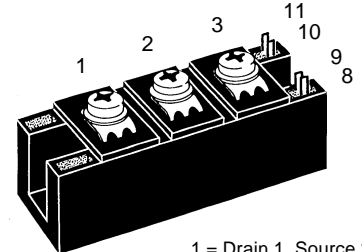
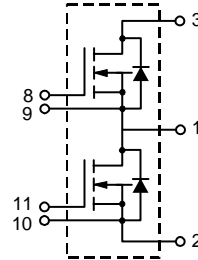


# Dual Power HiPerFET™ Module

## VMM 85-02F

$V_{DSS} = 200\text{ V}$   
 $I_{D25} = 84\text{ A}$   
 $R_{DS(on)} = 25\text{ m}\Omega$

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



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

Symbol	Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	200	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 10\text{ k}\Omega$	200	V
$V_{GS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	84	A
$I_{D80}$	$T_C = 80^\circ\text{C}$	63	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$ , pulse width limited by $T_{JM}$	335	A
$P_{tot}$	$T_C = 25^\circ\text{C}$	370	W
$T_J$		-40 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-40 ... +125	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz $I_{ISOL} \leq 1\text{ mA}$	$t = 1\text{ min}$ $t = 1\text{ s}$	3000 V~ 3600 V~
$M_d$	Mounting torque (M5 or 10-32 UNF) Terminal connection torque (M5)	2.25-2.75/20-25 2.5-4/22-35	Nm/lb.in. Nm/lb.in.
<b>Weight</b>	Typical including screws	130	g

### Features

- Two MOSFET's in phaseleg config.
- International standard package
- Direct copper bonded  $\text{Al}_2\text{O}_3$  ceramic base plate
- Isolation voltage 3600 V~
- Low  $R_{DS(on)}$  HDMOS™ process
- Low package inductance for high speed switching
- Kelvin source contact

### Applications

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

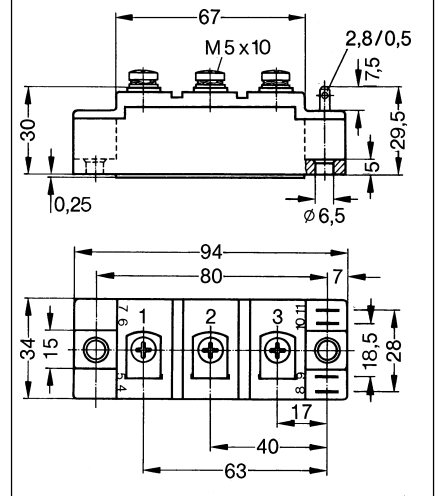
### Advantages

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

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

Data per MOSFET unless otherwise stated.  
IXYS reserves the right to change limits, test conditions and dimensions

Symbol	Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$ pulsed	40	60	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		9600	15000 pF
$C_{oss}$			1800	4500 pF
$C_{rss}$			620	1500 pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\ \Omega$ (External), resistive load		70	ns
$t_r$			80	ns
$t_{d(off)}$			200	ns
$t_f$			100	ns
$Q_g$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		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/s <sup>2</sup>

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


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

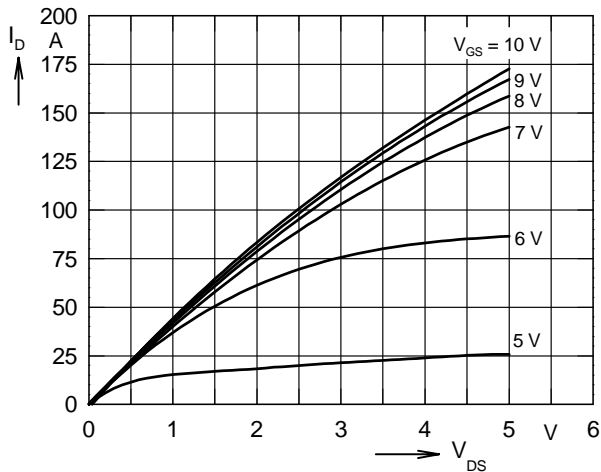


Fig. 1 Typical output characteristics  $I_D = f(V_{DS})$

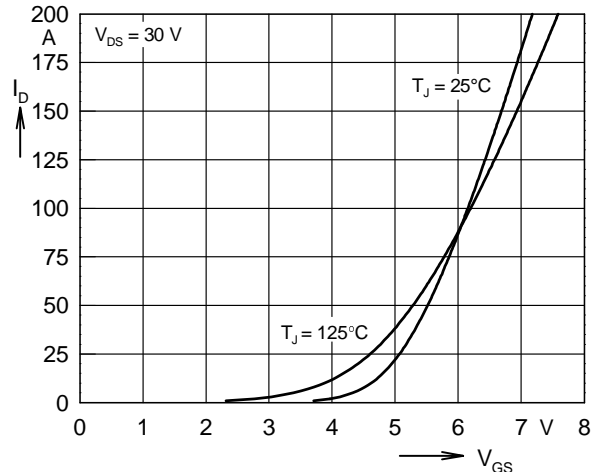


Fig. 2 Typical transfer characteristics  $I_D = f(V_{GS})$

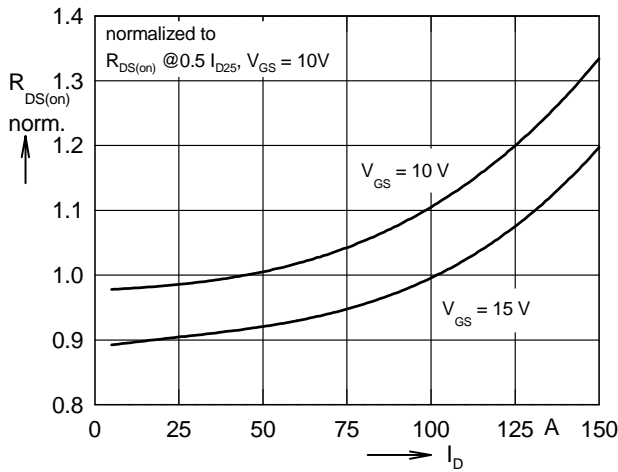


Fig. 3 Typical normalized  $R_{DS(on)} = f(I_D)$

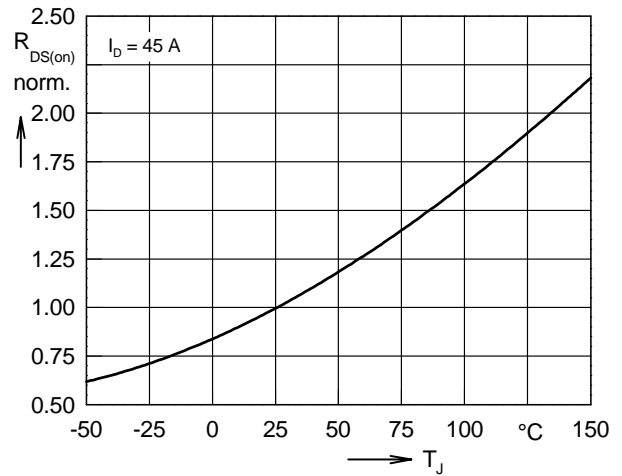


Fig. 4 Typical normalized  $R_{DS(on)} = f(T_J)$

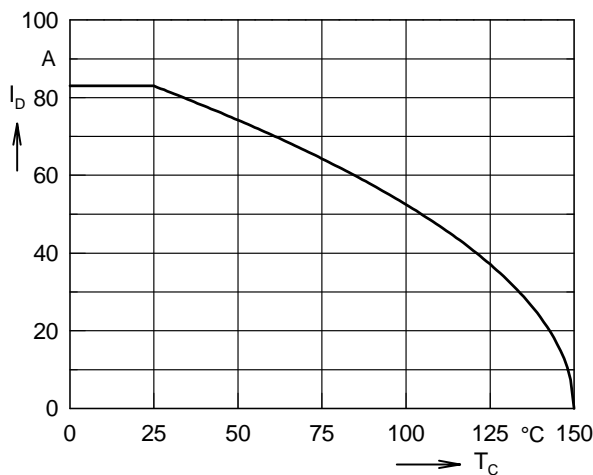


Fig. 5 Continuous drain current  $I_D = f(T_C)$

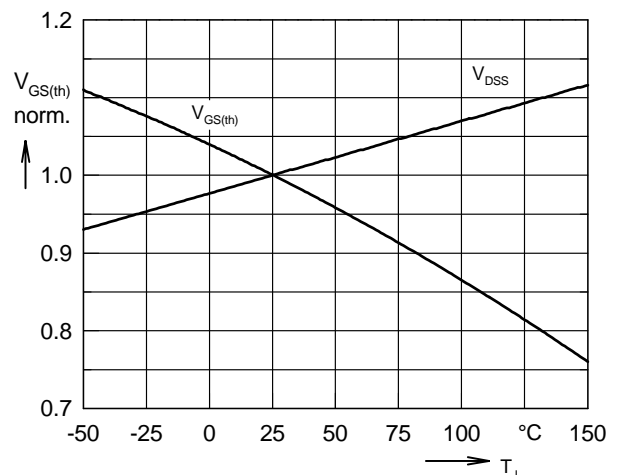


Fig. 6 Typical normalized  $V_{DSS} = f(T_J)$ ,  $V_{GS(th)} = f(T_J)$

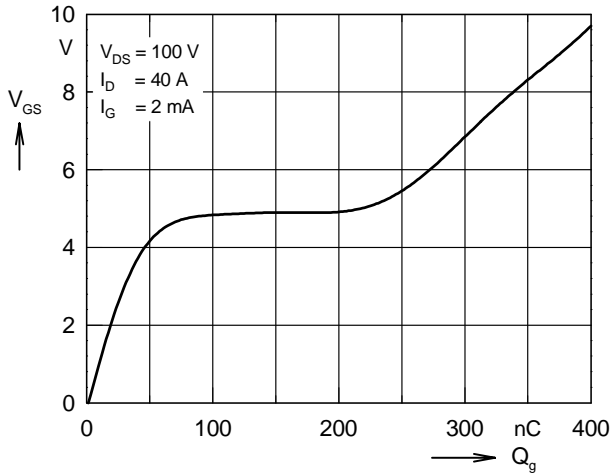


Fig. 7 Typical turn-on gate charge characteristics

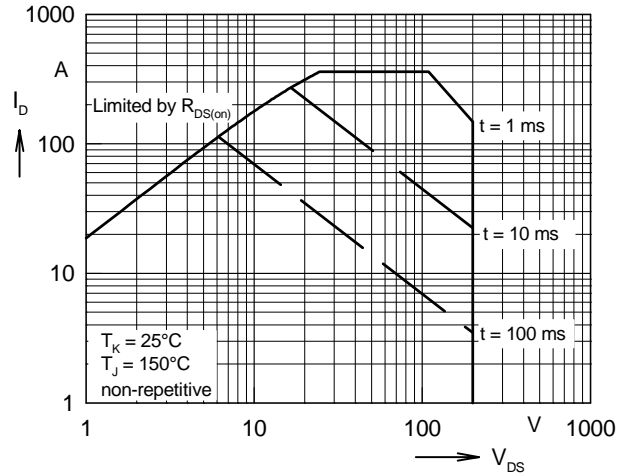


Fig. 8 Forward Safe Operating Area,  $I_D = f(V_{DS})$

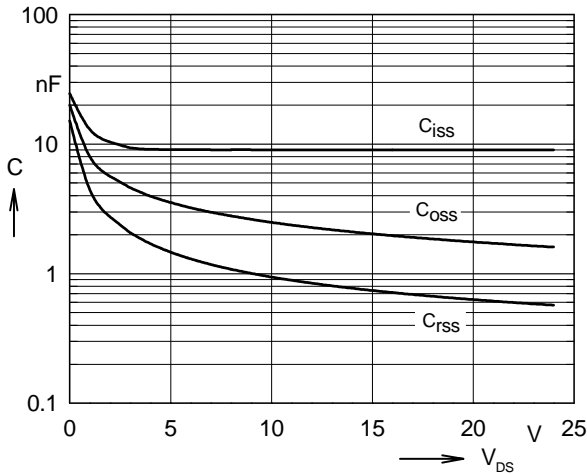


Fig. 9 Typical capacitances  $C = f(V_{DS})$ ,  $f = 1 \text{ MHz}$

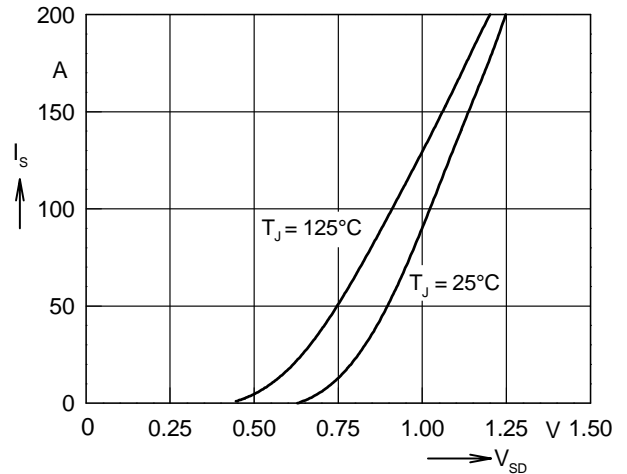


Fig. 10 Typical forward characteristics of reverse diode,  $I_S = f(V_{SD})$

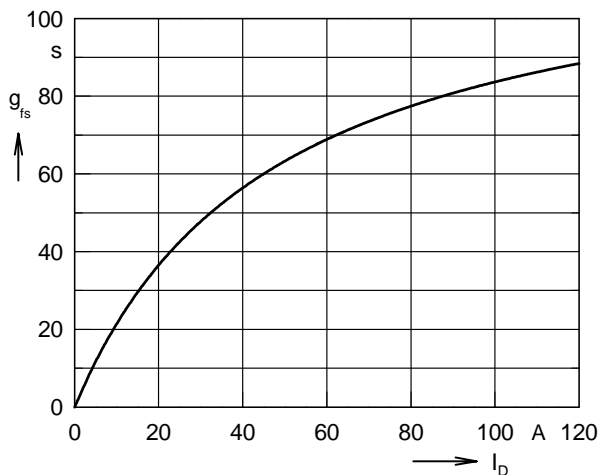


Fig. 11 Typical transconductance  $g_{fs} = f(I_D)$

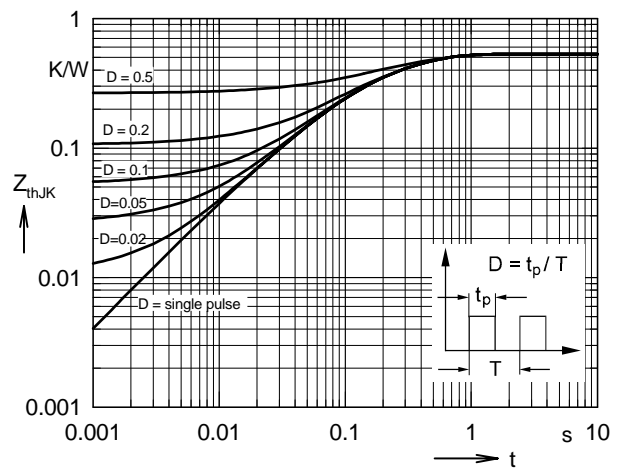


Fig. 12 Transient thermal resistance  $Z_{thJK} = f(t_p)$