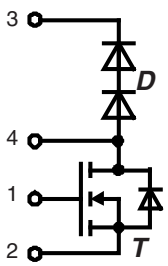
CoolMOS™ [1] Power MOSFET with HiPerDyn™ FRED

Buck and Boost Topologies

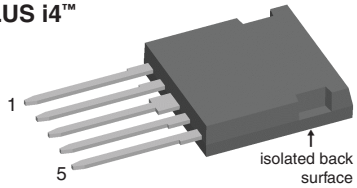
I_{D25} = 15 A
V_{DSS} = 600 V
$R_{DS(on)\ max}$ = 0.165 Ω

Electrically isolated back surface
2500 V electrical isolation
N-Channel Enhancement Mode
Low R_{DSon}, high V_{DSS} MOSFET
Ultra low gate charge

Preliminary data



ISOPLUS i4™



E72873

MOSFET T				
Symbol	**Conditions**		**Maximum Ratings**	
V_{DSS}	T_{VJ} = 25°C		600	V
V_{GS}			± 20	V
I_{D25}	T_C = 25°C		15	A
I_{D90}	T_C = 90°C		11	A
E_{AS}	single pulse	I_D = 7.9 A; T_C = 25°C	522	mJ
E_{AR}	repetitive		0.79	mJ
dV/dt	MOSFET dV/dt ruggedness V_{DS} = 0...480 V		50	V/ns

Symbol	**Conditions**		**Characteristic Values** (T_{VJ} = 25°C, unless otherwise specified)			
			min.	typ.	max.	
R_{DSon}	V_{GS} = 10 V; I_D = 12 A			150	165	mΩ
$V_{GS(th)}$	$V_{DS} = V_{GS}$; I_D = 0.79 mA		2.5	3	3.5	V
I_{DSS}	V_{DS} = 600 V; V_{GS} = 0 V	T_{VJ} = 25°C			1	µA
		T_{VJ} = 125°C		10		µA
I_{GSS}	V_{GS} = ± 20 V; V_{DS} = 0 V				100	nA
C_{iss}	V_{GS} = 0 V; V_{DS} = 100 V			2000		pF
C_{oss}	f = 1 MHz			100		pF
Q_g	V_{GS} = 0 to 10 V; V_{DS} = 400 V; I_D = 12 A			40	52	nC
Q_{gs}				9		nC
Q_{gd}				13		nC
$t_{d(on)}$	V_{GS} = 10 V; V_{DS} = 400 V; I_D = 12 A; R_G = 3.3 Ω			12		ns
t_r				5		ns
$t_{d(off)}$				50		ns
t_f				5		ns
E_{on}				tbd		mJ
E_{off}				tbd		mJ
$E_{rec\ off}$				tbd		mJ
R_{thJC}					1.1	K/W
R_{thCH}	with heat transfer paste			0.35		K/W

Features

- Silicon chip on Direct-Copper-Bond substrate
  - high power dissipation
  - isolated mounting surface
  - 2500 V electrical isolation
  - low drain to tab capacitance (< 40 pF)
- Fast CoolMOS™ [1] power MOSFET 4th generation
  - high blocking capability
  - lowest resistance
  - avalanche rated for unclamped inductive switching (UIS)
  - low thermal resistance due to reduced chip thickness
- Enhanced total power density
- HiPerDyn™ FRED
  - consisting of series connected diodes
  - enhanced dynamic behaviour for high frequency operation

Applications

- Switched mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)
- Power factor correction (PFC)

Advantages

- Easy assembly: no screws or isolation foils required
- Space savings
- High power density
- High reliability

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

MOSFET T Source-Drain Diode

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_S	V_{GS} = 0 V			12	A
V_{SD}	I_F = 12 A; V_{GS} = 0 V		0.9	1.2	V
t_{rr}	I_F = 12 A; -di_F/dt = 100 A/µs; V_R = 400 V		390		ns
Q_{RM}			7.5		µC
I_{RM}			38		A

Diode D (data for series connection)

Symbol	Conditions	Maximum Ratings	
V_{RRM}	T_{VJ} = 25°C to 150°C	600	V
I_{F25}	T_C = 25°C	15	A
I_{F90}	T_C = 90°C	8	A

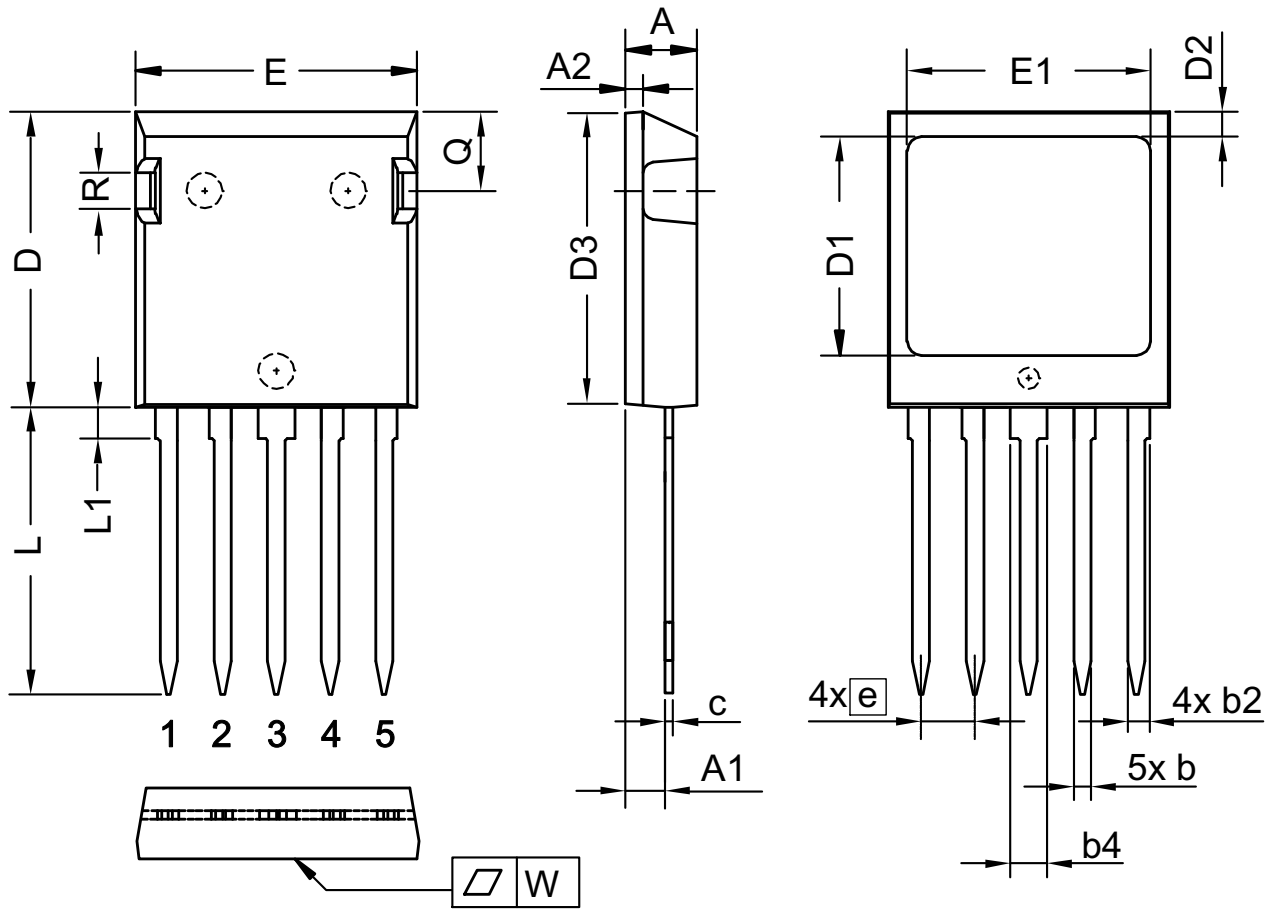
Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	I_F = 15 A	T_{VJ} = 25°C			2.50	V
	I_F = 30 A				3.00	V
	I_F = 15 A	T_{VJ} = 150°C			2.00	A
	I_F = 30 A				2.55	A
I_R	V_R = V_{RRM}	T_{VJ} = 25°C			1	µA
		T_{VJ} = 150°C			0.08	mA
I_{FSM}	t = 10 ms (50 Hz), sine;	T_{VJ} = 45°C			150	A
I_{RM}	I_F = 20 A; V_R = 100 V;	T_{VJ} = 25°C			3	A
t_{rr}	-di_F/dt = 200 A/µs				35	ns
R_{thJC}					2.4	K/W
R_{thJH}	with heat transfer paste			0.8		K/W

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-55...+150	°C
T_{stg}	storage	-55...+125	°C
V_{ISOL}	I_{ISOL} < 1 mA; 50/60 Hz	2500	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	pin - pin	1.7			mm
d_S, d_A	pin - backside metal	5.5			mm
Weight			9		g

ISOPLUS i4™ 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	
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

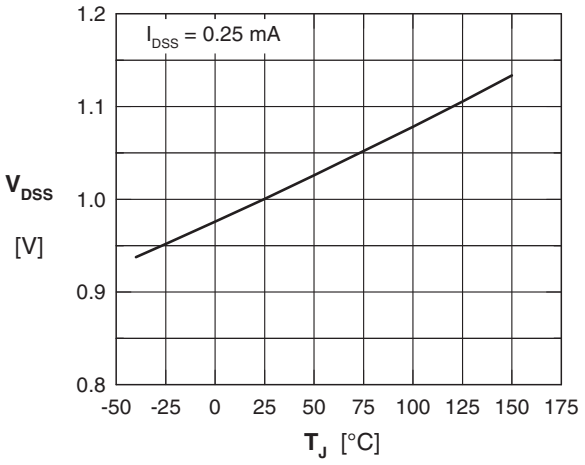


Fig.1 Drain source breakdown voltage V_{DSS} vs. junction temperature T_{VJ}

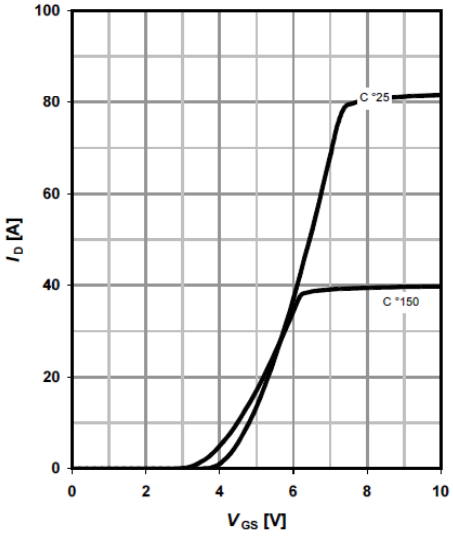


Fig.2 Typ. transfer characteristics

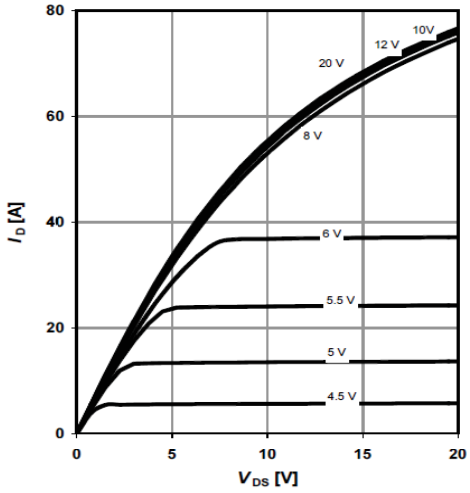


Fig. 3 Typical output characteristics (25°C)

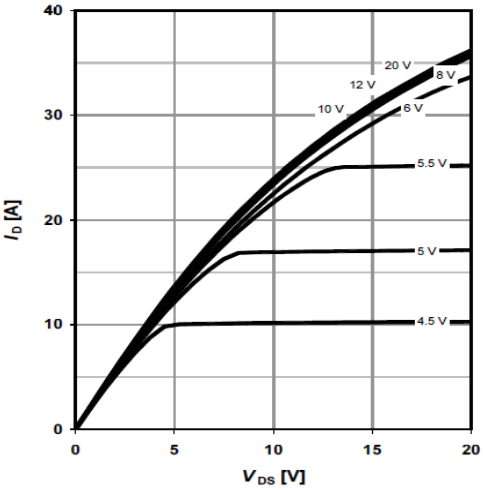


Fig. 4 Typical output characteristics (150°C)

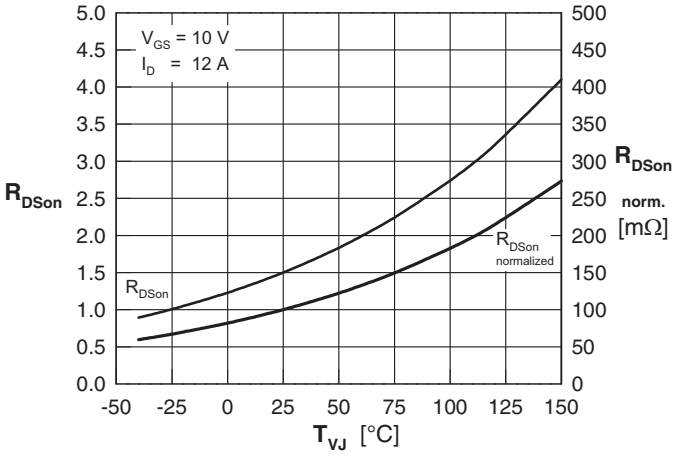


Fig. 5 Drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_{VJ}

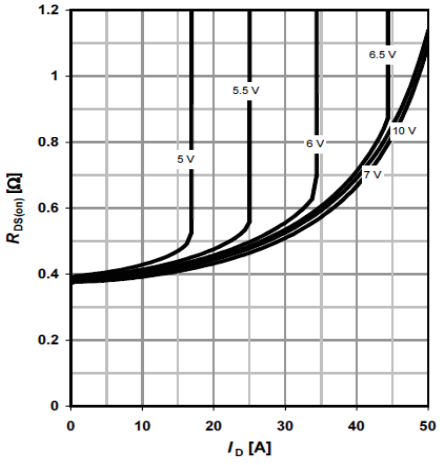


Fig. 6 Typ. drain source on-state resistance

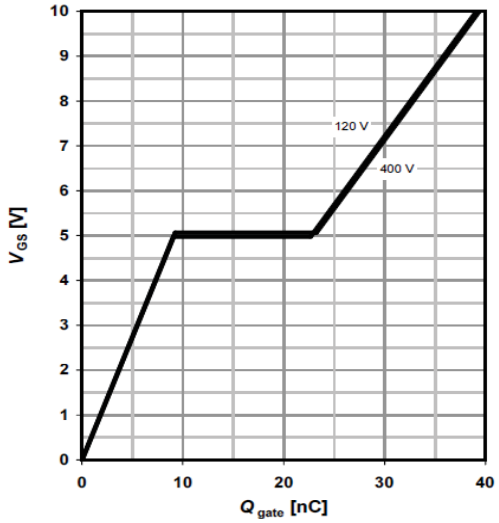


Fig. 7 Typ. turn-on gate charge

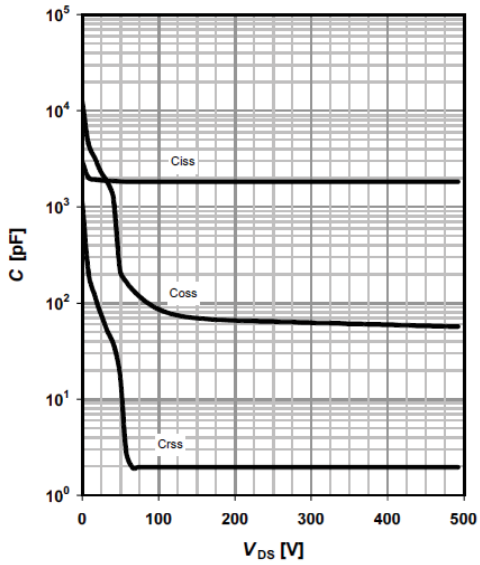


Fig. 8 Typ. capacitances

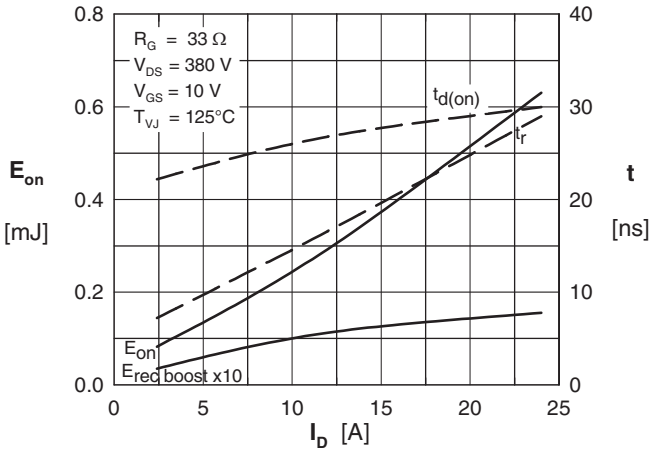


Fig. 9 Typ. turn-on energy and switching times vs. collector current, induktive switching

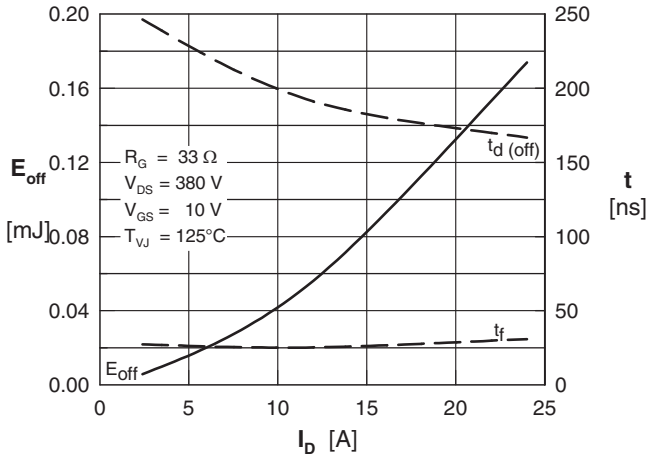


Fig. 10 Typ. turn-off energy and switching times vs. collector current, induktive switching

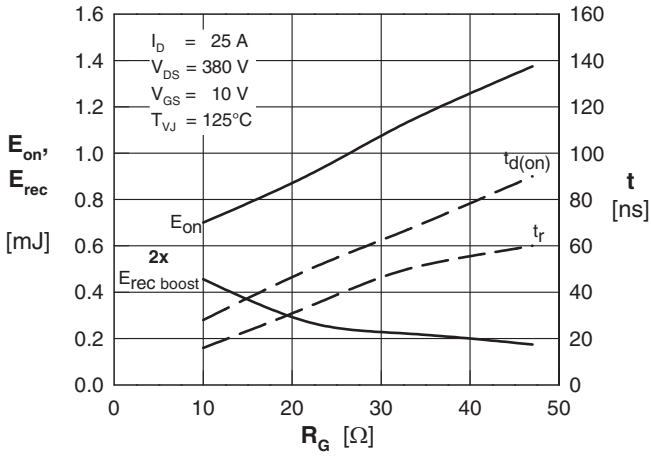


Fig. 11 Typ. turn-on energy and switching times versus gate resistor, induktive switching

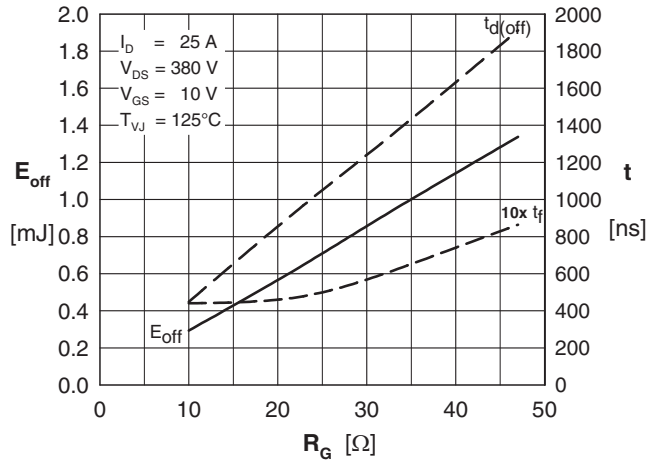


Fig. 12 Typ. turn-off energy and switching times versus gate resistor, induktive switching

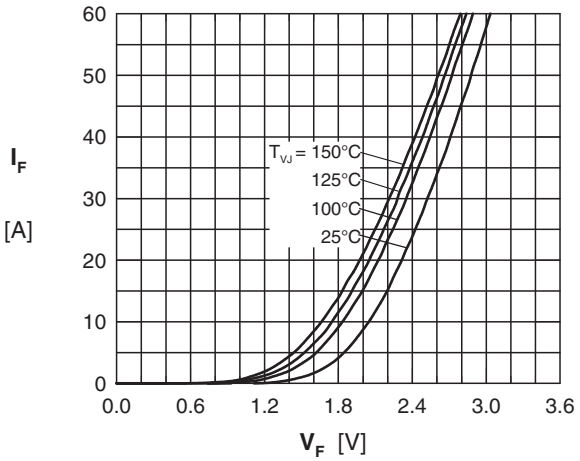


Fig. 13 Typ. forward characteristics boost diode

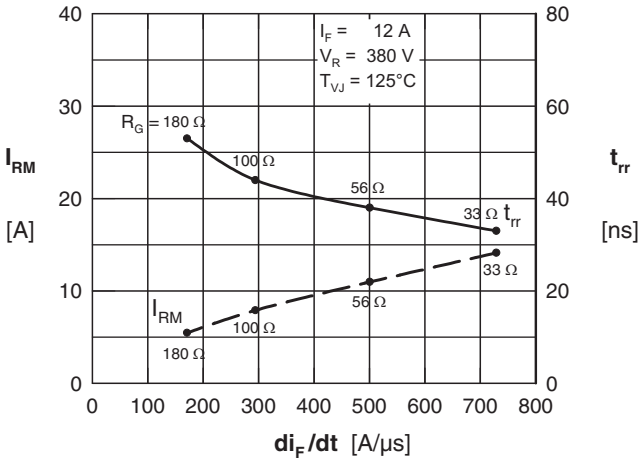


Fig. 14 Typ. reverse recovery characteristics of boost-diode

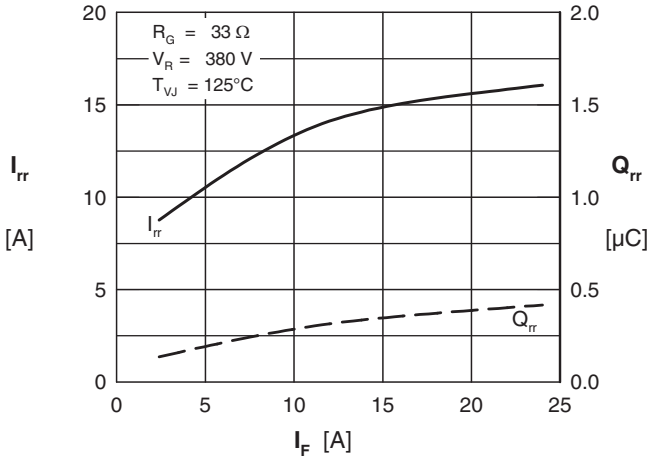


Fig. 15 Typ. reverse recovery characteristics

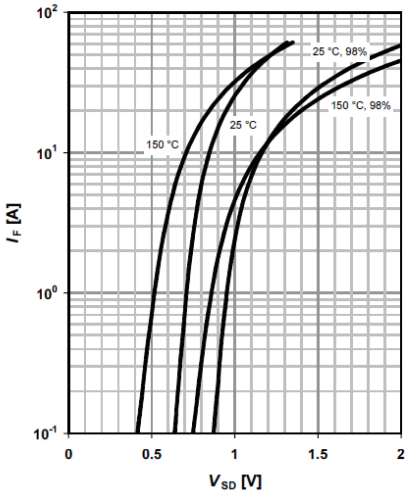


Fig. 16 Typ. forward characteristics of reverse diode

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