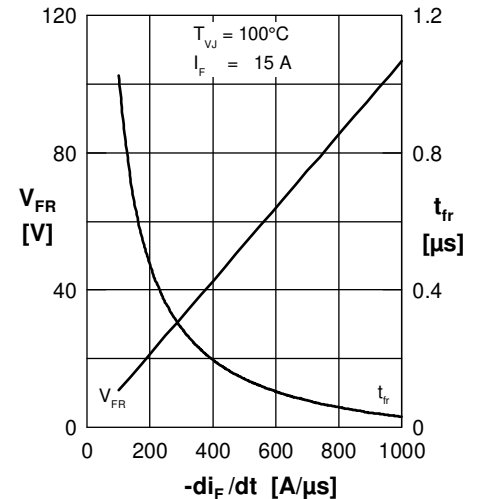
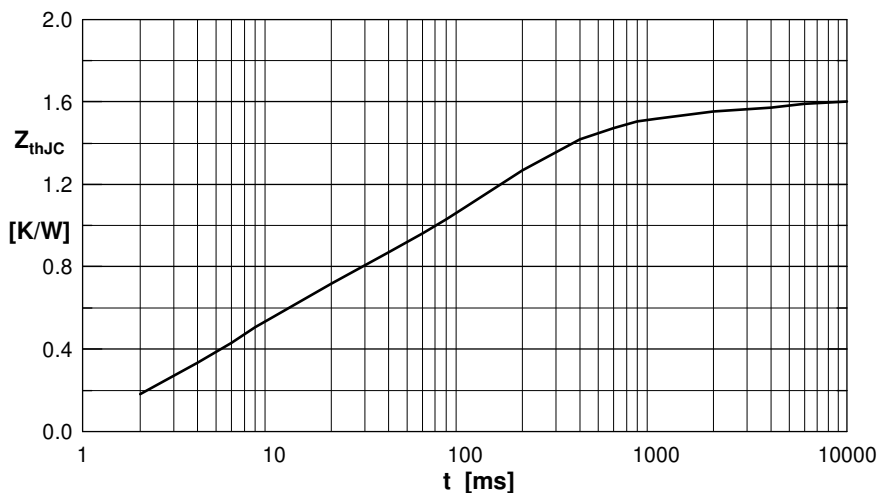
Fast Diode

 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 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_{fr} versus di_F/dt


Fig. 7 Transient thermal impedance junction to case

 Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.160 | 0.0010 |
| 2 | 0.100 | 0.0150 |
| 3 | 0.500 | 0.0040 |
| 4 | 0.840 | 0.1200 |