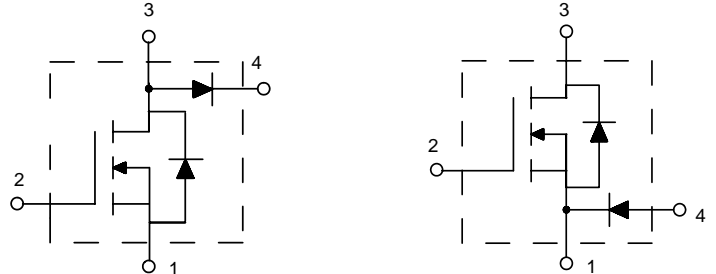


# HiPerFET™

## Power MOSFETs

|                         | $V_{DSS}$ | $I_D$ (cont) | $R_{DS(on)}$  | $t_{rr}$ |
|-------------------------|-----------|--------------|---------------|----------|
| IXFN44N50U2 IXFN44N50U3 | 500 V     | 44 A         | 0.12 $\Omega$ | 35 ns    |
| IXFN48N50U2 IXFN48N50U3 | 500 V     | 48 A         | 0.10 $\Omega$ | 35 ns    |

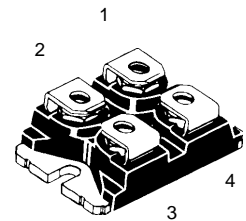
### Buck & Boost Configurations for PFC & Motor Control Circuits



Preliminary data

| Symbol          | Test Conditions | Maximum Ratings  |  |                  |                        |
|-----------------|-----------------|--|--|------------------|------------------------|
| HiPerFET MOSFET | $V_{DSS}$       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$  | 500                                    | V                |                        |
|                 | $V_{DGR}$       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$  | 500                                    | V                |                        |
|                 | $V_{GS}$        | Continuous   | $\pm 20$                               | V                |                        |
|                 | $V_{GSM}$       | Transient  | $\pm 30$                               | V                |                        |
|                 | $I_{D25}$       | $T_C = 25^\circ\text{C}$   | 44N50<br>48N50                         | 44<br>48         | A                      |
|                 | $I_{DM}$        | $T_C = 25^\circ\text{C}$ ,<br>pulse width limited by max. $T_{JM}$   | 44N50<br>48N50                         | 176<br>192       | A                      |
|                 | $I_{AR}$        | $T_C = 25^\circ\text{C}$   |  | 24               | A                      |
|                 | $E_{AR}$        | Repetitive   |  | 30               | mJ                     |
|                 | $dv/dt$         | $I_S \leq I_{DM}$ , $-di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$ |  | 5                | V/ns                   |
|                 | $P_D$           | $T_C = 25^\circ\text{C}$   |  | 520              | W                      |
| DIODE           | $V_{RRM}$       |  | 600                                    | V                |                        |
|                 | $I_{FAVM}$      | $T_C = 70^\circ\text{C}$ ; rectangular, $d = 0.5$  | 60                                     | A                |                        |
|                 | $I_{FRM}$       | $tp < 10\ \mu\text{s}$ ; pulse width limited by $T_J$  | 800                                    | A                |                        |
|                 | $P_D$           | $T_C = 25^\circ\text{C}$   | 180                                    | W                |                        |
| CASE            | $T_J$           |  | -40 ... +150                           | $^\circ\text{C}$ |                        |
|                 | $T_{JM}$        |  | 150                                    | $^\circ\text{C}$ |                        |
|                 | $T_{stg}$       |  | -40 ... +150                           | $^\circ\text{C}$ |                        |
|                 | $V_{ISOL}$      | 50/60 Hz, RMS<br>$I_{ISOL} \leq 1\text{ mA}$   | $t = 1\text{ min}$<br>$t = 1\text{ s}$ | 2500<br>3000     | V~<br>V~               |
|                 | $M_d$           | Mounting torque<br>Terminal connection torque (M4)   |  | 1.5/13<br>1.5/13 | Nm/lb.in.<br>Nm/lb.in. |
| <b>Weight</b>   |                 |  | 30                                     | g                |                        |

### miniBLOC, SOT-227 B



#### Features

- Popular Buck & Boost circuit topologies
- International standard package miniBLOC SOT-227B
- Aluminium nitride isolation - high power dissipation
- Isolation voltage 3000 V~
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Low drain-to-case capacitance (<60 pF) - reduced RFI
- Ultra-fast FRED diode with soft reverse recovery

#### Applications

- Power factor controls and buck regulators
- DC servo and robotic drives
- DC choppers
- Switch reluctance motor controls

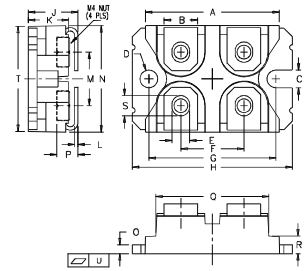
#### Advantages

- Easy to mount with 2 screws
- Space savings
- Tightly coupled FRED

| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |   |                                |
|--------------|---|---|---|--------------------------------|
|              |   | min.  | typ.  | max.                           |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$  | 500   |   | V                              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 8\text{ mA}$  | 2   |   | V                              |
| $I_{GSS}$    | $V_{GS} = \pm 20 V_{DC}, V_{DS} = 0$  |   |   | $\pm 200$ nA                   |
| $I_{DSS}$    | $V_{DS} = 0.8 V_{DSS}$<br>$V_{GS} = 0\text{ V}$   |   | $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | 400 $\mu\text{A}$<br>2 mA      |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\delta \leq 2\%$ |   | 44N50<br>48N50  | 0.12 $\Omega$<br>0.10 $\Omega$ |

| Symbol       | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |
|--------------|---|---|------|------|
|              |   | min.  | typ. | max. |
| $g_{fs}$     | $V_{DS} = 10\text{ V}, I_D = 0.5 I_{D25}$ , pulse test  | 22  | 42   | S    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                   |   | 8400 | pF   |
| $C_{oss}$    |   |   | 900  | pF   |
| $C_{rss}$    |   |   | 280  | pF   |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$<br>$R_G = 1\ \Omega$ (External) |   | 30   | ns   |
| $t_r$        |   |   | 60   | ns   |
| $t_{d(off)}$ |   |   | 100  | ns   |
| $t_f$        |   |   | 30   | ns   |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$                                 |   | 270  | nC   |
| $Q_{gs}$     |   |   | 60   | nC   |
| $Q_{gd}$     |   |   | 135  | nC   |
| $R_{thJC}$   |   | 0.24  |      | K/W  |
| $R_{thCK}$   |   | 0.05  |      | K/W  |

| Symbol     | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |   |
|------------|--|---|------|---|
|            |  | min.  | typ. | max.  |
| $I_R$      | $T_J = 25^\circ\text{C}; V_R = V_{RRM}$<br>$V_R = 0.8 V_{RRM}$<br>$T_J = 125^\circ\text{C}; V_R = 0.8 V_{RRM}$   |   |      | 200 $\mu\text{A}$<br>100 $\mu\text{A}$<br>14 mA |
| $V_F$      | $I_F = 70\text{ A}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\delta \leq 2\%$ $T_J = 25^\circ\text{C}$ |   |      | 1.5 V<br>1.8 V                                  |
| $t_{rr}$   | $I_1 = 1\text{ A}, di/dt = -200\text{ A}/\mu\text{s}, V_R = 30\text{ V}, T_J = 25^\circ\text{C}$   |   | 35   | 50 ns   |
| $I_{RM}$   | $I_F = 60\text{ A}, di/dt = -480\text{ A}/\mu\text{s}, V_R = 350\text{ V}, T_J = 100^\circ\text{C}$  |   | 19   | 21 A  |
| $R_{thJC}$ |  |   |      | 0.7 K/W   |
| $R_{thJK}$ |  |   | 0.05 | K/W   |

**miniBLOC, SOT-227 B**


M4 screws (4x) supplied

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 38.00      | 38.23 | 1.496  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.76       | 0.84  | 0.030  | 0.033 |
| M    | 12.60      | 12.85 | 0.496  | 0.506 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.98       | 2.13  | 0.078  | 0.084 |
| P    | 4.95       | 5.97  | 0.195  | 0.235 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.174 |
| S    | 4.72       | 4.85  | 0.186  | 0.191 |
| T    | 24.59      | 25.07 | 0.968  | 0.987 |
| U    | -0.05      | 0.1   | -0.002 | 0.004 |

Fig.1 Output Characteristics

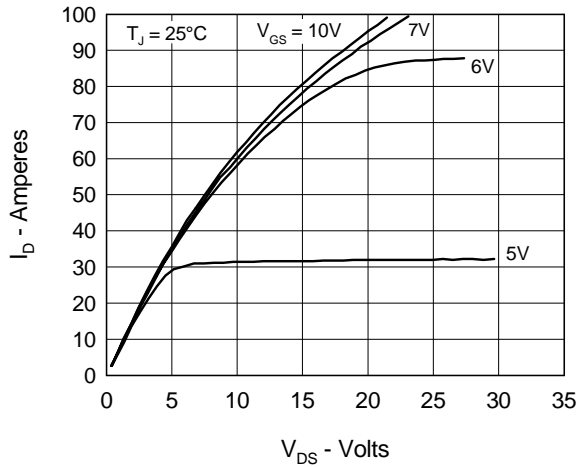


Fig.2 Input Admittance

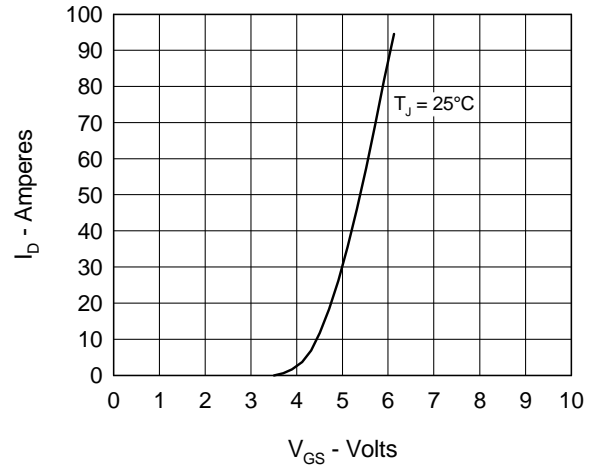


Fig.3  $R_{DS(on)}$  vs. Drain Current

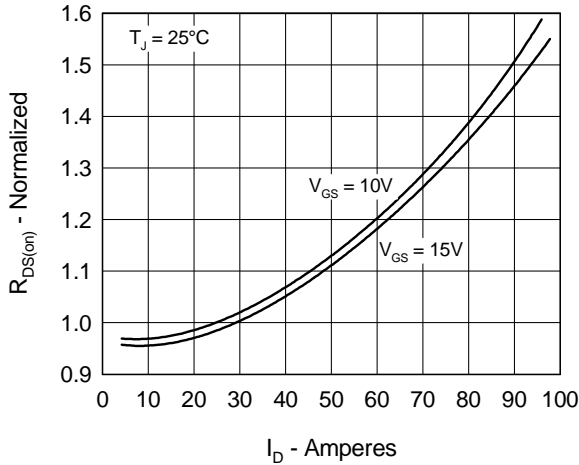


Fig.4 Temperature Dependence of Drain to Source Resistance

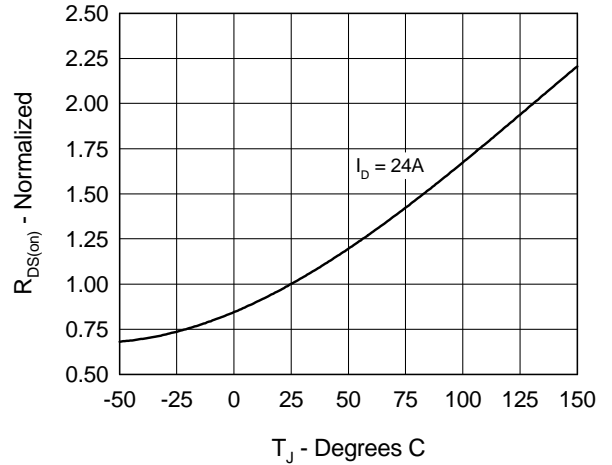


Fig.5 Drain Current vs. Case Temperature

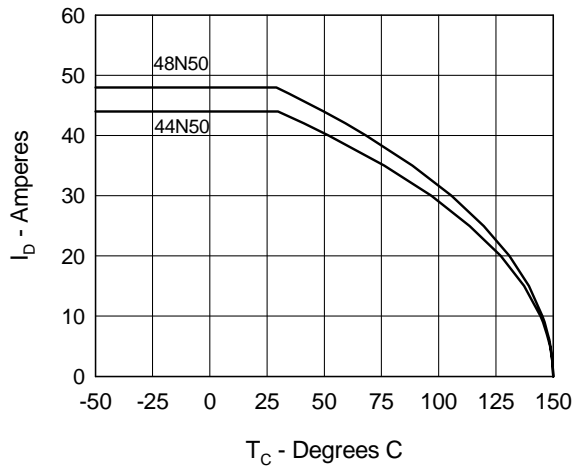


Fig.6 Temperature Dependence of Breakdown and Threshold Voltage

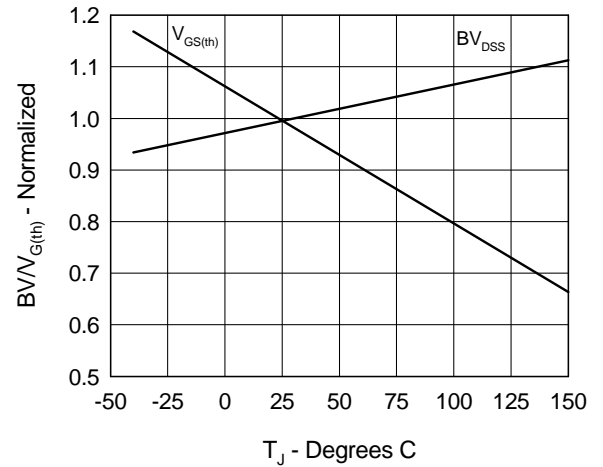


Fig.7 Gate Charge Characteristic Curve

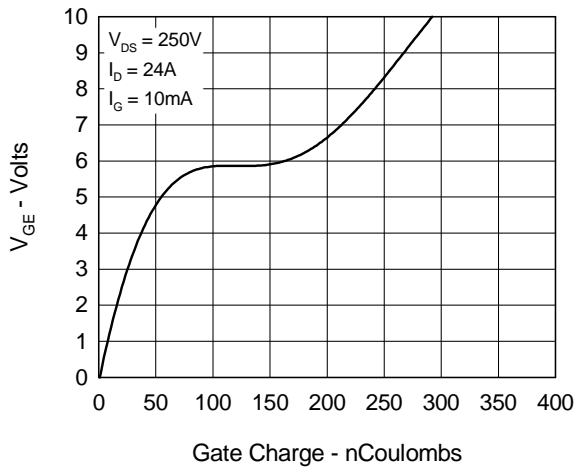


Fig.8 Capacitance Curves

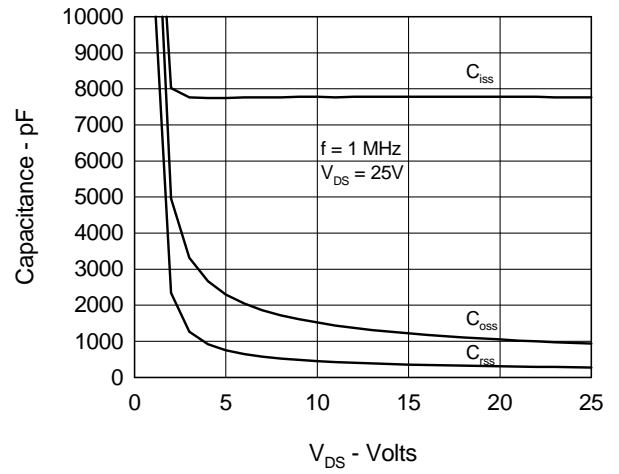


Fig.9 Source Current vs. Source to Drain Voltage

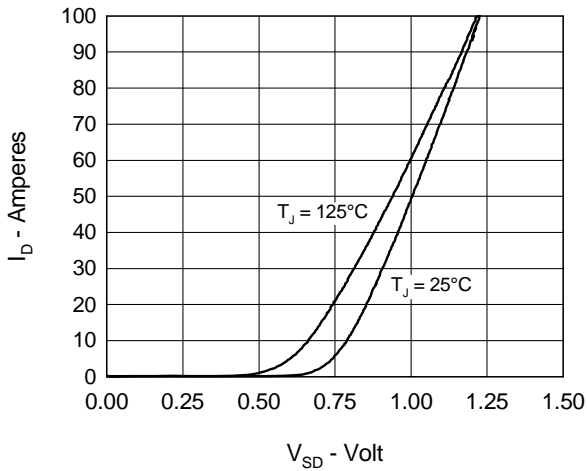
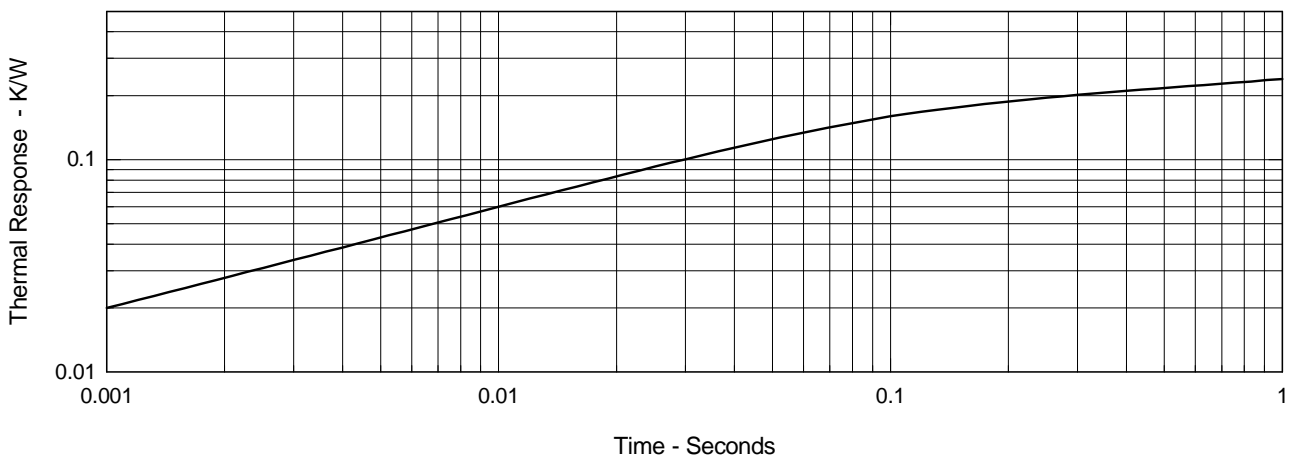


Fig.10 Transient Thermal Impedance



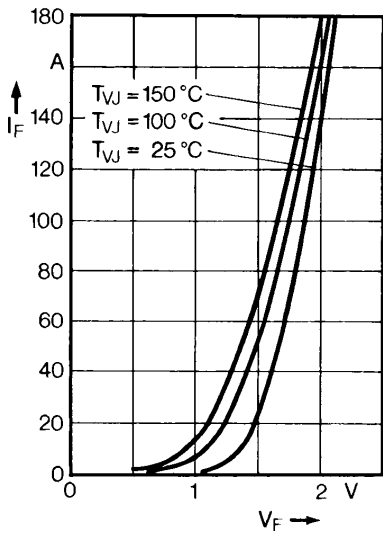


Fig. 11. Forward voltage drop.

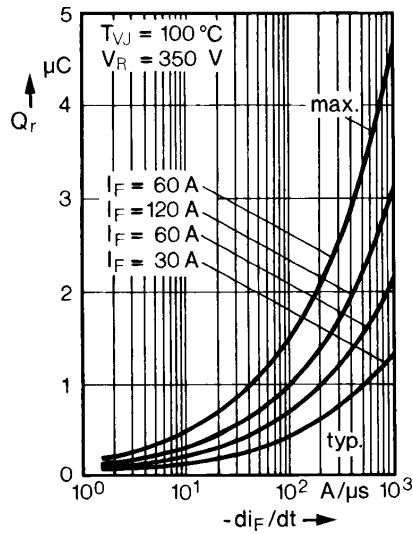


Fig. 12. Recovery charge versus  $-di_F/dt$ .

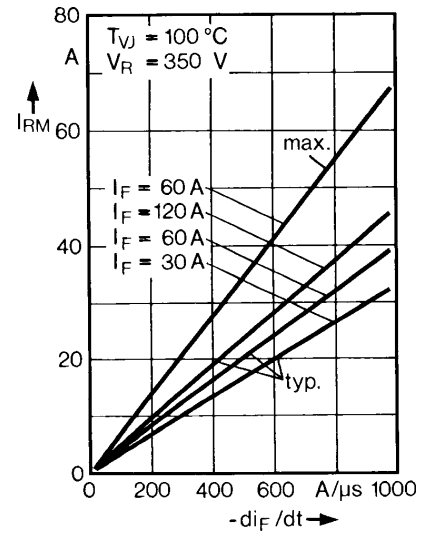


Fig. 13. Peak reverse current vs.  $-di_F/dt$ .

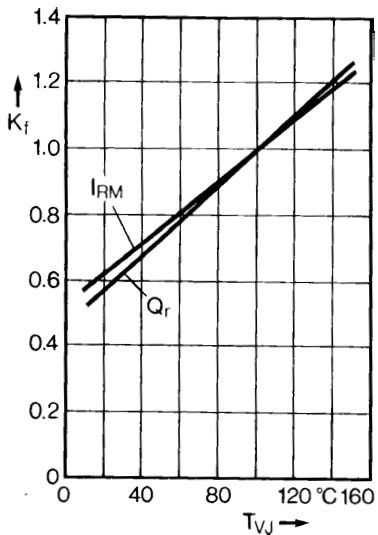


Fig. 14. Dynamic parameters versus junction temperature.

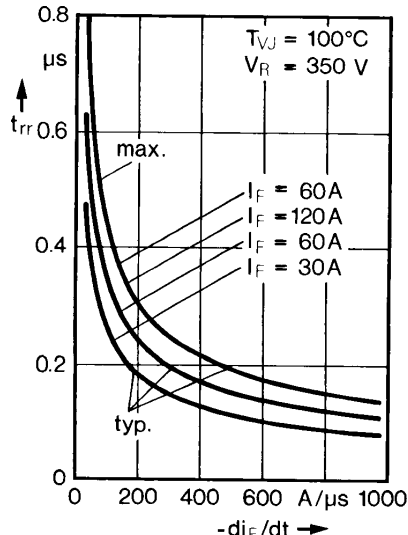


Fig. 15. Recovery time versus  $-di_F/dt$ .

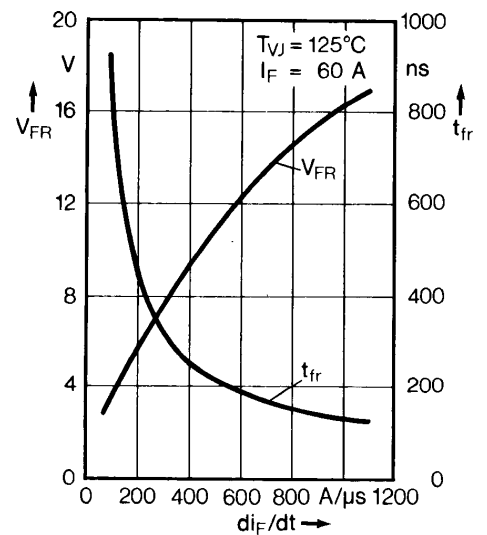


Fig. 16. Peak forward voltage and forward recovery time vs.  $di_F/dt$ .

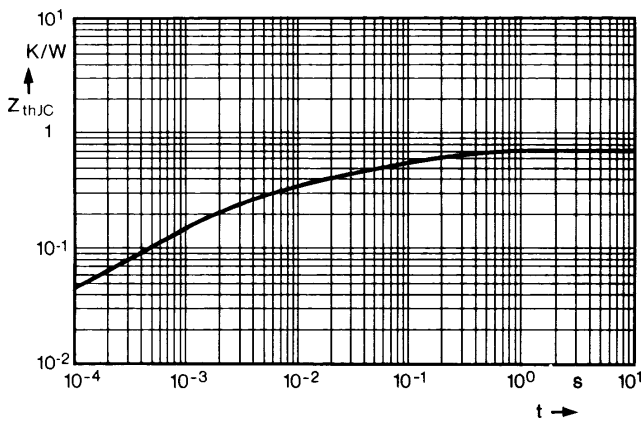


Fig. 17. Transient thermal impedance junction to case.