# FRED

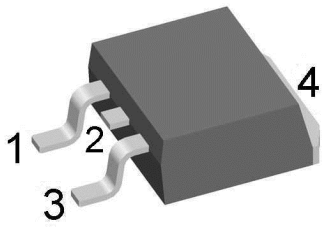
| | | |
|---|---|---|
| $V_{RRM}$ | = | 600 V |
| $I_{FAV}$ | = | 25 A |
| $t_{rr}$ | = | 35 ns |

Fast Recovery Epitaxial Diode
Single Diode

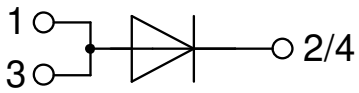
**Part number**

**DSEI25-06AS**

*Marking on Product: DSEI25-06AS*




Backside: cathode




**Features / Advantages:**

- Planar passivated chips
- 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

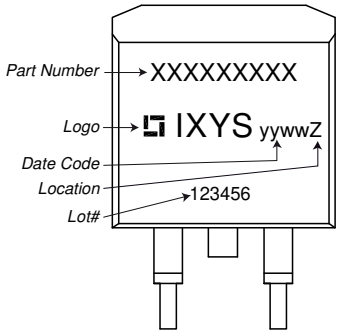
## Fast Diode

| 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 |
| | | $V_R$ = 480 V | $T_{VJ}$ = 125°C | | | 6 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 25 A | $T_{VJ}$ = 25°C | | | 1.51 | V |
| | | $I_F$ = 50 A | | | | 1.73 | V |
| | | $I_F$ = 25 A | $T_{VJ}$ = 150°C | | | 1.37 | V |
| | | $I_F$ = 50 A | | | | 1.66 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 100°C | $T_{VJ}$ = 150°C | | | 25 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 150°C | | | 1.10 | V |
| $r_F$ | *slope resistance* | | | | | 10.6 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.2 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.50 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 105 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 240 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 20 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25°C | | 9 | | A |
| | | $I_F$ = 30 A; $V_R$ = 300 V | $T_{VJ}$ = 125°C | | 14 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 50 | | ns |
| | | | $T_{VJ}$ = 125°C | | 120 | | ns |

| 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* | | -40 | | 150 | °C |
| $T_{op}$ | *operation temperature* | | -40 | | 125 | °C |
| $T_{stg}$ | *storage temperature* | | -40 | | 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

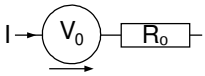



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DSEI25-06AS-TRL | DSEI25-06AS | Tape & Reel | 800 | 520750 |
| Alternative | DSEI25-06AS-TUB | DSEI25-06AS | Tube | 50 | 525170 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DSEI25-06A | TO-220AC (2) | 600 |
| DFE25I600HA | TO-247AD (2) | 600 |

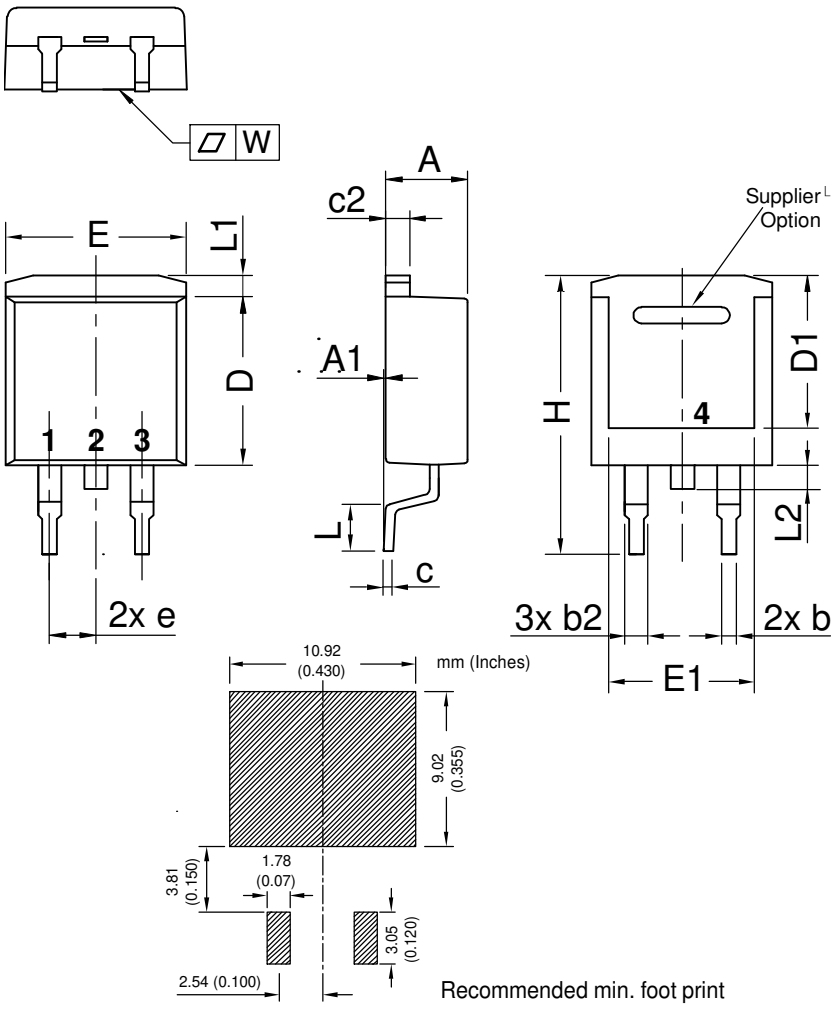
## Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 150°C$




| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 1.1 | V |
| $R_{0\,max}$ | *slope resistance ** | 7.5 | mΩ |

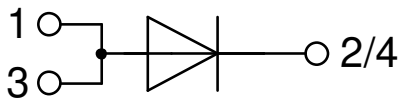
## Outlines TO-263 (D2Pak)




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.*



## Fast Diode

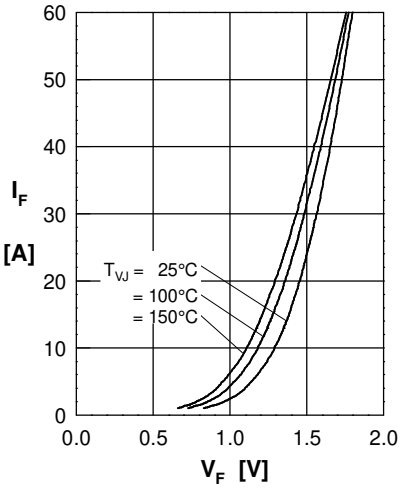



Fig. 1 Forward current $I_F$ versus max. forward voltage drop $V_F$

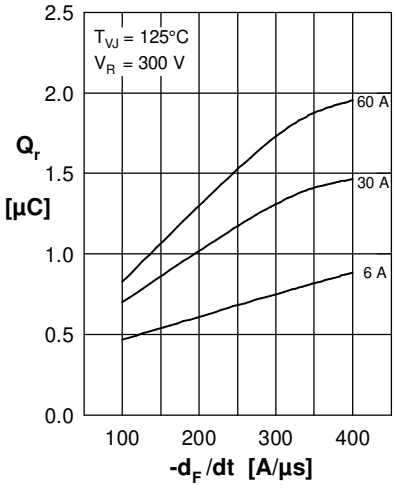



Fig. 2 Typ. reverse recov. charge $Q_r$ versus $-di_F/dt$

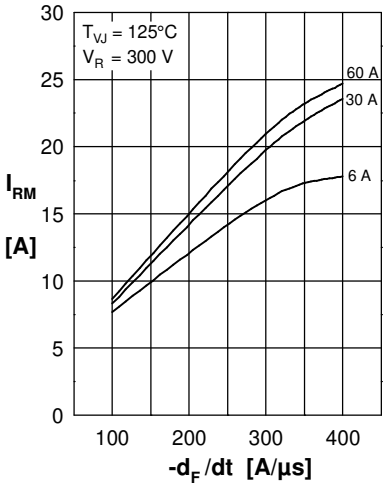



Fig. 3 Typ. peak reverse current $I_{RM}$ versus $-di_F/dt$

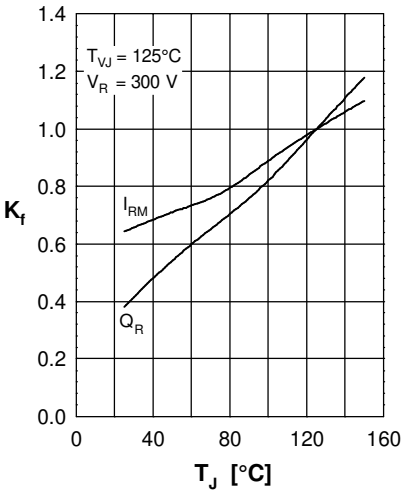



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

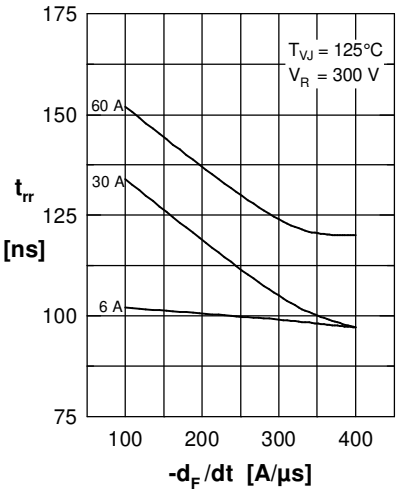



Fig. 5 Typ. recovery time $t_{rr}$ versus $-di_F/dt$

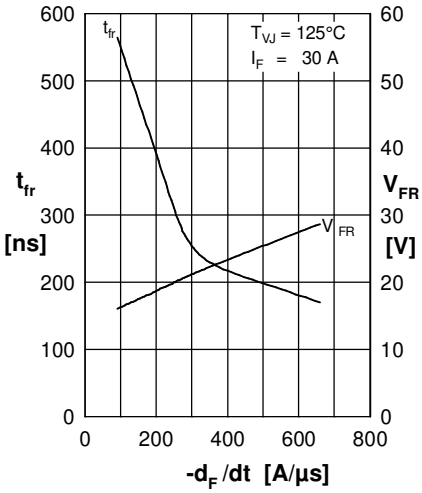



Fig. 6 Typ. peak forward voltage $V_{FR}$ and $t_{fr}$ versus $di_F/dt$

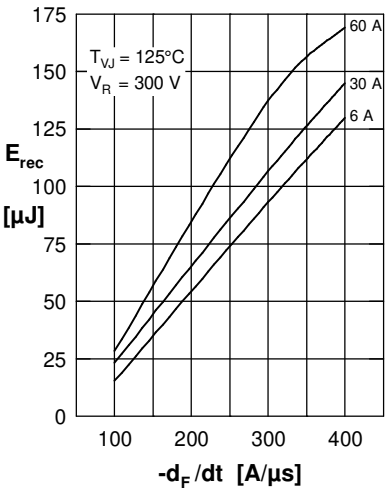



Fig. 7 Recovery energy versus $-di_F/dt$

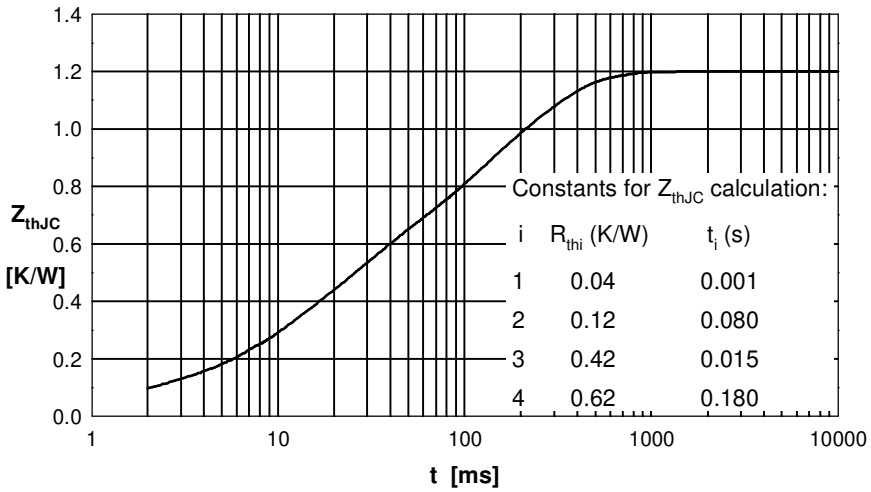



Fig. 8 Transient thermal impedance junction to case