

# FRED

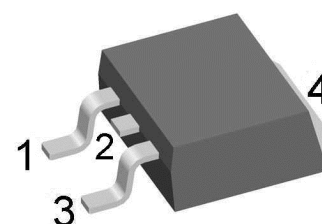
|           |   |       |
|-----------|---|-------|
| $V_{RRM}$ | = | 600 V |
| $I_{FAV}$ | = | 25 A  |
| $t_{rr}$  | = | 35 ns |

## Fast Recovery Epitaxial Diode Single Diode

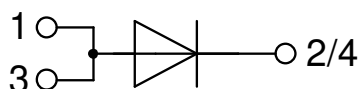
### Part number

**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  $I_{rm}$ -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-263 (D2Pak)

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

### Disclaimer Notice

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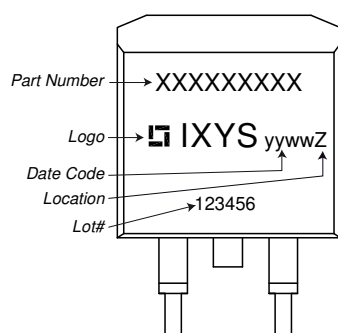


| Fast Diode |                                              |                                                                                  |                                | Ratings                        |      |      |               |
|------------|----------------------------------------------|----------------------------------------------------------------------------------|--------------------------------|--------------------------------|------|------|---------------|
| Symbol     | Definition                                   | Conditions                                                                       |                                | min.                           | typ. | max. | Unit          |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 600  | V             |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 600  | V             |
| $I_R$      | reverse current, drain current               | $V_R = 600\text{ V}$                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 100  | $\mu\text{A}$ |
|            |                                              | $V_R = 480\text{ V}$                                                             | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 6    | mA            |
| $V_F$      | forward voltage drop                         | $I_F = 25\text{ A}$                                                              | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.51 | V             |
|            |                                              | $I_F = 50\text{ A}$                                                              |                                |                                |      | 1.73 | V             |
|            |                                              | $I_F = 25\text{ A}$                                                              | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.37 | V             |
|            |                                              | $I_F = 50\text{ A}$                                                              |                                |                                |      | 1.66 | V             |
| $I_{FAV}$  | average forward current                      | $T_C = 100^{\circ}\text{C}$<br>rectangular $d = 0.5$                             | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 25   | A             |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                                                |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 1.10 | V             |
| $r_F$      | slope resistance                             |                                                                                  |                                |                                |      | 10.6 | m $\Omega$    |
| $R_{thJC}$ | 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                      | $T_C = 25^{\circ}\text{C}$                                                       |                                |                                |      | 105  | W             |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$               | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 240  | A             |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}$ $f = 1\text{ MHz}$                                          | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 20   |      | pF            |
| $I_{RM}$   | max. reverse recovery current                | $I_F = 30\text{ A}; V_R = 300\text{ V}$<br>$-di_F/dt = 200\text{ A}/\mu\text{s}$ |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 9    | A             |
|            |                                              |                                                                                  |                                | $T_{VJ} = 125^{\circ}\text{C}$ |      | 14   | A             |
| $t_{rr}$   | reverse recovery time                        |                                                                                  |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 50   | ns            |
|            |                                              |                                                                                  |                                | $T_{VJ} = 125^{\circ}\text{C}$ |      | 120  | ns            |

| Package TO-263 (D2Pak) |                              |                            | Ratings |      |      |      |
|------------------------|------------------------------|----------------------------|---------|------|------|------|
| Symbol                 | Definition                   | Conditions                 | min.    | typ. | max. | Unit |
| $I_{RMS}$              | RMS current                  | per terminal <sup>1)</sup> |         |      | 35   | A    |
| $T_{VJ}$               | virtual junction temperature |                            | -40     |      | 150  | °C   |
| $T_{op}$               | operation temperature        |                            | -40     |      | 125  | °C   |
| $T_{stg}$              | storage temperature          |                            | -40     |      | 150  | °C   |
| <b>Weight</b>          |                              |                            |         | 1.5  |      | g    |
| $F_c$                  | mounting force with clip     |                            | 20      |      | 60   | N    |

<sup>1)</sup>  $I_{RMS}$  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



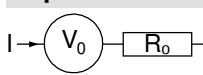
| Ordering    | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard    | DSEI25-06AS-TRL | DSEI25-06AS        | Tape & Reel   | 800      | 520750   |
| Alternative | DSEI25-06AS-TUB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

$T_{VJ} = 150^{\circ}\text{C}$



**Fast Diode**

$V_{0 \max}$  threshold voltage

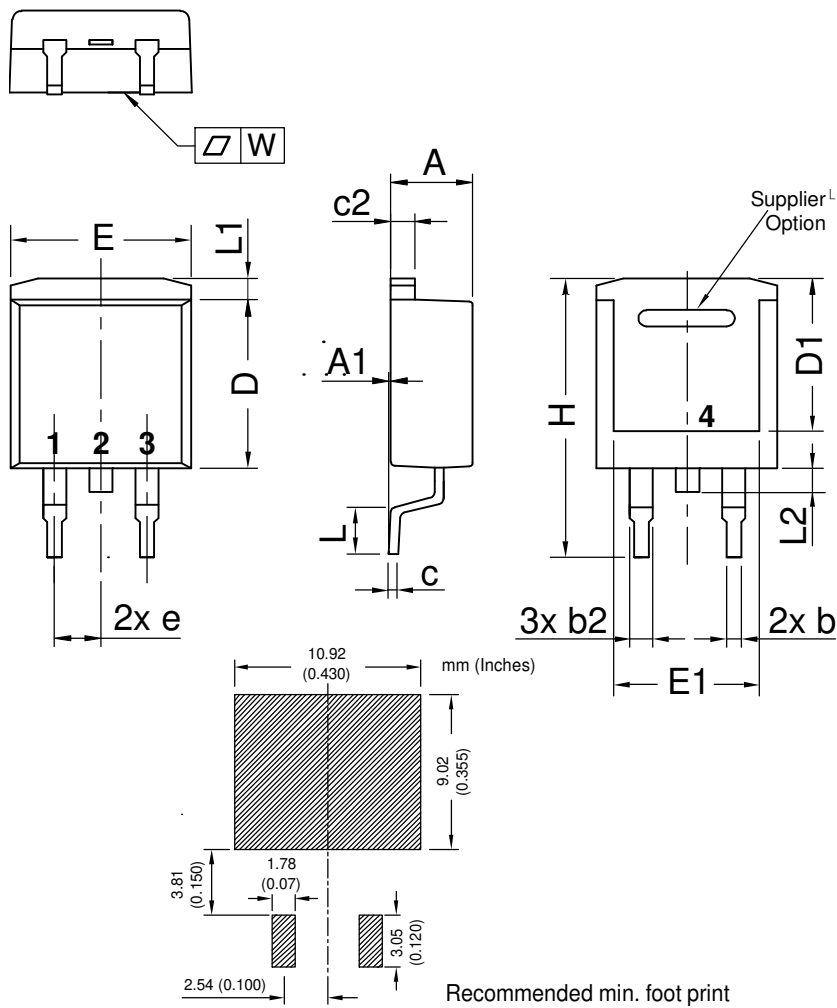
1.1

V

$R_{0 \max}$  slope resistance \*

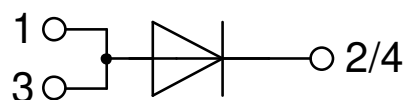
7.5

mΩ

**Outlines TO-263 (D2Pak)**


| 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.*



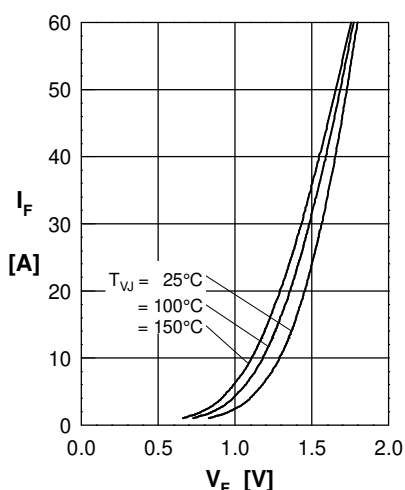
**Fast Diode**


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

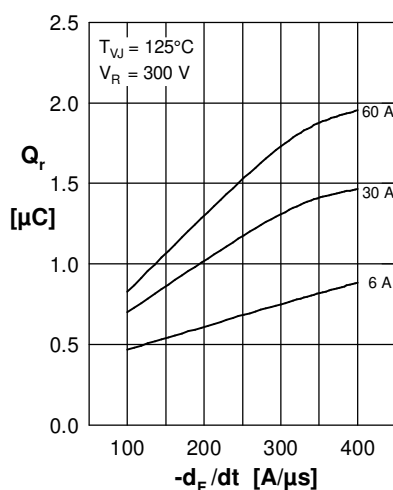


Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$

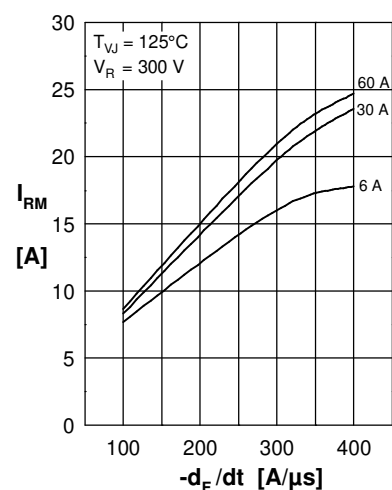


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

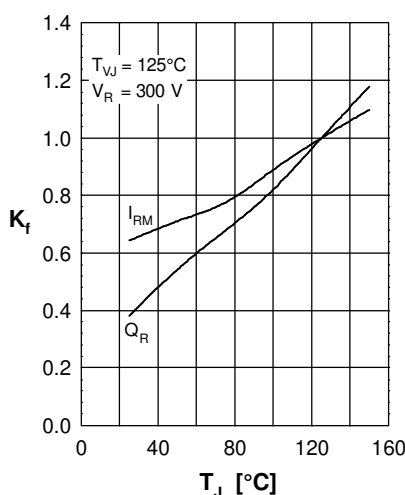


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

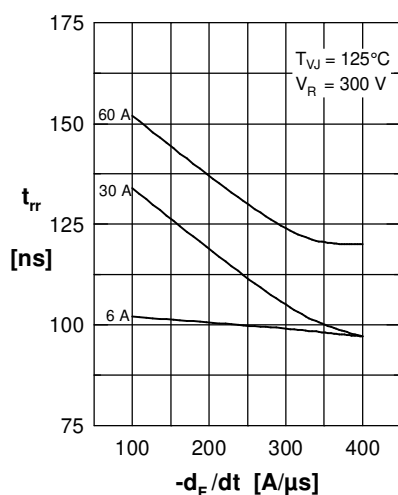


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

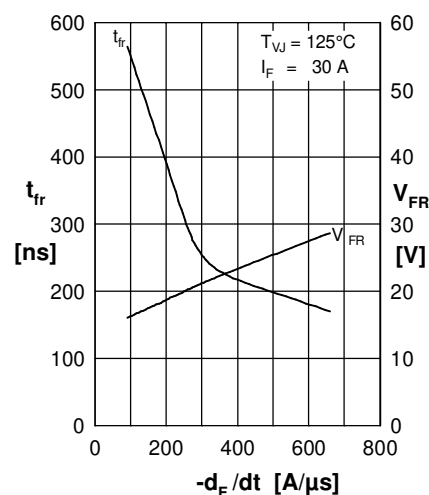


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

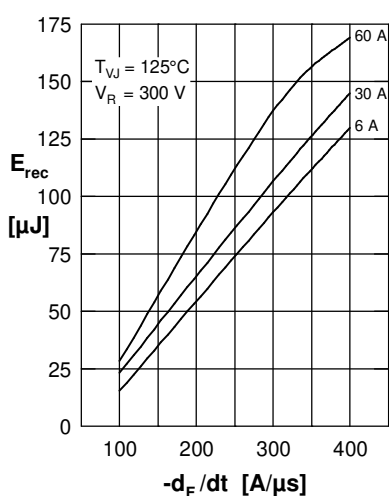


Fig. 7 Recovery energy versus  $-di_F/dt$

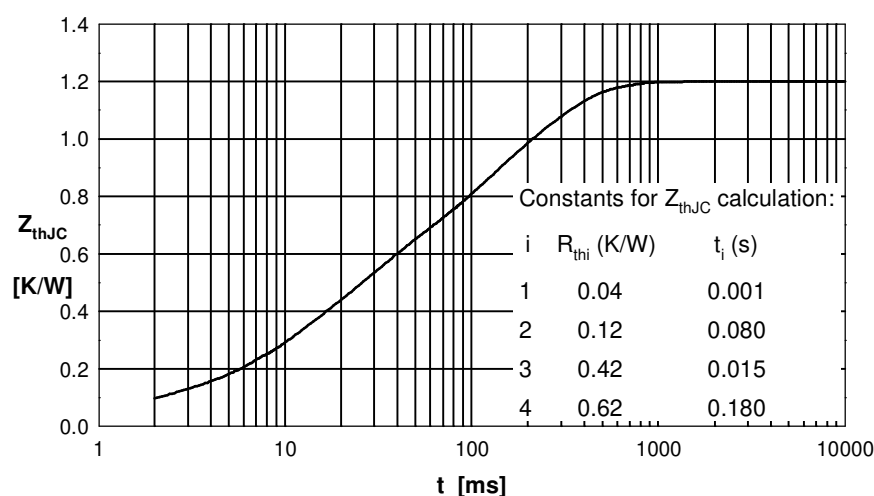


Fig. 8 Transient thermal impedance junction to case