



# FRED

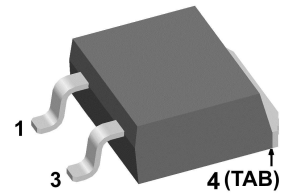
$V_{RRM} = 1200\text{ V}$   
 $I_{FAV} = 12\text{ A}$   
 $t_{rr} = 50\text{ ns}$

## Fast Recovery Epitaxial Diode Single Diode

### Part number

**DSEI12-12AZ**

Marking on Product: DSEI12-12AZ



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-HV)

- 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](http://www.littelfuse.com/disclaimer-electronics).

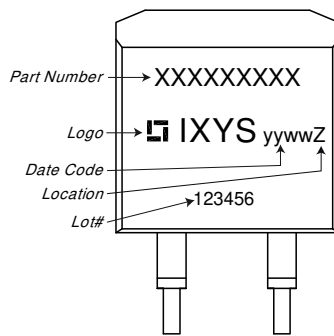


| Fast Diode |  |  |                              | Ratings                      |      |      |               |
|------------|--|--|------------------------------|------------------------------|------|------|---------------|
| Symbol     | Definition                                   | Conditions   |                              | 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               | $V_R = 1200\text{ V}$  | $T_{VJ} = 25^\circ\text{C}$  |                              |      | 250  | $\mu\text{A}$ |
|            |  | $V_R = 960\text{ V}$   | $T_{VJ} = 125^\circ\text{C}$ |                              |      | 4    | mA            |
| $V_F$      | forward voltage drop                         | $I_F = 12\text{ A}$  | $T_{VJ} = 25^\circ\text{C}$  |                              |      | 2,58 | V             |
|            |  | $I_F = 24\text{ A}$  |                              |                              |      | 2,94 | V             |
|            |  | $I_F = 12\text{ A}$  | $T_{VJ} = 150^\circ\text{C}$ |                              |      | 2,23 | V             |
|            |  | $I_F = 24\text{ A}$  |                              |                              |      | 2,72 | V             |
| $I_{FAV}$  | average forward current                      | $T_C = 100^\circ\text{C}$<br>rectangular $d = 0.5$                                 | $T_{VJ} = 150^\circ\text{C}$ |                              |      | 12   | A             |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only  |                              |                              |      | 1,77 | V             |
| $r_F$      | slope resistance                             |  |                              |                              |      | 38   | m $\Omega$    |
| $R_{thJC}$ | 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                      |  |                              | $T_C = 25^\circ\text{C}$     |      | 78   | W             |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$                 |                              | $T_{VJ} = 45^\circ\text{C}$  |      | 75   | A             |
| $C_J$      | junction capacitance                         | $V_R = 600\text{ V}$ $f = 1\text{ MHz}$  |                              | $T_{VJ} = 25^\circ\text{C}$  |      | 6    | pF            |
| $I_{RM}$   | max. reverse recovery current                | } $I_F = 11\text{ A}; V_R = 540\text{ V}$<br>$-di_F/dt = 100\text{ A}/\mu\text{s}$ |                              | $T_{VJ} = 25^\circ\text{C}$  |      | 4    | A             |
|            |  |  |                              | $T_{VJ} = 100^\circ\text{C}$ |      | 6    | A             |
| $t_{rr}$   | reverse recovery time                        |  |                              | $T_{VJ} = 25^\circ\text{C}$  |      | 150  | ns            |
|            |  |  |                              | $T_{VJ} = 100^\circ\text{C}$ |      | 300  | ns            |



| Package TO-263 (D2Pak-HV) |  | Ratings              |      |      |      |      |
|---------------------------|--|----------------------|------|------|------|------|
| Symbol                    | Definition   | Conditions           | min. | typ. | max. | Unit |
| $I_{RMS}$                 | RMS current  | per terminal         |      |      | 25   | 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    |
| $d_{Spp/App}$             | creepage distance on surface / striking distance through air | terminal to terminal | 4,2  |      |      | mm   |
| $d_{Spb/Apb}$             |  | terminal to backside | 4,7  |      |      | mm   |

**Product Marking**



| Ordering    | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-----------------|--------------------|---------------|----------|----------|
| Standard    | DSEI12-12AZ-TRL | DSEI12-12AZ        | Tape & Reel   | 800      | 515338   |
| Alternative | DSEI12-12AZ-TUB | DSEI12-12AZ        | Tube          | 50       | 525375   |

**Equivalent Circuits for Simulation**

\* on die level

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



**Fast Diode**

|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 1,77 | V  |
| $R_{0\ max}$ | slope resistance * | 35   | mΩ |



**Outlines TO-263 (D2Pak-HV)**



| 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   | 2.3        |       | 0.091       |       |
| 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**

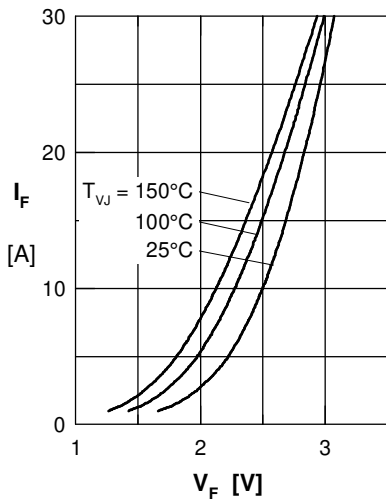


Fig. 1 Forward current  $I_F$  versus max. forward voltage drop  $V_F$

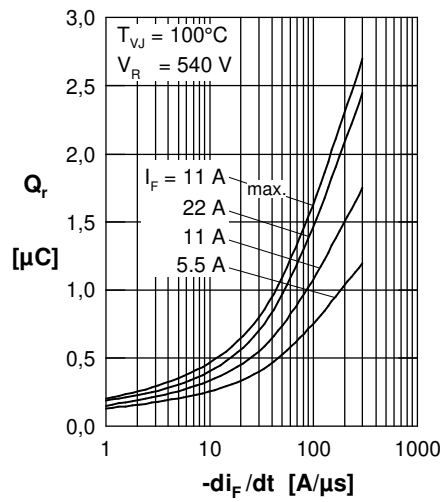


Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$

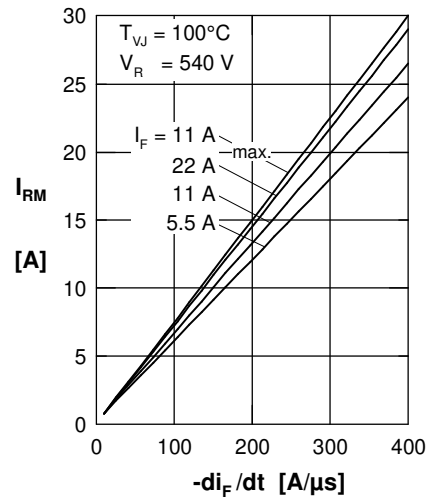


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

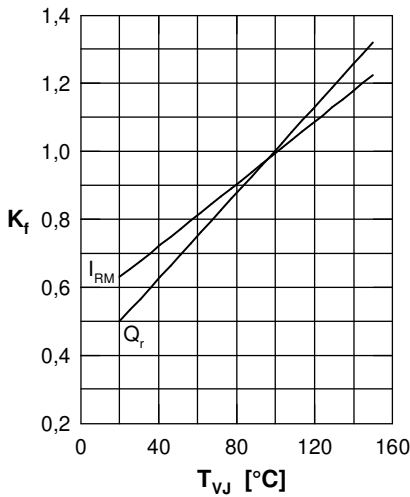


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

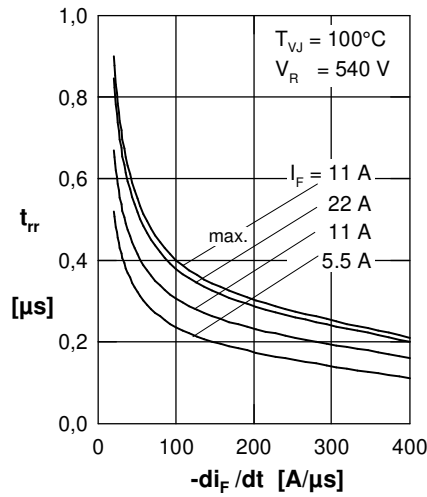


Fig. 5 Typ. recovery time  $t_{tr}$  versus  $-di_F/dt$

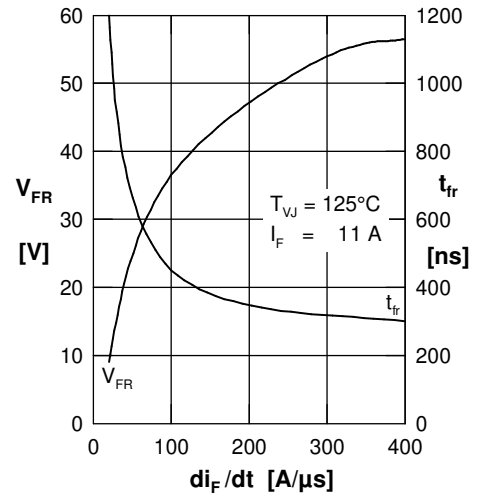


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

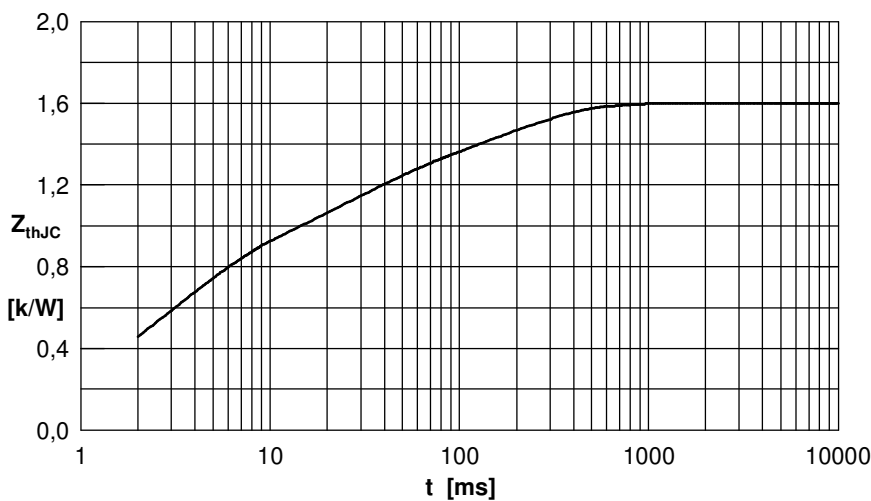


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.200           | 0.0018    |
| 2 | 0.220           | 0.0100    |
| 3 | 0.080           | 0.5000    |
| 4 | 0.300           | 0.0900    |
| 5 | 0.680           | 0.0300    |