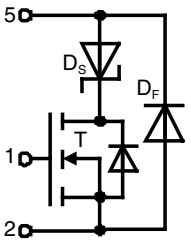
CoolMOS™ [1] Power MOSFET

with Series Schottky Diode and Ultra Fast Antiparallel Diode

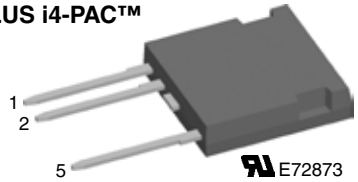
in High Voltage ISOPLUS i4-PAC™

Preliminary data

V_{DSS} = 600 V
I_{D25} = 41 A
$R_{DS(on)\ typ.}$ = 60 mΩ
t_{rr} = 70 ns



ISOPLUS i4-PAC™



MOSFET T						
Symbol	**Conditions**			**Maximum Ratings**		
V_{DSS}	T_{VJ} = 25°C to 150°C			600		V
V_{GS}				± 20		V
I_{D25}	T_C = 25°C			41		A
I_{D90}	T_C = 90°C			29		A
Symbol	**Conditions**			**Characteristic Values** (T_{VJ} = 25°C, unless otherwise specified)		
			min.	**typ.**	**max.**	
R_{DSon}	MOSFET 'T' only:					
	V_{GS} = 10 V; I_D = 25 A	T_{VJ} = 25°C		60	70	mΩ
		T_{VJ} = 125°C		135		mΩ
	MOSFET 'T & D_S' in series (pin 5, pin 2):					
	V_{GS} = 10 V; I_D = 10 A	T_{VJ} = 25°C		120		mΩ
		T_{VJ} = 125°C		170		mΩ
	V_{GS} = 10 V; I_D = 25 A	T_{VJ} = 25°C		85		mΩ
		T_{VJ} = 125°C		145		mΩ
$V_{GS(th)}$	V_{DS} = 20 V; I_D = 3 mA		2.1		3.9	V
I_{DSS}	V_{DS} = V_{DSS}; V_{GS} = 0 V	T_{VJ} = 25°C			0.3	mA
		T_{VJ} = 150°C		1		mA
I_{GSS}	V_{GS} = ± 20 V; V_{DS} = 0 V				100	nA
Q_g	V_{GS} = 10 V; V_{DS} = 350 V; I_D = 50 A			250		nC
Q_{gs}				25		nC
Q_{gd}				120		nC
$t_{d(on)}$	Inductive load	T_{VJ} = 125°C		30		ns
t_r	V_{GS} = 10 V; V_{DS} = 380 V			18		ns
$t_{d(off)}$	I_D = 25 A; R_G = 10 Ω			500		ns
t_f				50		ns
E_{on}				0.7		mJ
E_{off}				0.3		mJ
$E_{rec(off)}$				0.22		mJ
R_{thJC}					0.45	K/W
R_{thJH}	with heatsink compound (IXYS test setup)			0.5	0.7	K/W

Features

- fast CoolMOS™ [1] power MOSFET 3rd generation
  - high blocking voltage
  - low on resistance
  - low thermal resistance due to reduced chip thickness
- Series Schottky diode prevents current flow through MOSFET's body diode
  - very low forward voltage
  - fast switching
- Ultra fast HiPerFRED™ anti parallel diode
  - low operating forward voltage
  - fast and soft reverse recovery
  - low switching losses
- ISOPLUS i4-PAC™ high voltage package
  - isolated back surface
  - low coupling capacity between pins and heatsink
  - enlarged creepage towards heatsink
  - enlarged creepage betw. high voltage pins
  - application friendly pinout
  - high reliability
  - industry standard outline
  - UL registered E 72873

Applications

Converters with
- circuit operation leading to current flow through switches in reverse direction - e. g.
  - phaseleg with inductive load
  - resonant circuits
- high switching frequency

Examples
- switched mode power supplies (SMPS)
- uninterruptable power supplies (UPS)
- DC-DC converters
- welding converters
- converters for inductive heating
- drive converters

[1] CoolMOS™ is a trademark of Infineon Technologies AG.

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Series Schottky Diode D_S

Symbol	Conditions	Maximum Ratings	
I_{F25}	T_C = 25°C	77	A
I_{F90}	T_C = 90°C	45	A

Symbol	Conditions (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
V_F	I_F = 20 A; T_C = 25°C			0.71	V
	T_C = 125°C		0.5		V
V_{T0}	T_{VJ} = 150°C			0.42	V
r_T	for power loss calculation only			4.1	mΩ
R_{thJC}				2.2	K/W
R_{thJH}	with heatsink compound (IXYS test setup)		2.8	3.5	K/W

Free Wheeling Diode D_F

Symbol	Conditions	Maximum Ratings	
I_{F25}	T_C = 25°C	40	A
I_{F90}	T_C = 90°C	23	A

Symbol	Conditions (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values typ.	max.	
V_F	I_F = 30 A; T_C = 25°C	2.1	2.5	V
	T_C = 125°C	1.4		V
V_{T0}	T_{VJ} = 150°C		1.0	V
r_T	for power loss calculation only		17.3	mΩ
I_{RM}	I_F = 25 A; di_F/dt = -400 A/µs; T_{VJ} = 125°C	15		A
t_{rr}	V_R = 380 V; V_{GE} = 0 V	110		ns
R_{thJC}			1.8	K/W
R_{thJH}	with heatsink compound (IXYS test setup)	2.3	2.5	K/W

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-40...+150	°C
T_{stg}	storage	-40...+125	°C
V_{ISOL}	I_{ISOL} = 1 mA, 50/60 Hz, t = 1 min	3000	V~
F_C	mounting force with clip	20-120	N

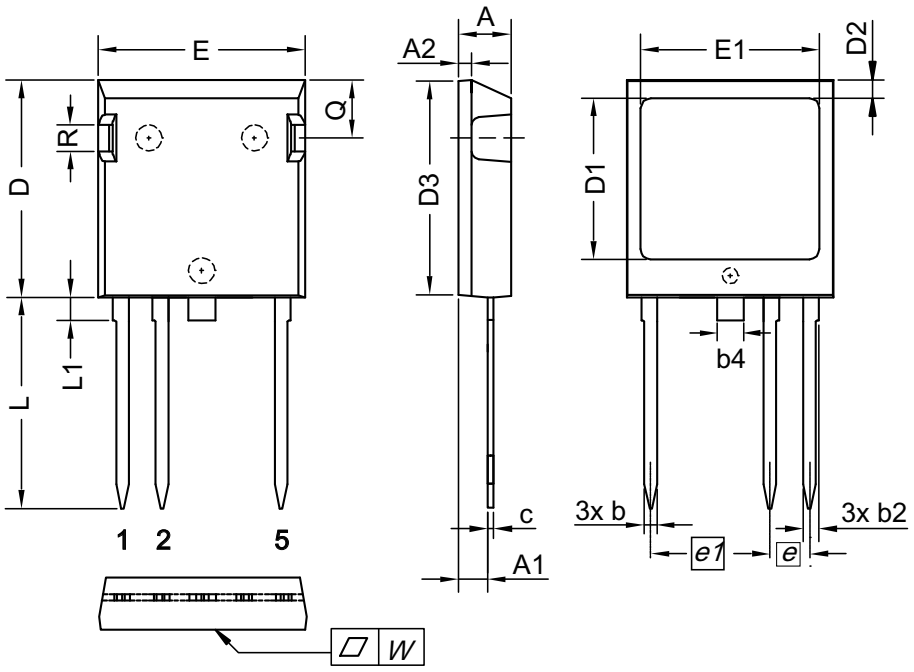
Symbol	Conditions	Characteristic Values min.	typ.	max.	
C_P	coupling capacity between shorted pins and mounting tab in the case		40		pF
d_S, d_A	D pin - S pin	7			mm
d_S, d_A	pin - backside metal	5.5			mm
Weight			6		g

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ISOPLUS i4-PAC™ Outline



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.83	5.21	0.190	0.205
A1	2.59	3.00	0.102	0.118
A2	1.17	2.16	0.046	0.085
b	1.14	1.40	0.045	0.055
b2	1.47	1.73	0.058	0.068
b4	2.54	2.79	0.100	0.110
c	0.51	0.74	0.020	0.029
D	20.80	21.34	0.819	0.840
D1	14.99	15.75	0.590	0.620
D2	1.65	2.03	0.065	0.080
D3	20.30	20.70	0.799	0.815
E	19.56	20.29	0.770	0.799
E1	16.76	17.53	0.660	0.690
e	3.81 BSC		0.150 BSC	
e1	11.43 BSC		0.450 BSC	
L	19.81	21.34	0.780	0.840
L1	2.11	2.59	0.083	0.102
Q	5.33	6.20	0.210	0.244
R	2.54	4.57	0.100	0.180
W	-	0.10	-	0.004

Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite
The convex bow of substrate is typ. < 0.05 mm over plastic surface level of device bottom side

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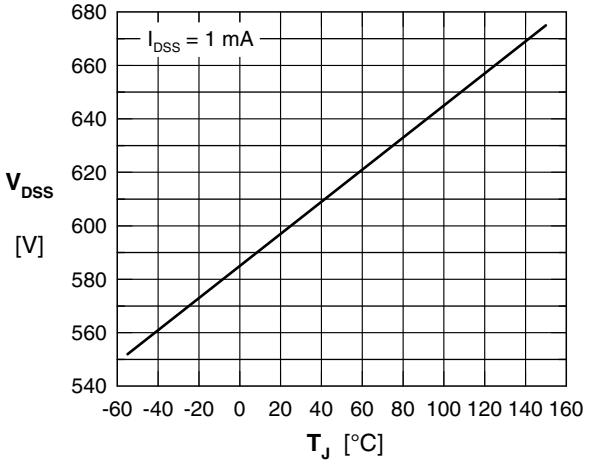


Fig. 1 Drain source breakdown voltage V_{DSS} vs. junction temperature T_J

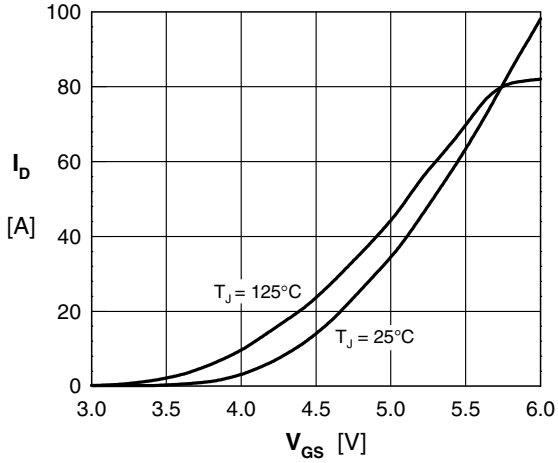


Fig. 2 Typical transfer characteristic

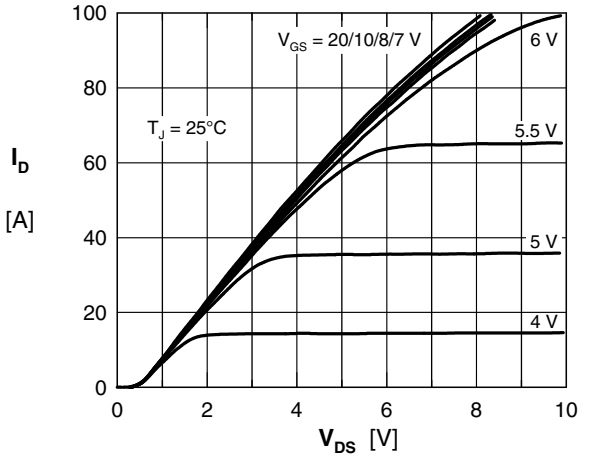


Fig. 3 Typical output characteristic (between pin 5 and pin 2)

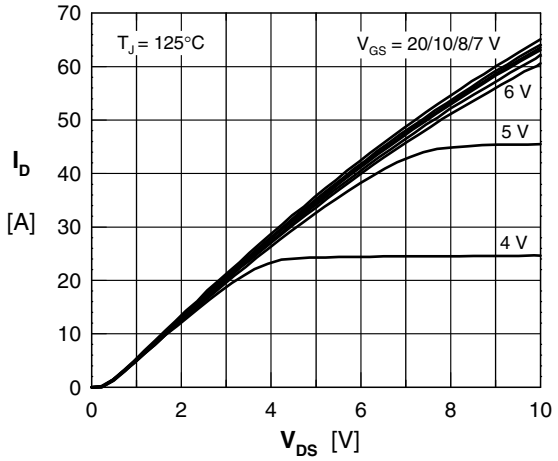


Fig. 4 Typical output characteristic (between pin 5 and pin 2)

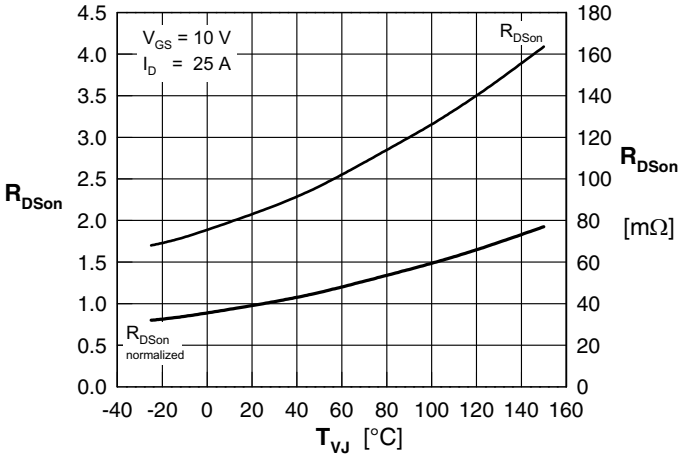


Fig. 5 Drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_J (between pin 5 and pin 2)

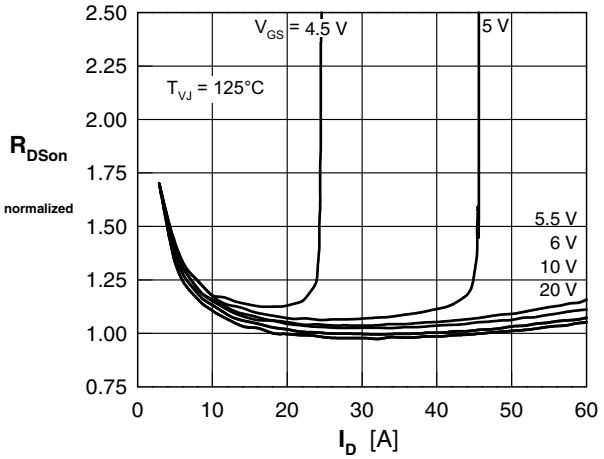


Fig. 6 Drain source on-state resistance $R_{DS(on)}$ versus I_D (between pin 5 and pin 2)

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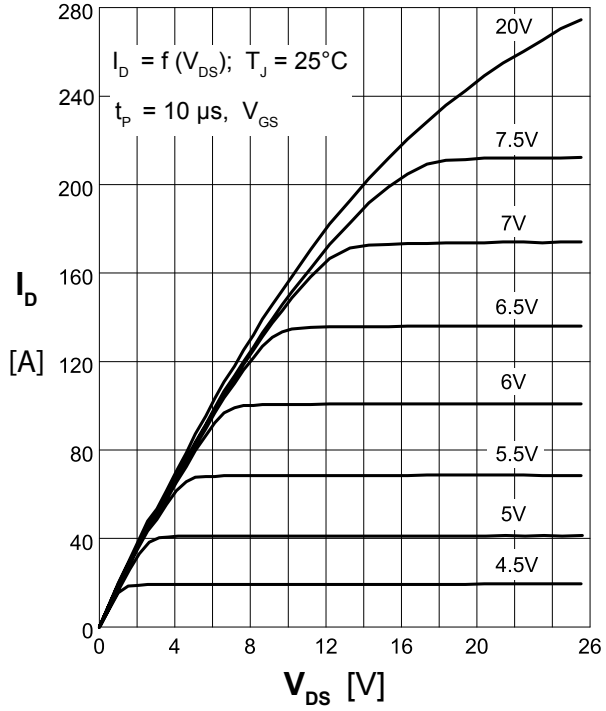


Fig. 7 Typical output characteristic (MOSFET only)

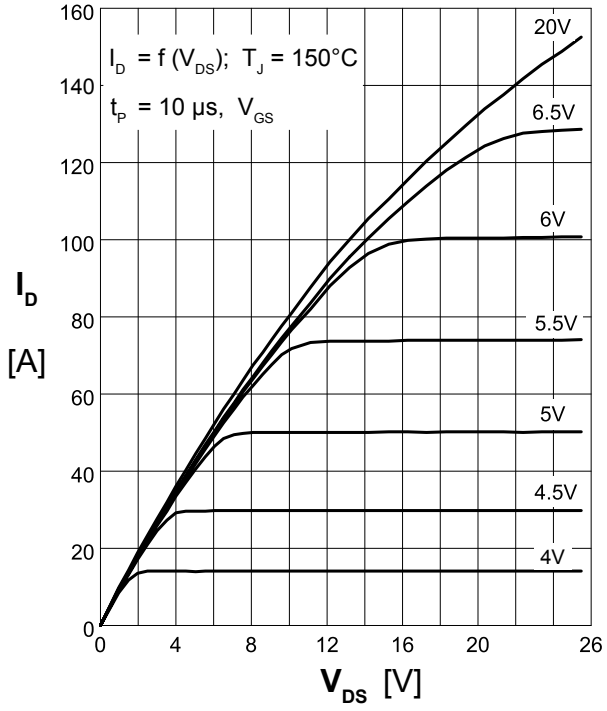


Fig. 8 Typical output characteristic (MOSFET only)

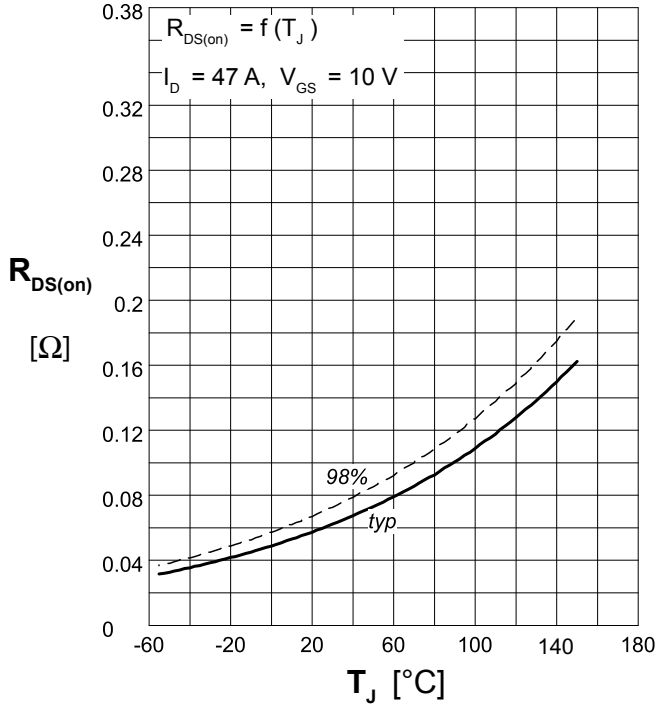


Fig. 9 Drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_J (MOSFET only)

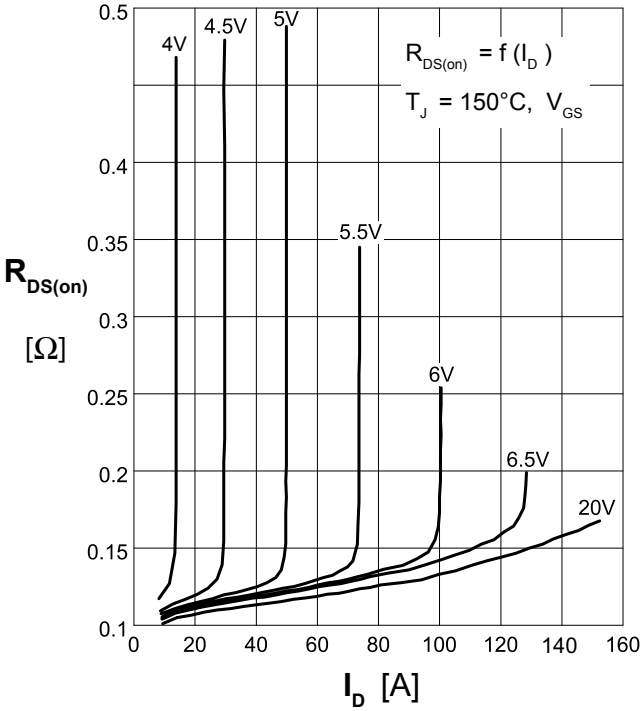


Fig. 10 Drain source on-state resistance $R_{DS(on)}$ versus I_D (MOSFET only)

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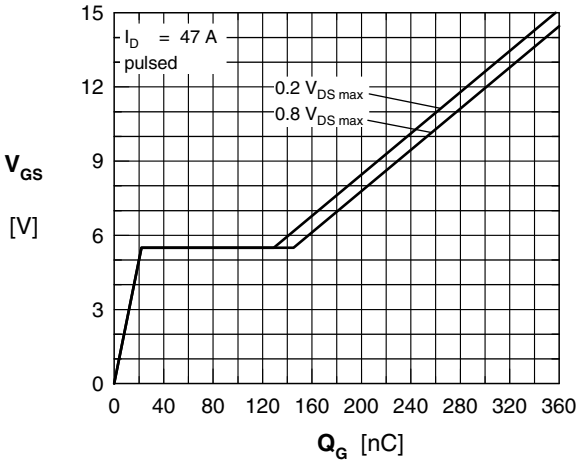


Fig.11 Gate charge characteristic

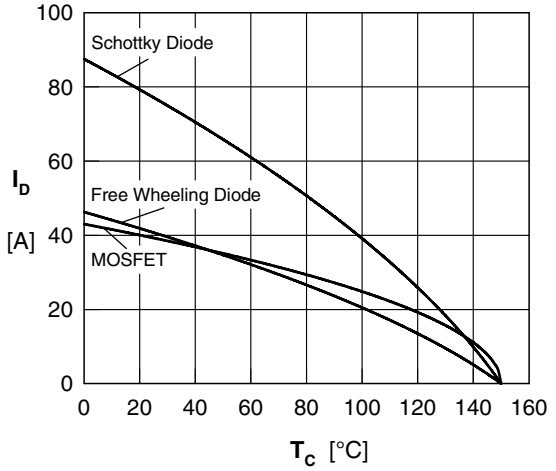


Fig. 12 Drain current I_D vs. case temperature T_C

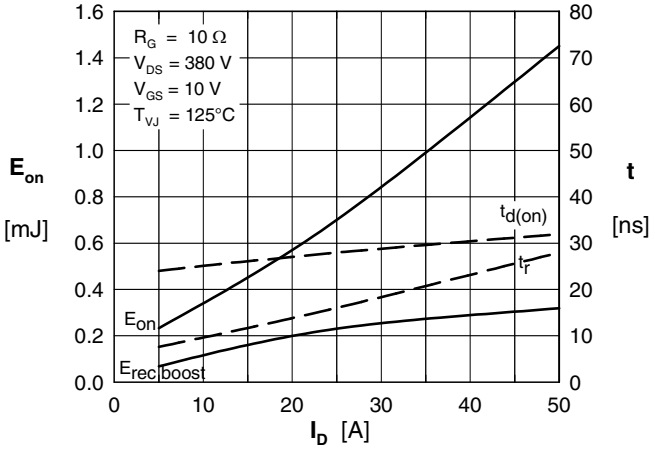


Fig. 13 Typ. turn-on energy & switching times vs. collector current, inductive switching

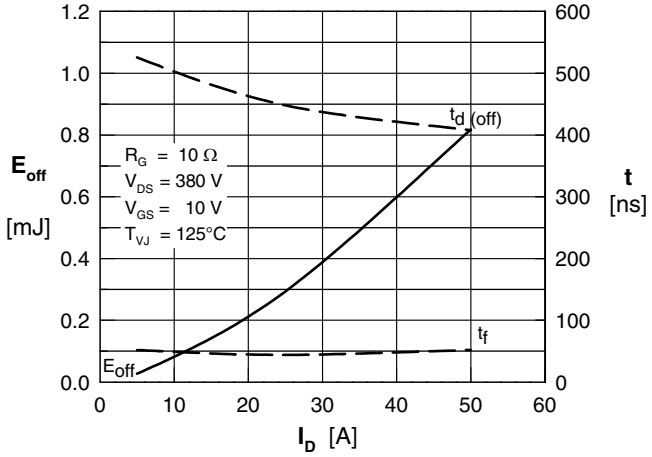


Fig. 14 Typ. turn-off energy & switching times vs. collector current, inductive switching

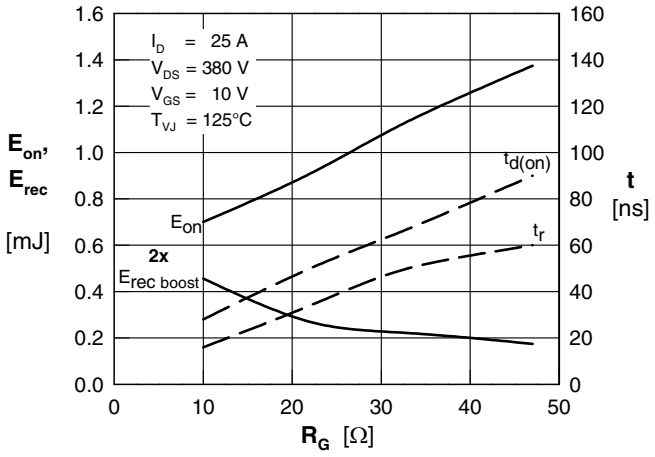


Fig. 15 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

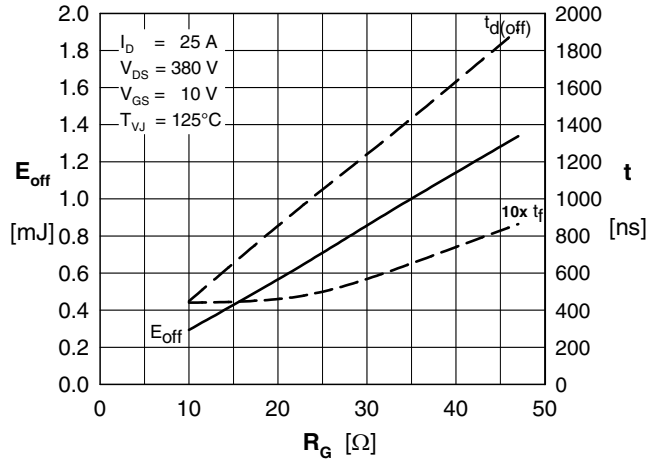


Fig. 16 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

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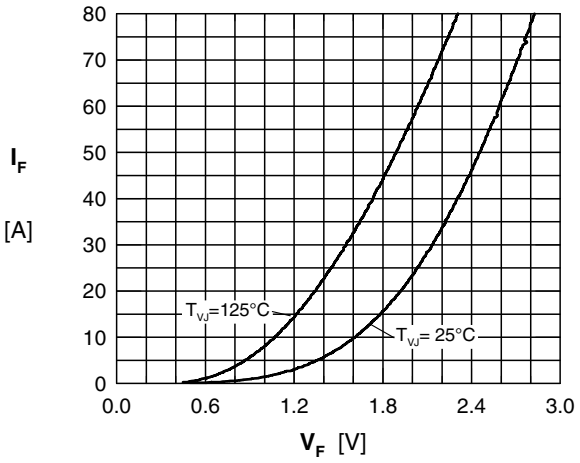


Fig. 17 Typ. forward characteristics of reverse diode

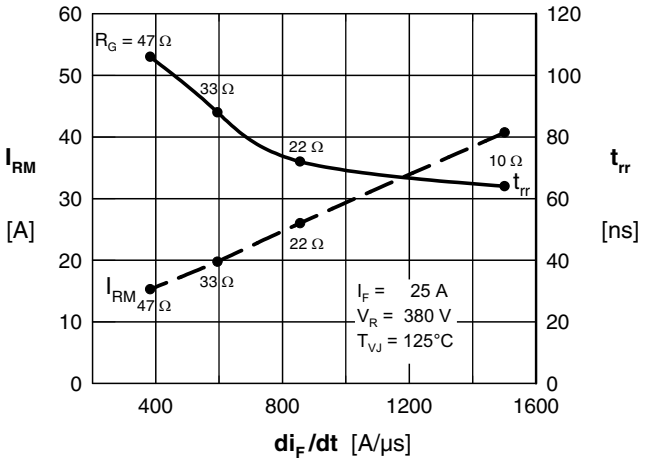


Fig. 18 Typ. reverse recovery characteristics of antiparallel diode

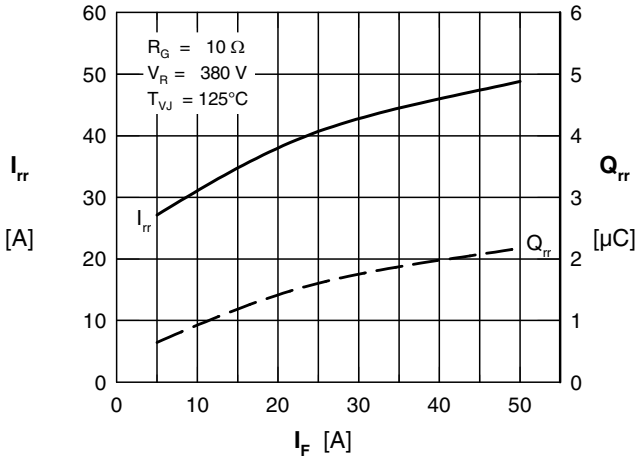


Fig. 19 Typ. reverse recovery characteristics

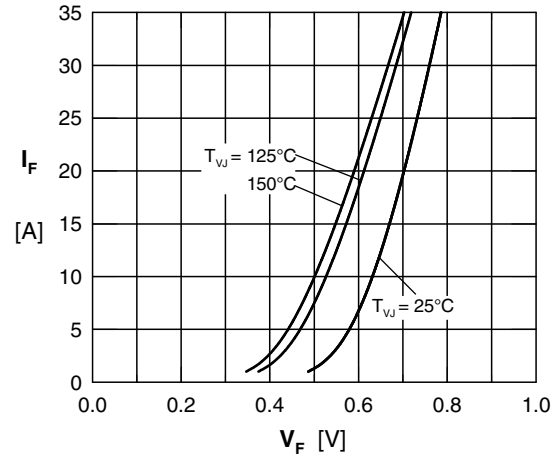


Fig. 20 Typ. forward characteristics of diode D_S

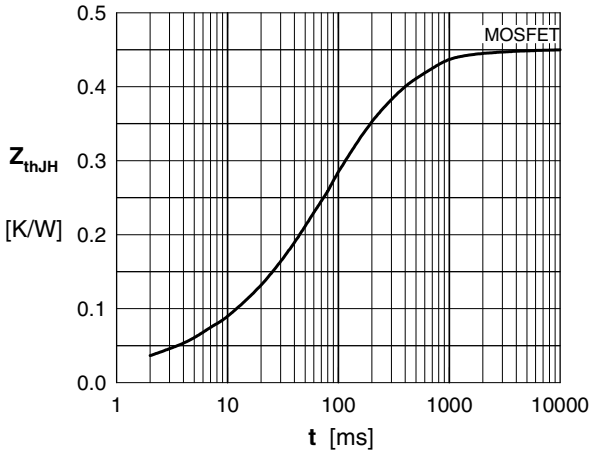


Fig. 21 Typ. thermal impedance junction to heatsink Z_{thJH} of the MOSFET with heat transfer paste

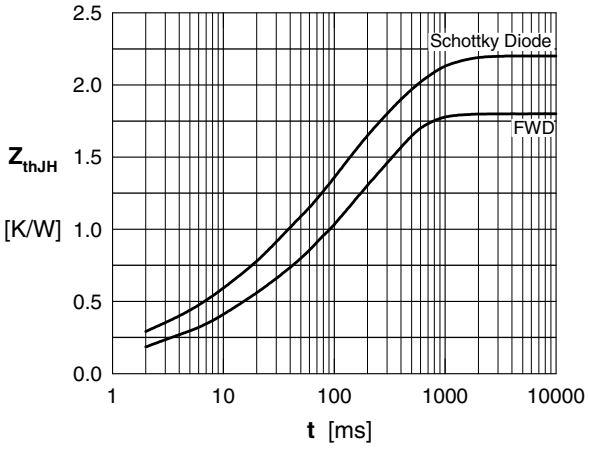


Fig. 22 Typ. thermal impedance junction to heatsink Z_{thJH} of the Diodes with heat transfer paste

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