

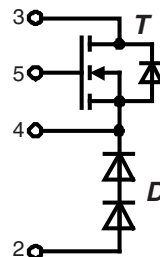
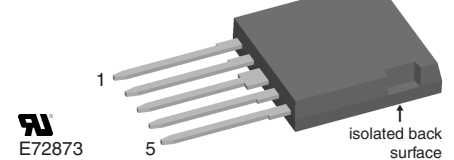
# CoolMOS™<sup>1)</sup> Power MOSFET with HiPerDyn™ FRED Buck and Boost Topologies

$$I_{D25} = 15 \text{ A}$$

$$V_{DSS} = 600 \text{ V}$$

$$R_{DS(on) \text{ max}} = 0.165 \Omega$$

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


**ISOPLUS i4™**


## Preliminary data

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

## Features

- Silicon chip on Direct-Copper-Bond substrate
  - high power dissipation
  - isolated mounting surface
  - 2500 V electrical isolation
  - low drain to tab capacitance ( $< 40 \text{ pF}$ )
- Fast CoolMOS™<sup>1)</sup> power MOSFET 4<sup>th</sup> 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

Symbol	Conditions	Characteristic Values			
		$(T_{VJ} = 25^\circ\text{C}, \text{ unless otherwise specified})$			
		min.	typ.	max.	
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}; I_D = 12 \text{ A}$		150	165	m $\Omega$
$V_{GS(th)}$	$V_{DS} = V_{GS}; I_D = 0.79 \text{ mA}$	2.5	3	3.5	V
$I_{DSS}$	$V_{DS} = 600 \text{ V}; V_{GS} = 0 \text{ V}$				
				1	$\mu\text{A}$
			10		$\mu\text{A}$
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}; V_{DS} = 0 \text{ V}$			100	nA
$C_{iss}$	$V_{GS} = 0 \text{ V}; V_{DS} = 100 \text{ V}$ $f = 1 \text{ MHz}$		2000		pF
$C_{oss}$				100	
$Q_g$	$V_{GS} = 0 \text{ to } 10 \text{ V}; V_{DS} = 400 \text{ V}; I_D = 12 \text{ A}$		40	52	nC
$Q_{gs}$			9		nC
$Q_{gd}$			13		nC
$t_{d(on)}$	$V_{GS} = 10 \text{ V}; V_{DS} = 400 \text{ V}$ $I_D = 12 \text{ A}; R_G = 3.3 \Omega$		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
$R_{thJC}$	with heat transfer paste			1.1	K/W
$R_{thCH}$			0.35		K/W

## 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

<sup>1)</sup> CoolMOS™ is a trademark of Infineon Technologies AG.

**MOSFET T Source-Drain Diode**

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

**Diode D (data for series connection)**

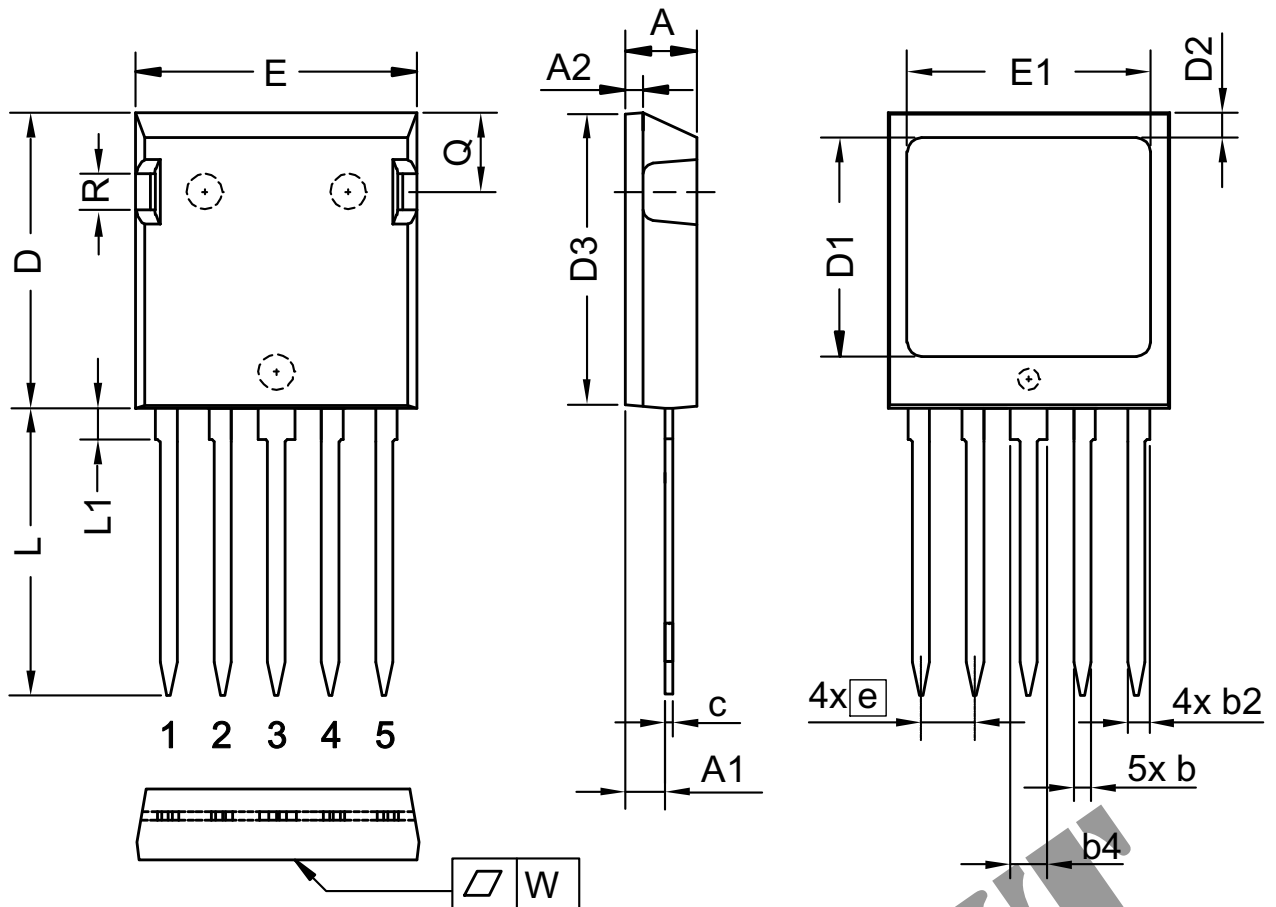
Symbol	Conditions	Maximum Ratings	
$V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	600	V
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	15	A
$I_{F90}$	$T_C = 90^{\circ}\text{C}$	8	A

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

**Component**

Symbol	Conditions	Maximum Ratings	
$T_{VJ}$	operating	-55...+150	$^{\circ}\text{C}$
$T_{stg}$	storage	-55...+125	$^{\circ}\text{C}$
$V_{ISOL}$	$I_{ISOL} < 1\text{ mA}; 50/60\text{ Hz}$	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*

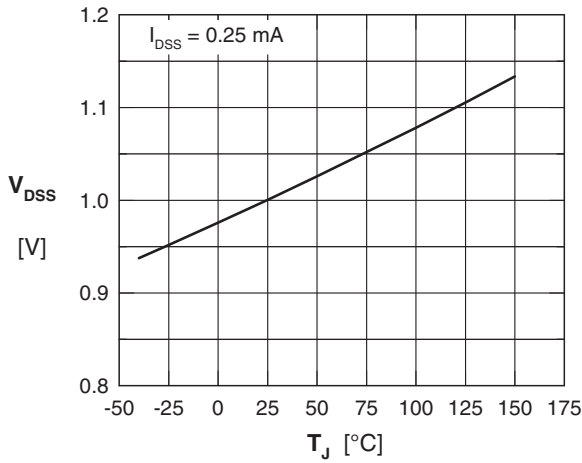


Fig. 1 Drain source breakdown voltage  $V_{DSS}$  vs. junction temperature  $T_{VJ}$

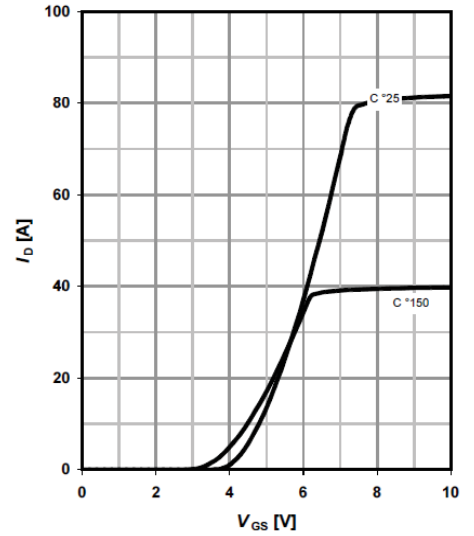


Fig.2 Typ. transfer characteristics

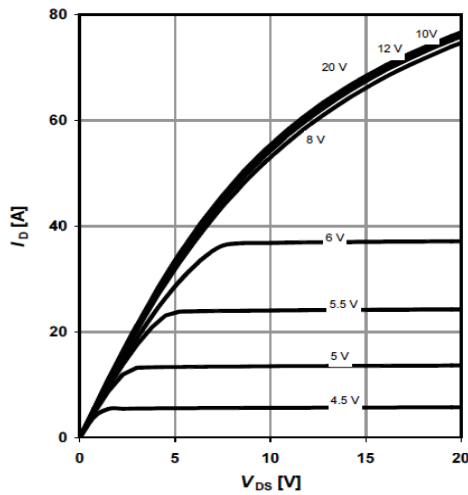


Fig. 3 Typical output characteristics (25°C)

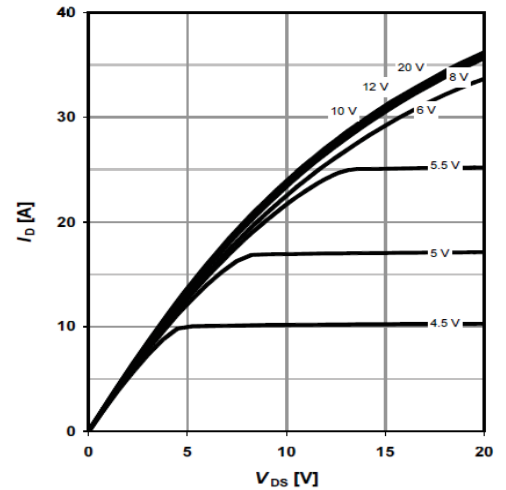


Fig. 4 Typical output characteristics (150°C)

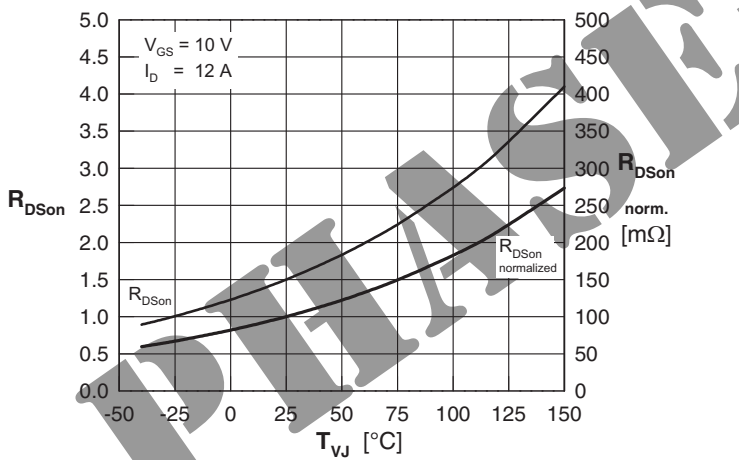


Fig. 5 Drain source on-state resistance  $R_{DS(on)}$  versus junction temperature  $T_{VJ}$

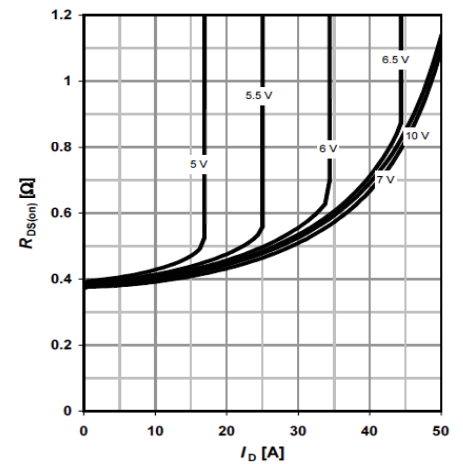


Fig. 6 Typ. drain source on-state resistance

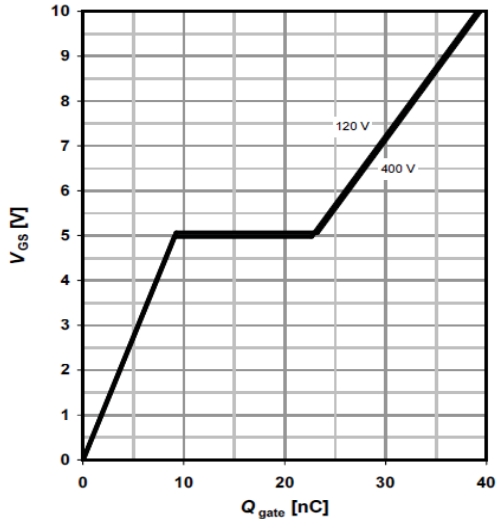


Fig. 7 Typ. turn-on gate charge

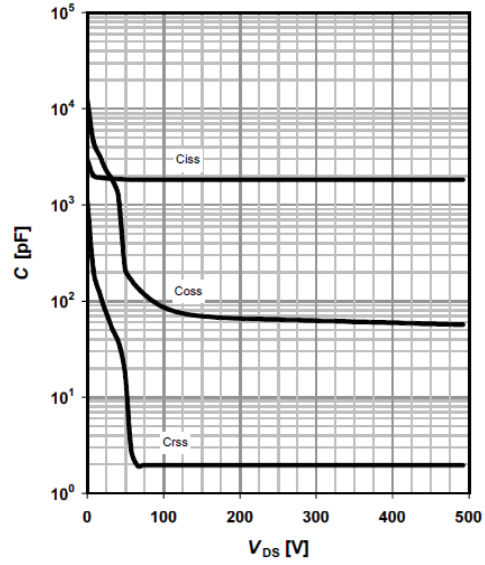


Fig. 8 Typ. capacitances

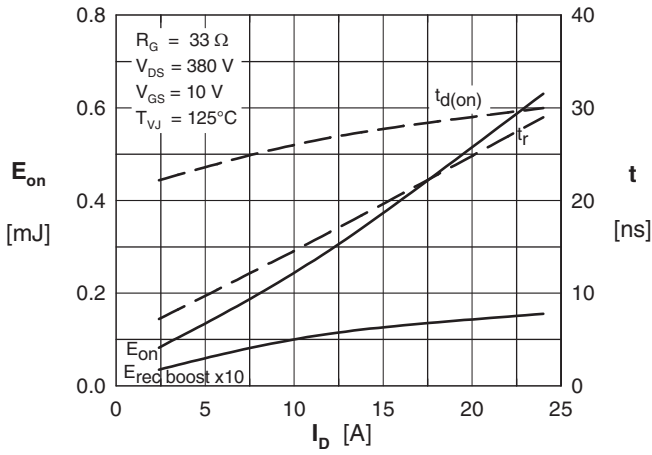


Fig. 9 Typ. turn-on energy and switching times vs. collector current, inductive switching

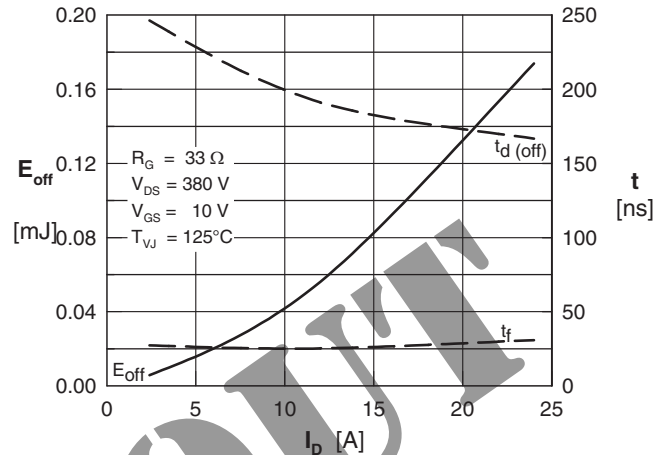


Fig. 10 Typ. turn-off energy and switching times vs. collector current, inductive switching

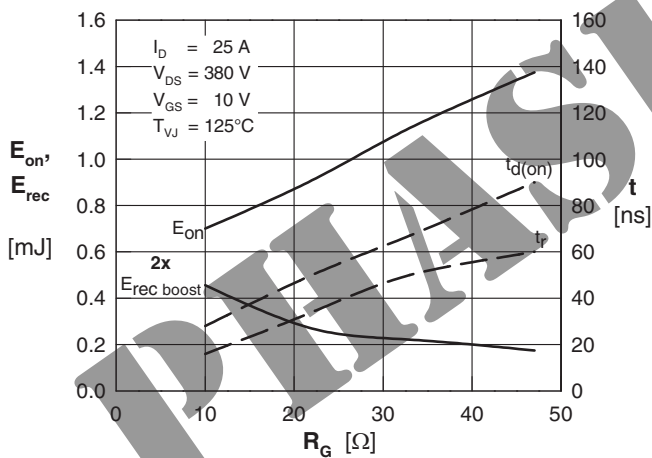


Fig. 11 Typ. turn-on energy and switching times versus gate resistor, inductive switching

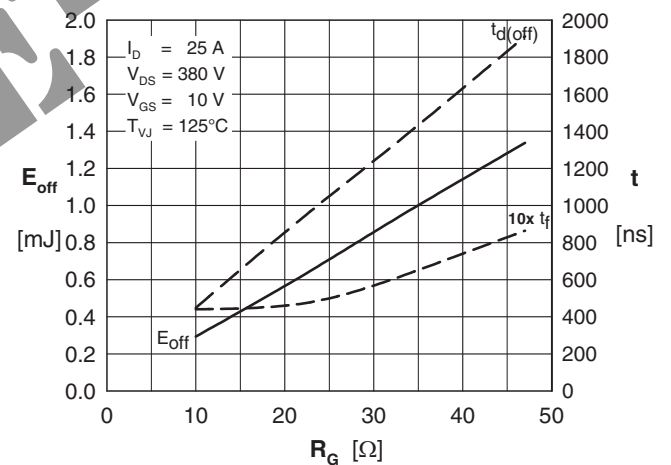


Fig. 12 Typ. turn-off energy and switching times versus gate resistor, inductive switching

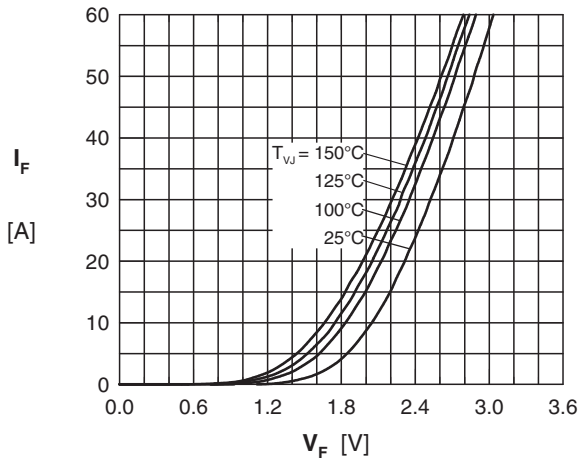


Fig. 13 Typ. forward characteristics boost diode

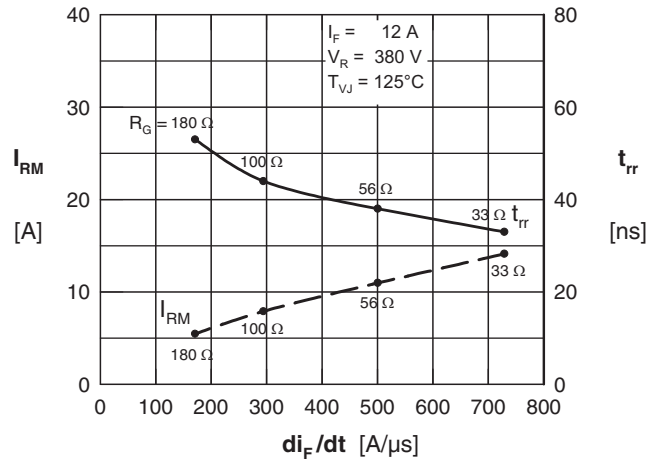


Fig. 14 Typ. reverse recovery characteristics of boost-diode

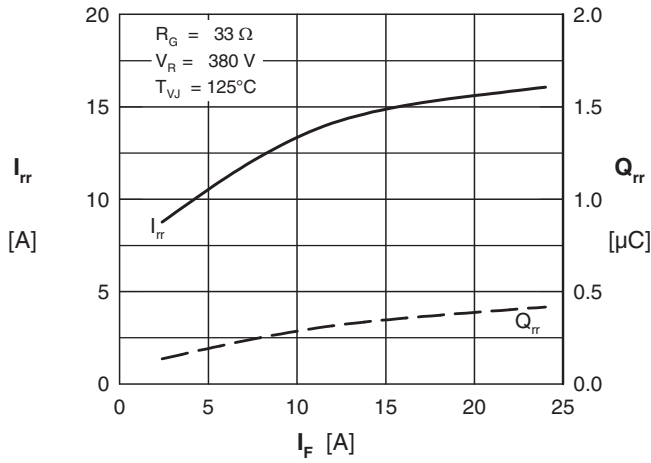


Fig. 15 Typ. reverse recovery characteristics

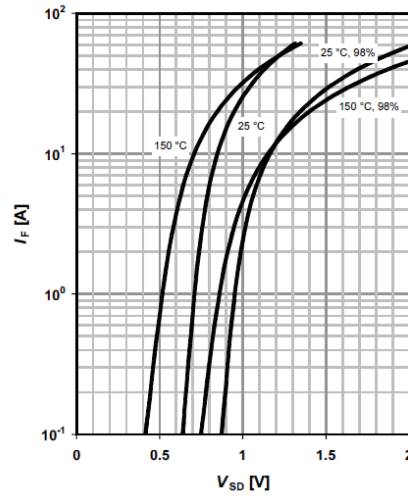


Fig. 16 Typ. forward characteristics of reverse diode

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