# HiPerFRED

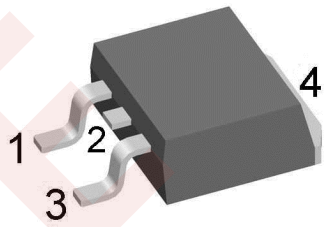
| | | |
|---|---|---|
| $V_{RRM}$ | = | 600 V |
| $I_{FAV}$ | = | 15 A |
| $t_{rr}$ | = | 35 ns |

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

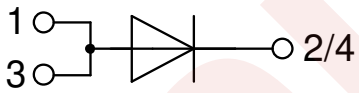
**Part number**

**DSEP15-06AS**

*Marking on Product: DSEP15-06AS*




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-263 (D2Pak)

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

**Disclaimer Notice**

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.



© 2019 IXYS all rights reserved

## 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 | | | 2.04 | V |
| | | $I_F$ = 30 A | | | | 2.25 | V |
| | | $I_F$ = 15 A | $T_{VJ}$ = 150°C | | | 1.35 | V |
| | | $I_F$ = 30 A | | | | 1.59 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 140°C | $T_{VJ}$ = 175°C | | | 15 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0.99 | V |
| $r_F$ | *slope resistance* } | | | | | 15 | 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 | | 5 | | A |
| | | $I_F$ = 15 A; $V_R$ = 300 V | $T_{VJ}$ = 100°C | | 7 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 35 | | ns |
| | | | $T_{VJ}$ = 100°C | | 95 | | ns |

OBSOLETE

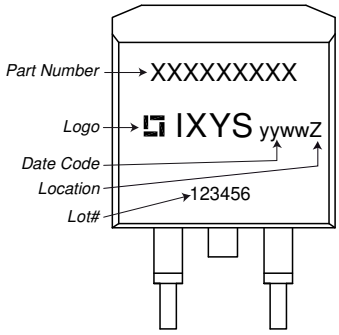


© 2019 IXYS all rights reserved

| Package TO-263 (D2Pak) | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal [1] | | | 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** | | | | 1.5 | | g |
| $F_C$ | *mounting force with clip* | | 20 | | 60 | N |

[1] $I_{RMS}$ is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

## Product Marking

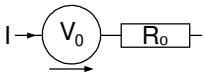



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DSEP15-06AS-TRL | DSEP15-06AS | Tape & Reel | 800 | 513021 |
| Alternative | DSEP15-06AS-TUB | DSEP15-06AS | Tube | 50 | 525177 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DSEP15-06BS | TO-263AB (D2Pak) (2) | 600 |
| DSEP15-06A | TO-220AC | 600 |
| DSEP15-06B | TO-220AC | 600 |

## Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 175°C$



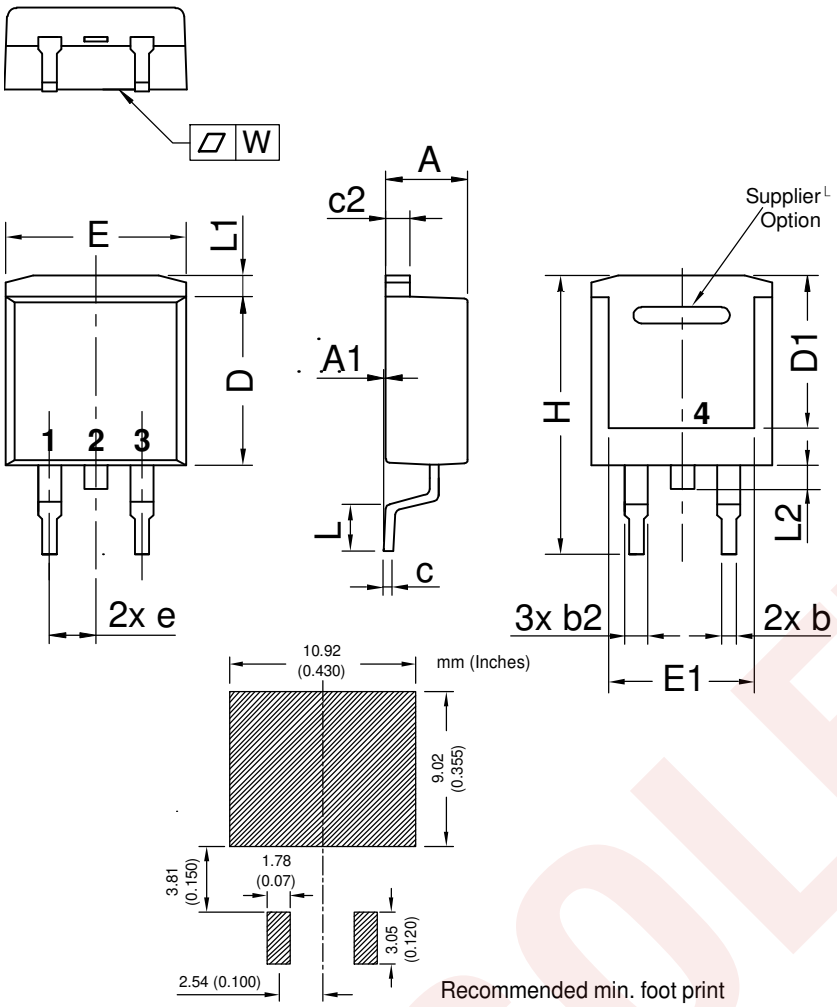

| | | Fast Diode | |
|---|---|---|---|
| $V_{0\ max}$ | *threshold voltage* | 0.99 | V |
| $R_{0\ max}$ | *slope resistance ** | 12 | mΩ |

OBSOLETE



© 2019 IXYS all rights reserved

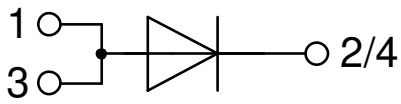
## Outlines TO-263 (D2Pak)




Recommended min. foot print

| Dim. | Millimeter | | Inches | |
|---|---|---|---|---|
| | min | max | min | max |
| A | 4.06 | 4.83 | 0.160 | 0.190 |
| A1 | typ. 0.10 | | typ. 0.004 | |
| A2 | 2.41 | | 0.095 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 |
| b2 | 1.14 | 1.40 | 0.045 | 0.055 |
| c | 0.40 | 0.74 | 0.016 | 0.029 |
| c2 | 1.14 | 1.40 | 0.045 | 0.055 |
| D | 8.38 | 9.40 | 0.330 | 0.370 |
| D1 | 8.00 | 8.89 | 0.315 | 0.350 |
| D2 | 2.5 | | 0.098 | |
| E | 9.65 | 10.41 | 0.380 | 0.410 |
| E1 | 6.22 | 8.50 | 0.245 | 0.335 |
| e | 2,54 BSC | | 0,100 BSC | |
| e1 | 4.28 | | 0.169 | |
| H | 14.61 | 15.88 | 0.575 | 0.625 |
| L | 1.78 | 2.79 | 0.070 | 0.110 |
| L1 | 1.02 | 1.68 | 0.040 | 0.066 |
| W | typ. 0.02 | 0.040 | typ. 0.0008 | 0.002 |

*All dimensions conform with and/or within JEDEC standard.*




OBSOLETE



© 2019 IXYS all rights reserved

## Fast Diode

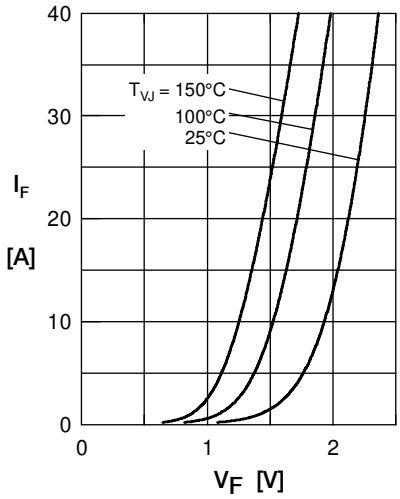



Fig. 1 Forward current $I_F$ versus $V_F$

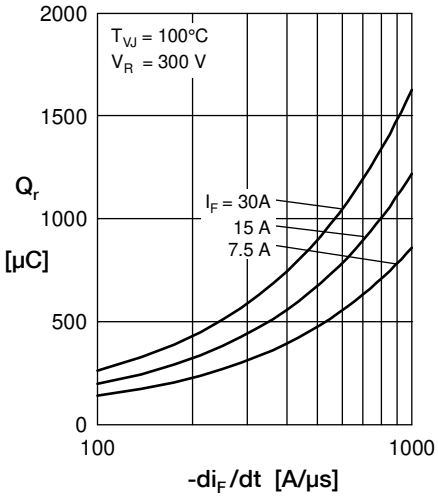



Fig. 2 Typ. reverse recov. charge $Q_r$ versus $-di_F/dt$

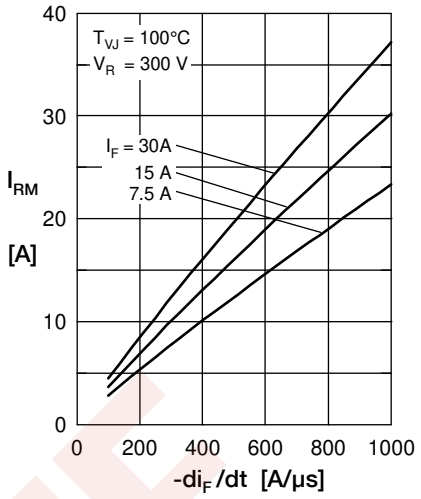



Fig. 3 Typ. peak reverse current $I_{RM}$ versus $-di_F/dt$

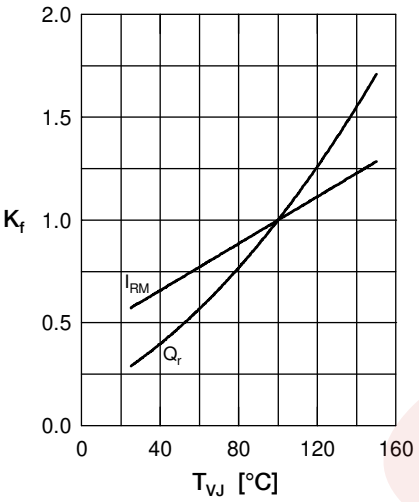



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

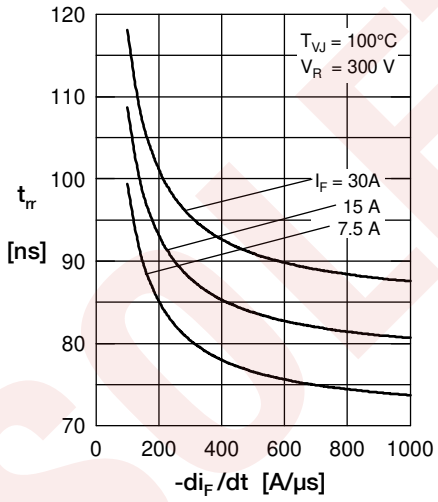



Fig. 5 Typ. recovery time $t_{rr}$ versus $-di_F/dt$

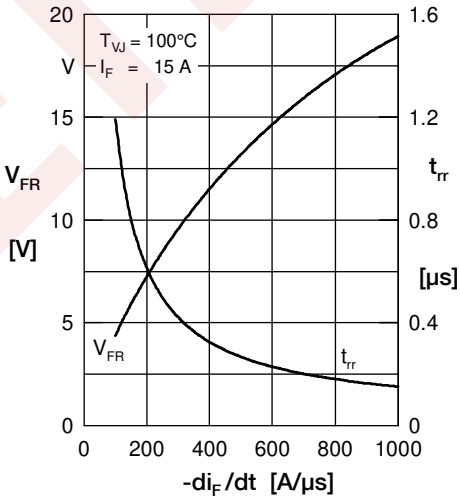



Fig. 6 Typ. peak forward voltage $V_{FR}$ and $t_{fr}$ versus $di_F/dt$

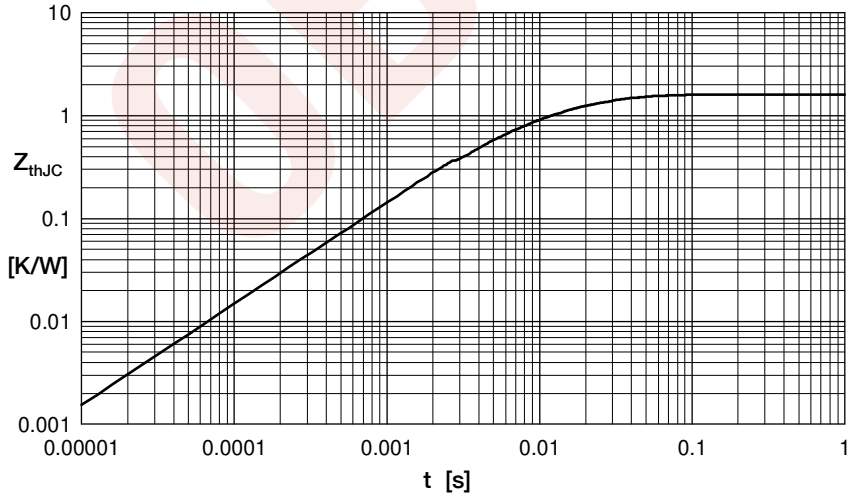



Fig. 7 Transient thermal impedance junction to case

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.908 | 0.0052 |
| 2 | 0.350 | 0.0003 |
| 3 | 0.342 | 0.017 |

OBSOLETE



© 2019 IXYS all rights reserved