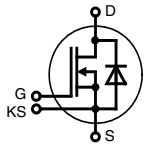
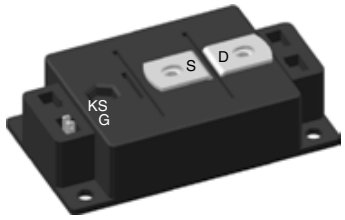
PolarHT™ Module

N-Channel Enhancement Mode

V_{DSS} = 200 V
I_{D80} = 1600 A
$R_{DS(on)}$ = 1.7 mΩ max.





MOSFET

Symbol	Conditions	Maximum Ratings	
V_{DSS}	T_{VJ} = 25°C to 150°C	200	V
V_{GS}		± 20	V
I_{D25}	T_C = 25°C	1900	A
I_{D80}	T_C = 80°C	1600	A
I_{F25}	T_C = 25°C (diode)	1900	A
I_{F80}	T_C = 80°C (diode)	1600	A

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
R_{DSon}	V_{GS} = 10 V; I_D = 1600 A;	T_{VJ} = 25°C		1.58	1.7	mΩ
		T_{VJ} = 125°C		3.25	3.6	mΩ
$V_{GS(th)}$	V_{DS} = 20 V; I_D = 5 mA		2.5		5	V
I_{DSS}	V_{DS} = V_{DSS}; V_{GS} = 0 V;	T_{VJ} = 25°C			0.5	mA
		T_{VJ} = 125°C		5.0		mA
I_{GSS}	V_{GS} = ± 20 V; V_{DS} = 0 V				2	µA
Q_g	V_{GS} = 10 V; V_{DS} = 0.5·V_{DSS}; I_D = I_{D80}			2900		nC
Q_{gs}				600		nC
Q_{gd}				1600		nC
$t_{d(on)}$	inductive load			320		ns
t_r				1220		ns
$t_{d(off)}$				620		ns
t_f	V_{GS} = 10 V; V_{DS} = 100 V			700		ns
E_{on}	I_D = 1600 A; R_G = 1.8 Ω	T_{VJ} = 25°C		24		mJ
E_{off}				152		mJ
E_{rec}				3.7		mJ
$t_{d(on)}$	inductive load			340		ns
t_r				1220		ns
$t_{d(off)}$				740		ns
t_f	V_{GS} = 10 V; V_{DS} = 100 V			580		ns
E_{on}	I_D = 1600 A; R_G = 1.8 Ω	T_{VJ} = 125°C		28		mJ
E_{off}				147		mJ
E_{rec}				4.9		mJ
R_{thJC}					0.03	K/W
R_{thJH}	with heat transfer paste			0.037	0.056	K/W

Features

- PolarHT™ technology
  - low R_{DSon}
  - dv/dt ruggedness
  - fast intrinsic reverse diode
- Package
  - low inductive current path
  - screw connection to high current main terminals
  - use of non interchangeable connectors for auxiliary terminals possible
  - Kelvin source terminals for easy drive
  - isolated ceramic base plate

Applications

- converters with high power density for
  - main & aux. AC drives of electric vehicles
  - DC drives
  - power supplies

Source Drain Diode

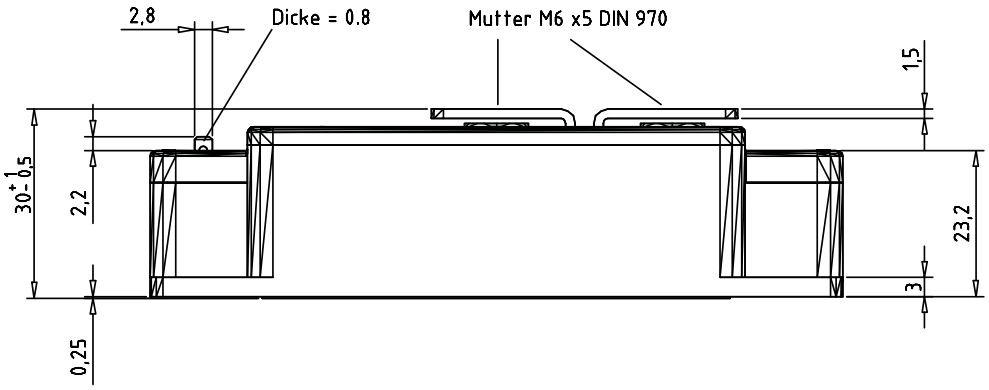
Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_{SD}	I_F = 1600 A; V_{GS} = 0 V;	T_{VJ} = 25°C		1.17		V
		T_{VJ} = 125°C		1.13		V
t_{rr}	V_{DS} = 100 V; I_F = 1600 A	T_{VJ} = 25°C		340		ns
Q_{rr}	dV_F/dt = 1300 A/µs			40		µC
I_{RM}				210		A
t_{rr}	V_{DS} = 100 V; I_F = 1600 A	T_{VJ} = 125°C		380		ns
Q_{rr}	dV_F/dt = 1300 A/µs			56		µC
I_{RM}				250		A

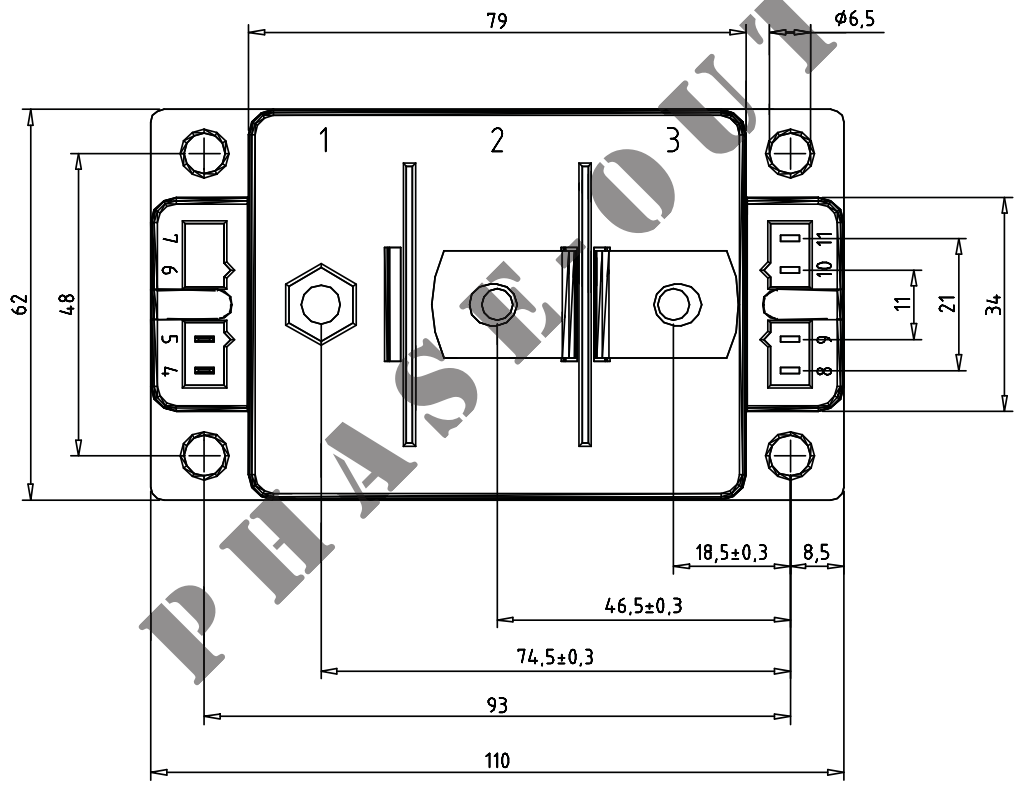
Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-40...+150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	$I_{ISOL} \leq$ 1 mA; 50/60 Hz	3600	V~
M_d	mounting torque (M6)	2.25 - 2.75	Nm
	teminal connection torque (M6)	4.5 - 5.5	Nm

Symbol	Conditions	Characteristic Values min.	typ.	max.	
Weight			250		g

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	VMO 1600-02P	VMO 1600-02P	Box	2	504288





Optional accessories for modules

keyed twin plugs
(UL758, style 1385, CSA class 5851,
guide 460-1-1)

- Type ZY180L with wire length 350 mm
  for pins 4 (Gate, yellow wire)
  and 5 (Kelvin Source, red wire)

Dimensions in mm (1 mm = 0.0394")

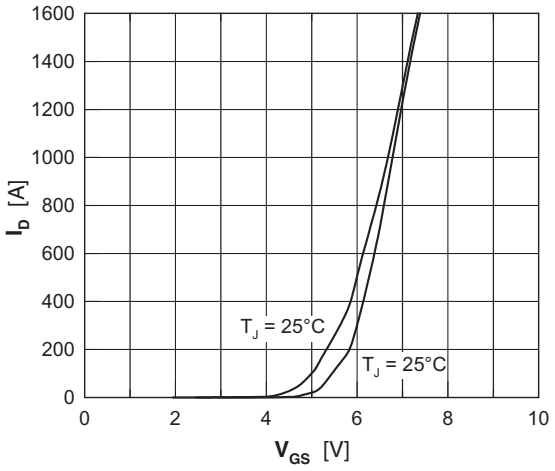


Fig. 1 Typical transfer characteristic

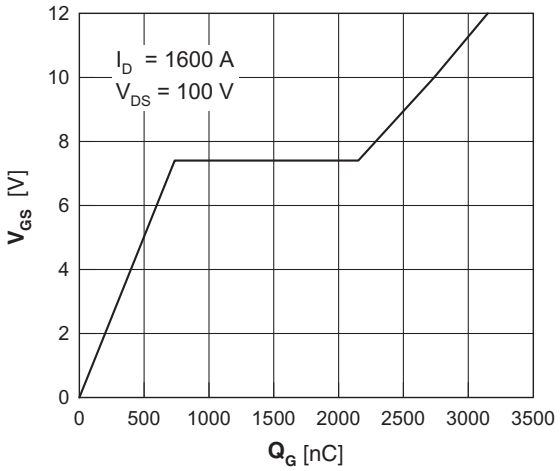


Fig. 2 Typical gate charge characteristic

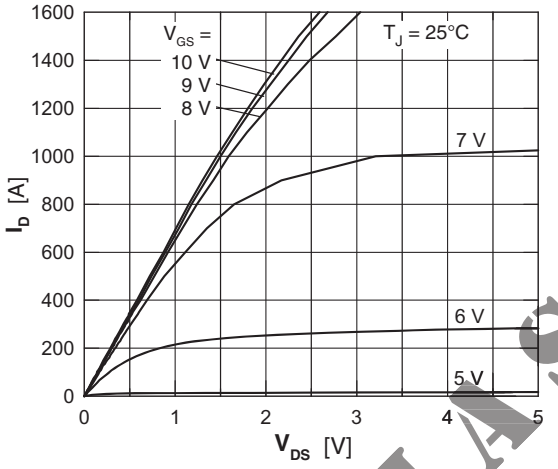


Fig. 3 Typical output characteristic

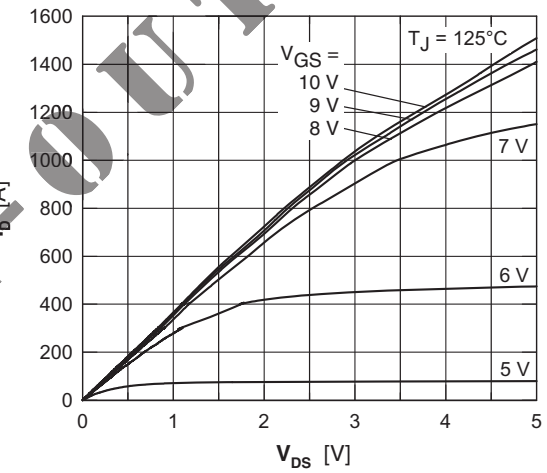


Fig. 4 Typical output characteristic

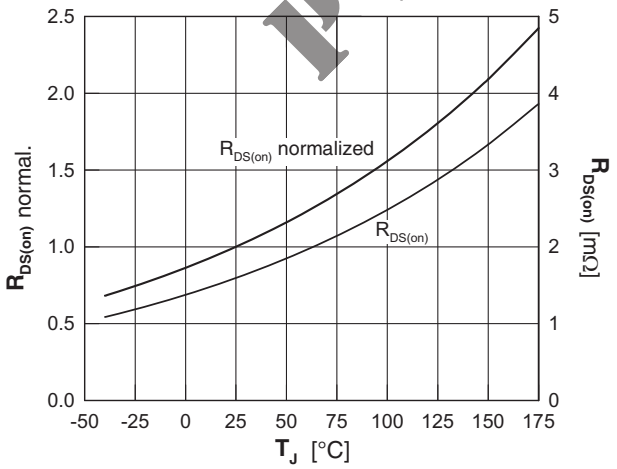


Fig. 5 Typ. drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_{VJ}

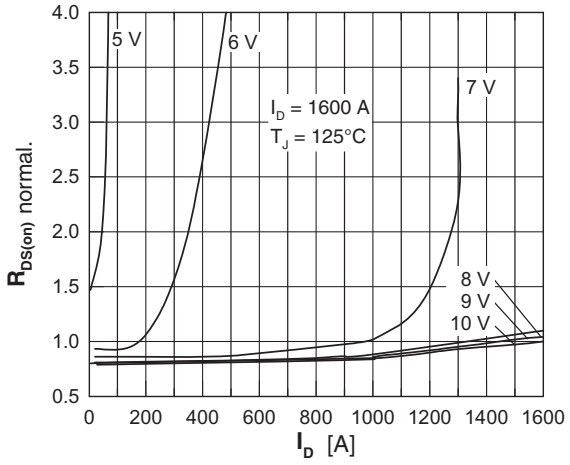


Fig. 6 Typ. drain source on-stateresistance $R_{DS(on)}$ versus I_D

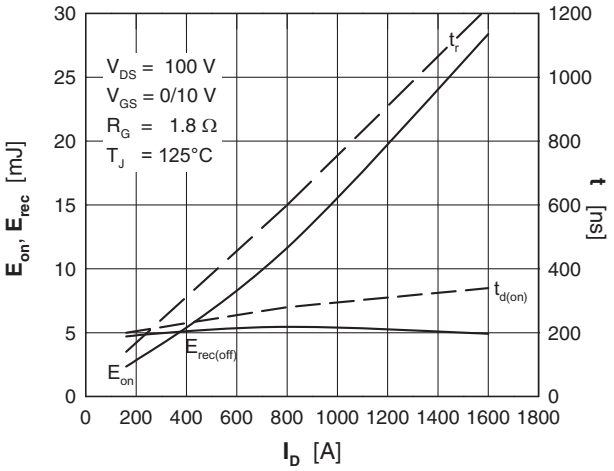


Fig.7 Typ. turn-on energy & switching times vs. drain source current, inductive switching

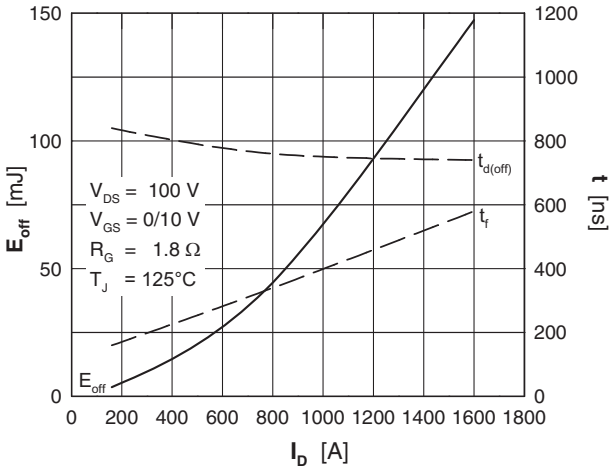


Fig. 8 Typ. turn-off energy & switching times vs. drain source current, inductive switching

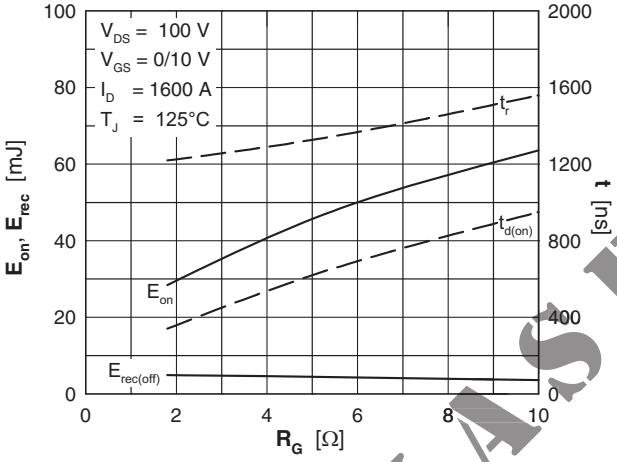


Fig. 9 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

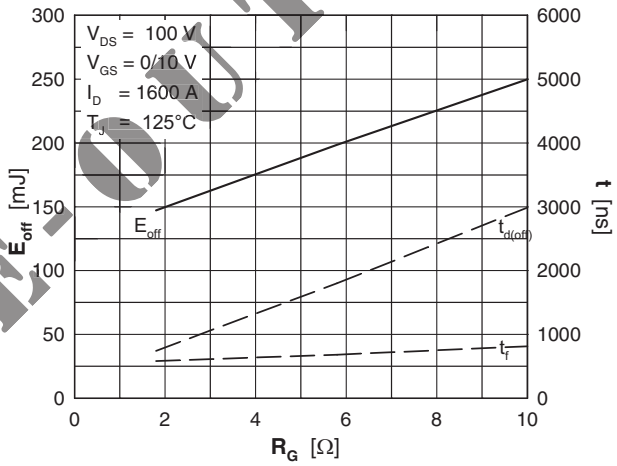


Fig. 10 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

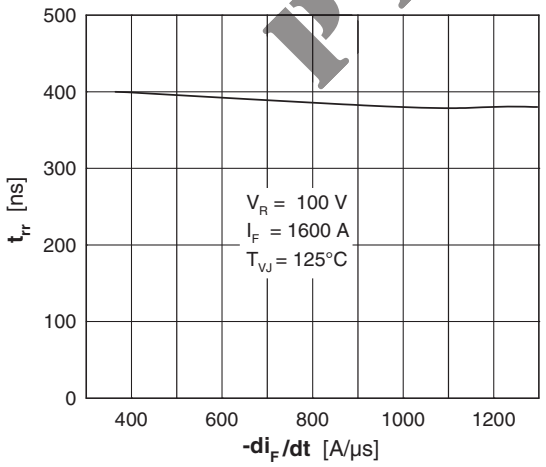


Fig.11 Typ. reverse recovery time t_{rr} of the body diode versus di/dt

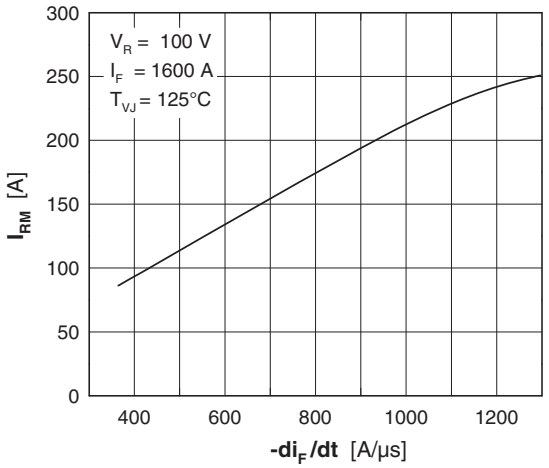


Fig. 12 Typ. reverse recovery current I_{RM} of the body diode versus di/dt

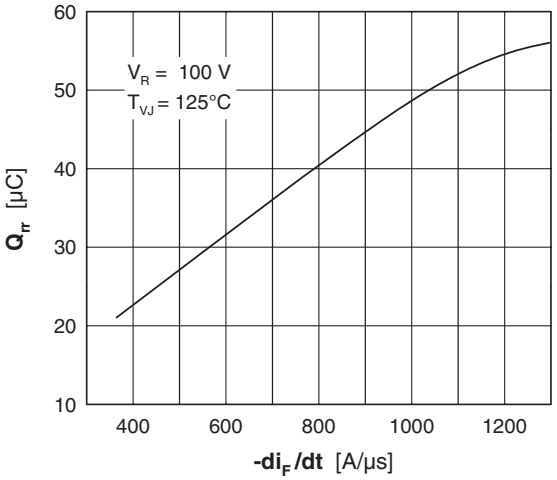


Fig. 13 Typical reverse recovery charge Q_{rr} of the body diode versus di/dt

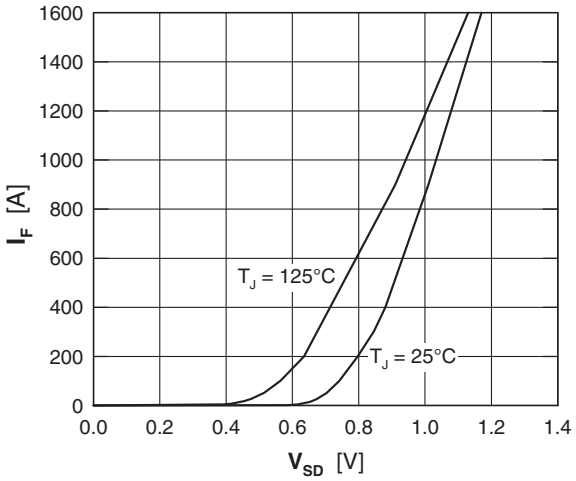


Fig. 14 Source drain current I_F (body diode) vs. typical source drain voltage V_{SD}

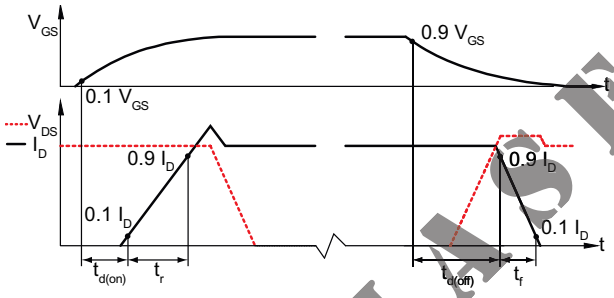


Fig. 15 Definition of switching times

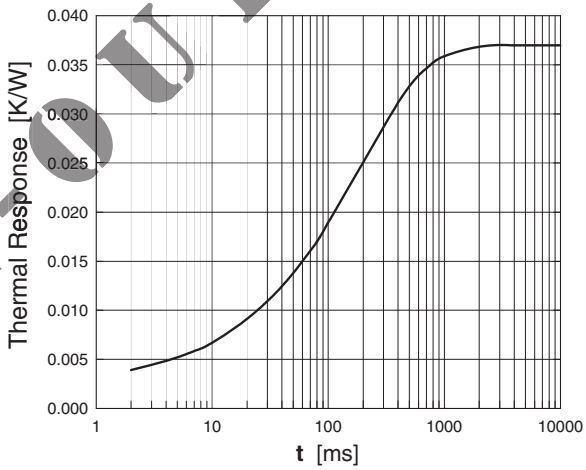


Fig. 16 Typ. thermal impedance junction to heatsink Z_{thJH} with heat transfer paste