# HiPerFRED

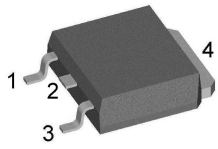
| | | |
|---|---|---|
| $V_{RRM}$ | = | 600 V |
| $I_{FAV}$ | = | 6 A |
| $t_{rr}$ | = | 20 ns |

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

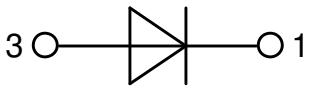
**Part number**

**DSEP6-06AS**

*Marking on Product: 6P060AS*




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-252 (DPak)

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

**Disclaimer Notice**

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## 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 | | | 50 | µA |
| | | $V_R$ = 600 V | $T_{VJ}$ = 150°C | | | 0.2 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 6 A | $T_{VJ}$ = 25°C | | | 2.03 | V |
| | | $I_F$ = 12 A | | | | 2.22 | V |
| | | $I_F$ = 6 A | $T_{VJ}$ = 150°C | | | 1.34 | V |
| | | $I_F$ = 12 A | | | | 1.55 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 150°C | $T_{VJ}$ = 175°C | | | 6 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 1.00 | V |
| $r_F$ | *slope resistance* | | | | | 34 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 2.8 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.50 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 55 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 40 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 5 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25°C | | 3 | | A |
| | | $I_F$ = 6 A; $V_R$ = 300 V | $T_{VJ}$ = 100°C | | 5 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 20 | | ns |
| | | | $T_{VJ}$ = 100°C | | 80 | | ns |



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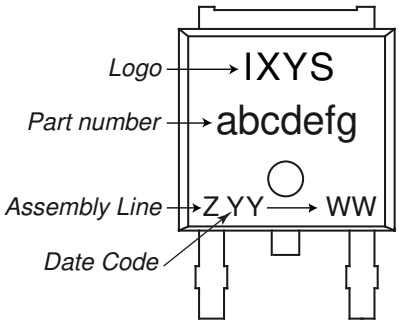
| Package TO-252 (DPak) | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal | | | 20 | A |
| $T_{VJ}$ | *virtual junction temperature* | | -55 | | 175 | °C |
| $T_{op}$ | *operation temperature* | | -55 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -55 | | 150 | °C |
| **Weight** | | | | 0.3 | | g |
| $F_C$ | *mounting force with clip* | | 20 | | 60 | N |

## Product Marking

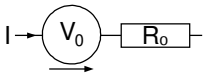



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DSEP6-06AS-TRL | 6P060AS | Tape & Reel | 2500 | 509806 |
| Alternative | DSEP6-06AS-TUB | 6P060AS | Tube | 70 | 524993 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DSEP6-06BS | TO-252AA (DPak) | 600 |

## Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 175\,°C$




| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 1 | V |
| $R_{0\,max}$ | *slope resistance ** | 30 | mΩ |



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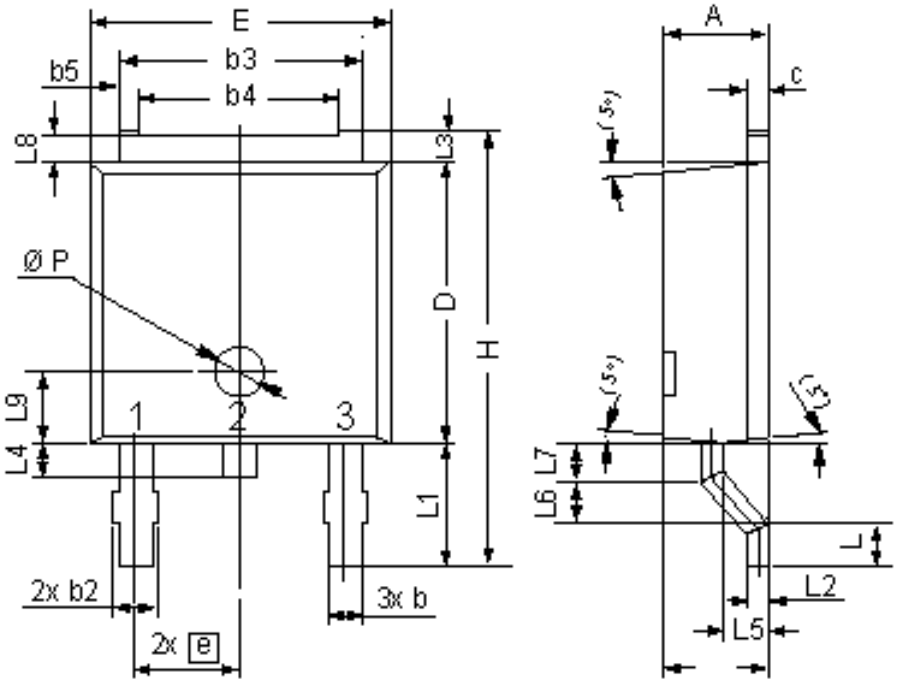
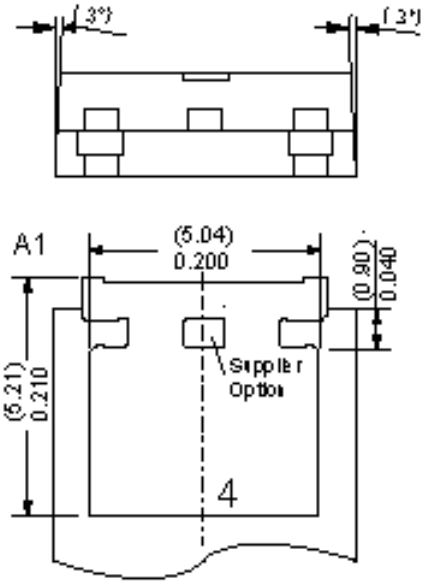
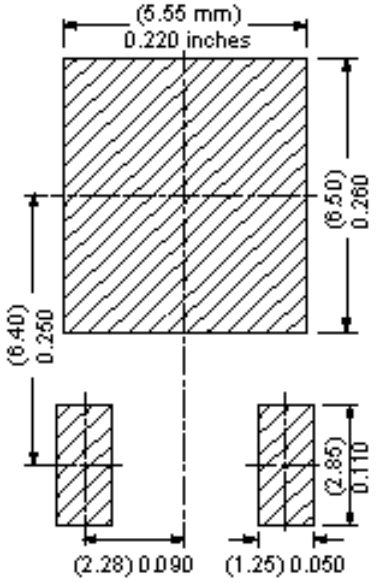
## Outlines TO-252 (DPak)

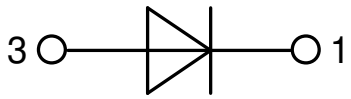



| Dim. | Millimeters | | Inches | |
|---|---|---|---|---|
| | min | max | min | max |
| A | 2.20 | 2.40 | 0.087 | 0.094 |
| A1 | 2.10 | 2.50 | 0.083 | 0.098 |
| b | 0.66 | 0.86 | 0.026 | 0.034 |
| b2 | - | 0.96 | - | 0.038 |
| b3 | 5.04 | 5.64 | 0.198 | 0.222 |
| b4 | 4.34 BSC | | 0.171 BSC | |
| b5 | 0.50 BSC | | 0.020 BSC | |
| c | 0.40 | 0.86 | 0.016 | 0.034 |
| D | 5.90 | 6.30 | 0.232 | 0.248 |
| E | 6.40 | 6.80 | 0.252 | 0.268 |
| e | 2.10 | 2.50 | 0.083 | 0.098 |
| H | 9.20 | 10.10 | 0.362 | 0.398 |
| L | 0.55 | 1.28 | 0.022 | 0.050 |
| L1 | 2.50 | 2.90 | 0.098 | 0.114 |
| L2 | 0.40 | 0.60 | 0.016 | 0.024 |
| L3 | 0.50 | 0.90 | 0.020 | 0.035 |
| L4 | 0.60 | 1.00 | 0.024 | 0.039 |
| L5 | 0.82 | 1.22 | 0.032 | 0.048 |
| L6 | 0.79 | 0.99 | 0.031 | 0.039 |
| L7 | 0.81 | 1.01 | 0.032 | 0.040 |
| L8 | 0.40 | 0.80 | 0.016 | 0.031 |
| L9 | 1.50 BSC | | 0.059 BSC | |
| Ø P | 1.00 BSC | | 0.039 BSC | |




Recommended
min. foot print



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## Fast Diode

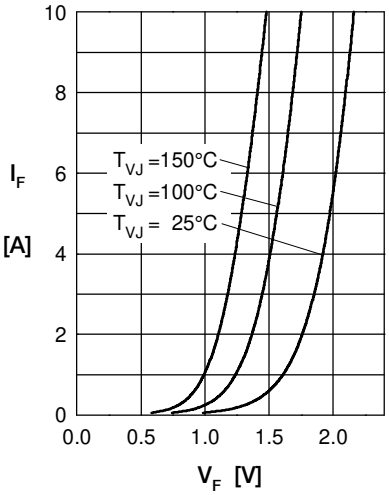


Fig. 1 Forward current $I_F$ versus $V_F$

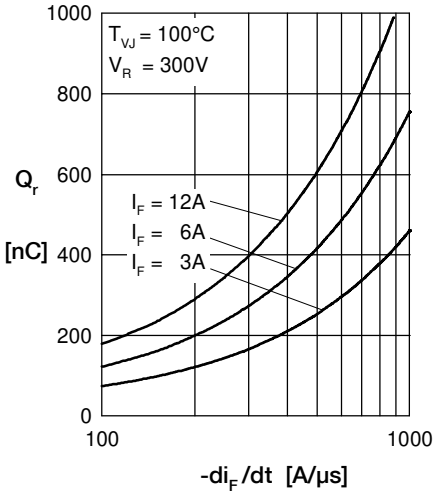


Fig. 2 Typ. reverse recov. charge $Q_r$ versus -$di_F$/dt

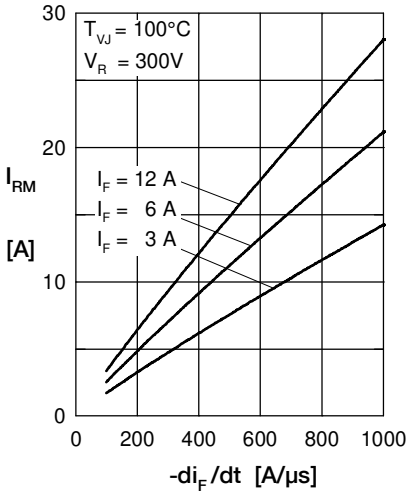


Fig. 3 Typ. peak reverse current $I_{RM}$ versus -$di_F$/dt

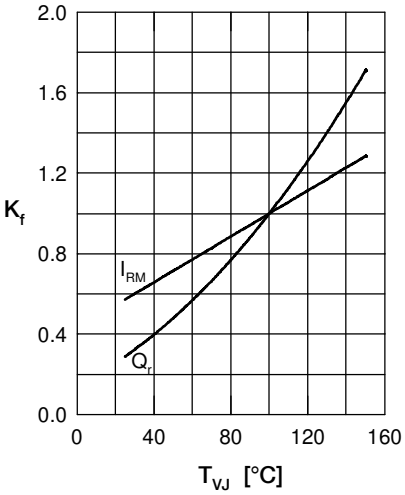


Fig. 4 Typ. dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

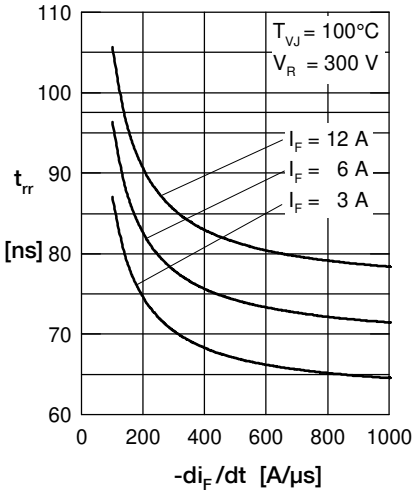


Fig. 5 Recovery time $t_{rr}$ versus -$di_F$/dt

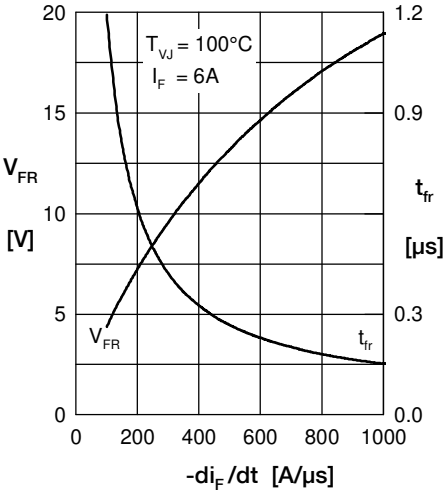


Fig. 6 Typ. peak forward voltage $V_{FR}$ and tfr versus $di_F$/dt

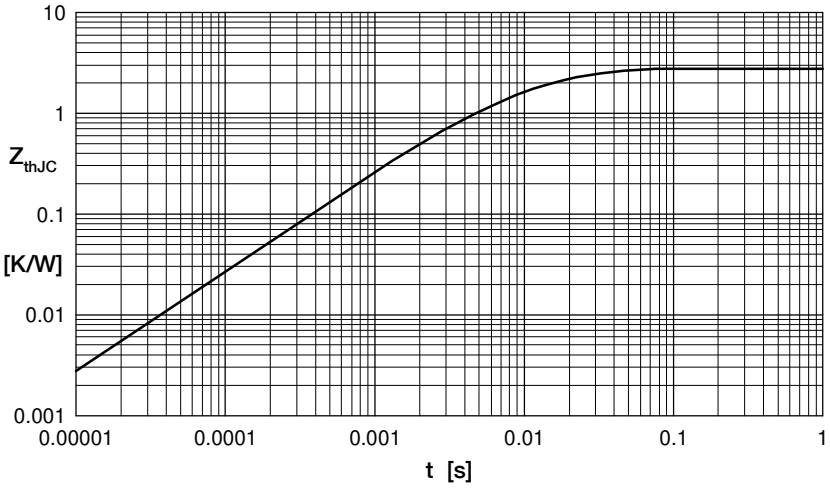


Fig. 7 Transient thermal resistance junction to case



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