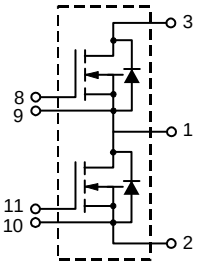
# Dual Power HIGHFEL MOSFET Module

$V_{DSS}$ = 200 V
$I_{D25}$ = 85 A
$R_{DS(on)}$ = 23 mΩ

Phaseleg Configuration
High dv/dt, Low $t_{rr}$, HIGHFEL Family





2 = Source 1
8 = Gate 2
10 = Kelvin Source 1
1 = Drain 1, Source 2
3 = Drain 2
9 = Kelvin Source 2
11 = Gate 1

| Symbol | Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | | 200 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C; $R_{GS}$ = 10 kΩ | | 200 | V |
| $V_{GS}$ | Continuous | | ±20 | V |
| $V_{GSM}$ | Transient | | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | | 85 | A |
| $I_{D80}$ | $T_C$ = 80°C | | 63 | A |
| $I_{DM}$ | $T_C$ = 25°C, $t_p$ = 10 µs, pulse width limited by $T_{JM}$ | | 335 | A |
| $P_{tot}$ | $T_C$ = 25°C | | 370 | W |
| $T_J$ | | | -40 ... +150 | °C |
| $T_{JM}$ | | | 150 | °C |
| $T_{stg}$ | | | -40 ... +125 | °C |
| $V_{ISOL}$ | 50/60 Hz | t = 1 min | 3000 | V~ |
| | $I_{ISOL}$ ≤ 1 mA | t = 1 s | 3600 | V~ |
| $M_d$ | Mounting torque (M5 or 10-32 UNF) | | 2.25-2.75/20-25 | Nm/lb.in. |
| | Terminal connection torque (M5) | | 2.5-4/22-35 | Nm/lb.in. |
| Weight | Typical including screws | | 130 | g |

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V | 200 | | | V |
| $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 8 mA | 3 | | 4 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20 V DC, $V_{DS}$ = 0 | | | 500 | nA |
| $I_{DSS}$ | $V_{DS}$ = $V_{DSS}$, $V_{GS}$ = 0 V, $T_J$ = 25°C | | | 400 | µA |
| | $V_{DS}$ = 0.8 • $V_{DSS}$, $V_{GS}$ = 0 V, $T_J$ = 125°C | | | 2 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 0.5 • $I_{D25}$ Pulse test, t ≤ 300 µs, duty cycle d ≤ 2% | | 20 | 25 | mΩ |

## Features

- Two MOSFET's in phaseleg config.
- International standard package
- Direct copper bonded $Al_2O_3$ ceramic base plate
- Isolation voltage 3600 V~
- Low $R_{DS(on)}$ HIGHFEL process
- Low package inductance for high speed switching
- Kelvin source contact

## Applications

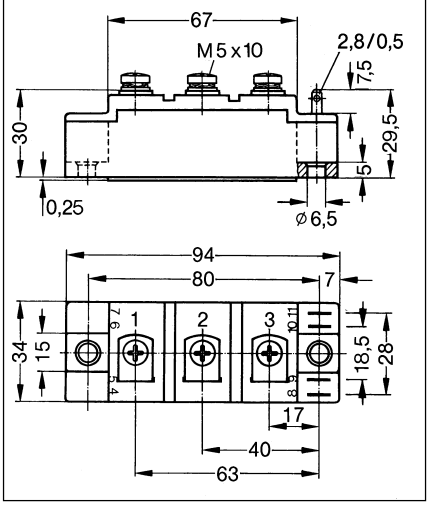
- Switched-mode and resonant-mode power supplies
- Uninterruptible power supplies (UPS)

## Advantages

- Easy to mount with two screws
- Space and weight savings
- High power density
- Low losses

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 0.5 • $I_{D25}$ pulsed | 40 | 60 | | S |
| $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 9600 | 15000 | pF |
| $C_{oss}$ | | | 1800 | 4500 | pF |
| $C_{rss}$ | | | 620 | 1500 | pF |
| $t_{d(on)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$; $R_G$ = 1 Ω (External), resistive load | | 70 | | ns |
| $t_r$ | | | 80 | | ns |
| $t_{d(off)}$ | | | 200 | | ns |
| $t_f$ | | | 100 | | ns |
| $Q_g$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 380 | 450 | nC |
| $Q_{gs}$ | | | 70 | 110 | nC |
| $Q_{gd}$ | | | 190 | 230 | nC |
| $R_{thJC}$ | | | | 0.33 | K/W |
| $R_{thCH}$ | heatsink compound applied | | 0.2 | | K/W |
| $d_S$ | Creepage distance on surface | 12.7 | | | mm |
| $d_A$ | Strike distance through air | 9.6 | | | mm |
| a | Allowable acceleration | | | 50 | m/s² |

**Dimensions in mm (1 mm = 0.0394")**




**Source-Drain Diode**

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 V | | | 84 | A |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$ | | | 335 | A |
| $V_{SD}$ | $I_F$ = $I_S$; $V_{GS}$ = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2% | | 0.9 | 1.2 | V |
| $t_{rr}$ | $I_F$ = $I_S$, -di/dt = 100 A/µs, $V_{DS}$ = 100 V, $V_{GS}$ = 0 V | | 200 | 400 | ns |

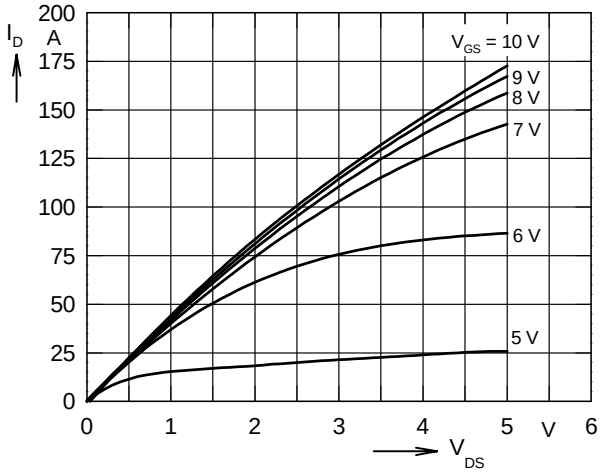



Fig. 1 Typical output characteristics $I_D = f(V_{DS})$

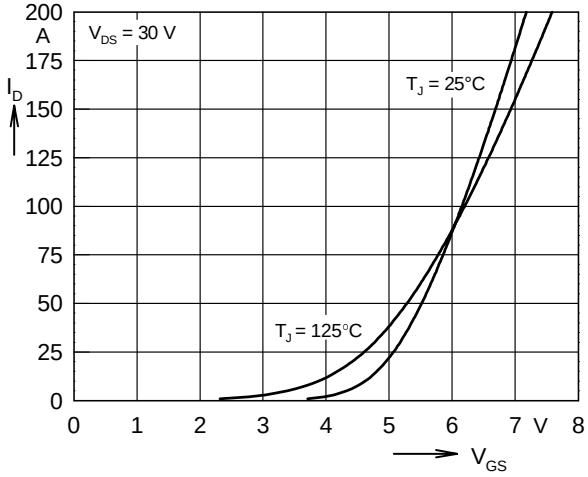



Fig. 2 Typical transfer characteristics $I_D = f(V_{GS})$

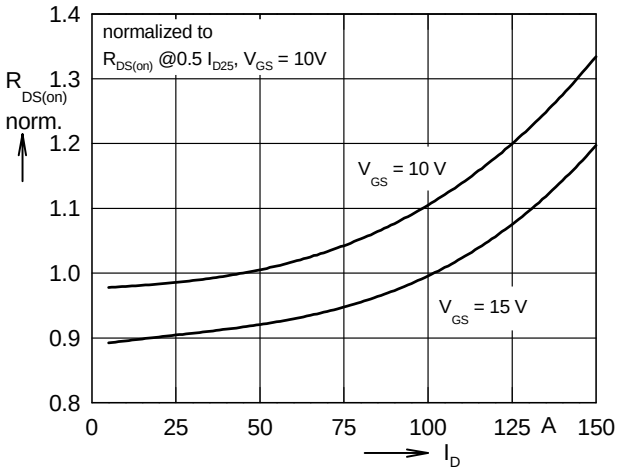



Fig. 3 Typical normalized $R_{DS(on)} = f(I_D)$

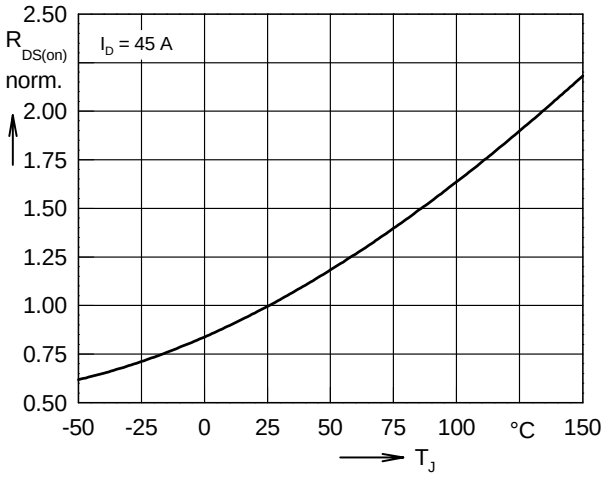



Fig. 4 Typical normalized $R_{DS(on)} = f(T_J)$

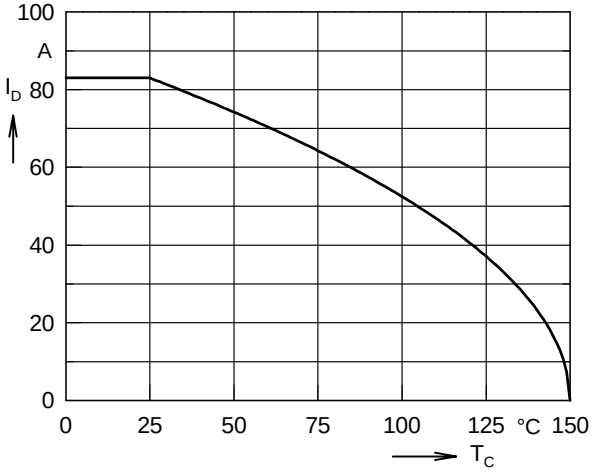



Fig. 5 Continuous drain current $I_D = f(T_C)$

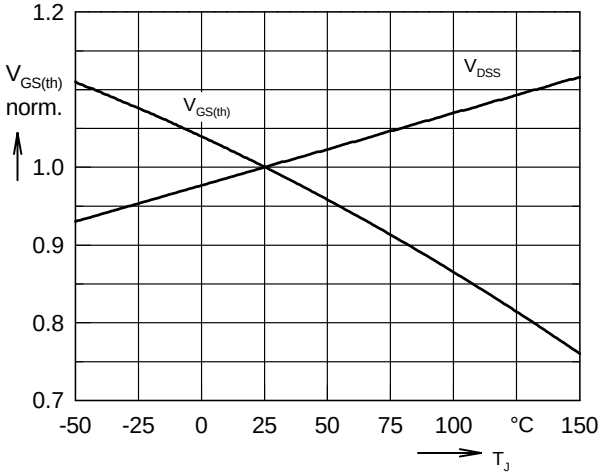



Fig. 6 Typical normalized $V_{DSS} = f(T_J)$, $V_{GS(th)} = f(T_J)$

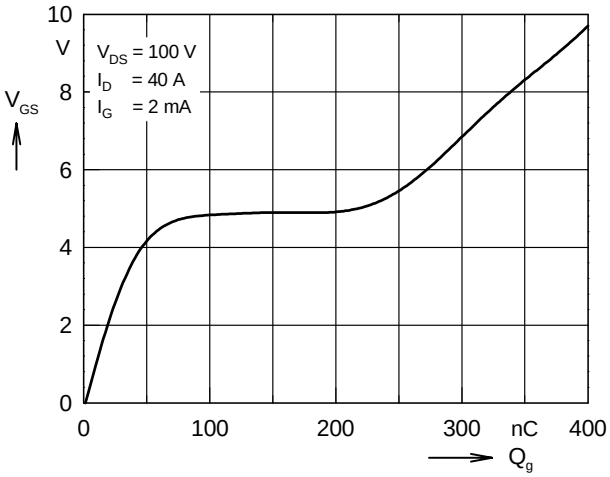



Fig. 7 Typical turn-on gate charge characteristics

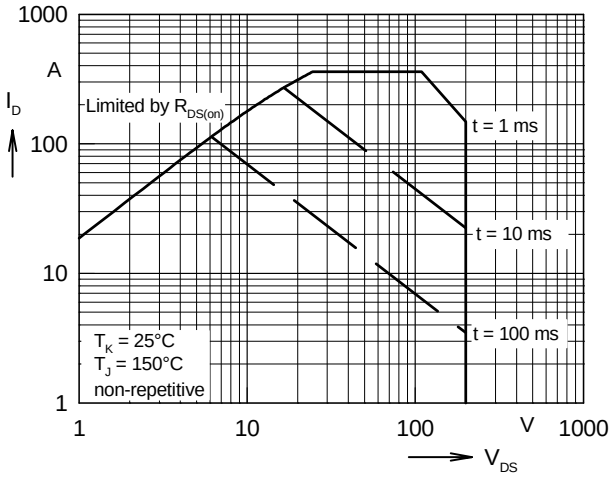



Fig. 8 Forward Safe Operating Area, $I_D = f(V_{DS})$

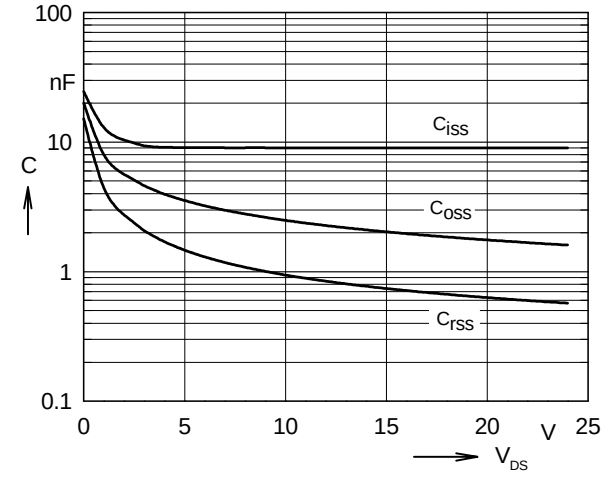



Fig. 9 Typical capacitances $C = f(V_{DS})$, f = 1 MHz

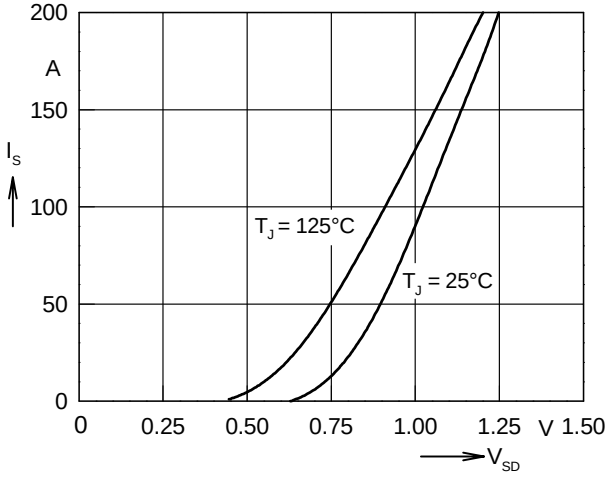



Fig. 10 Typical forward characteristics of reverse diode, $I_S = f(V_{SD})$

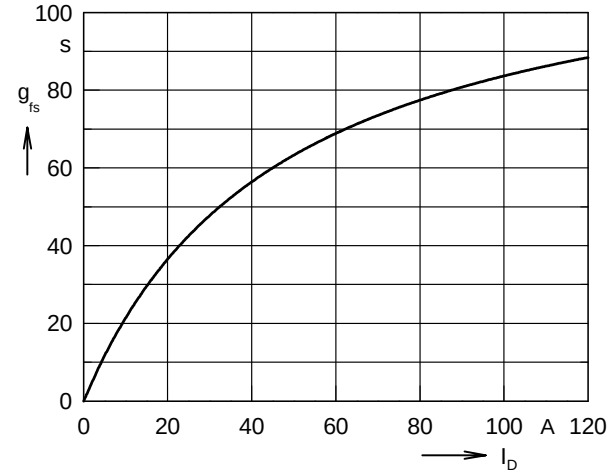



Fig. 11 Typical transconductance $g_{fs} = f(I_D)$

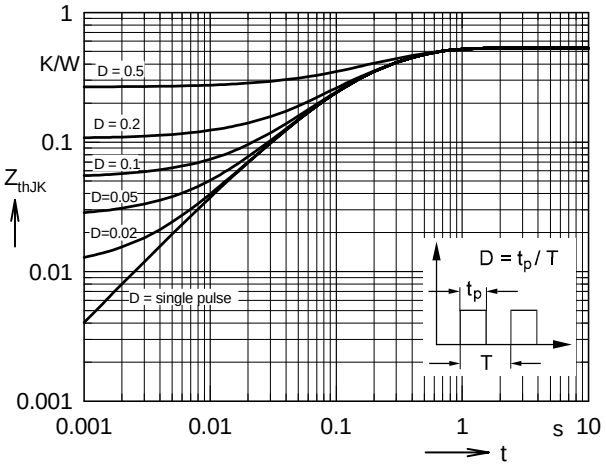



Fig. 12 Transient thermal resistance $Z_{thJK} = f(t_p)$