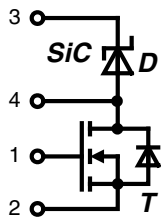
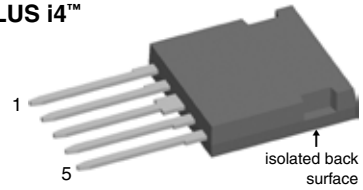
CoolMOS™ [1] Power MOSFET
with SiC Diode
Boost topology

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

Electrically isolated back surface
2500 V electrical isolation



ISOPLUS i4™



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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
$t_{d(on)}$	Inductive switching	T_{VJ} = 125°C		12		ns
t_r	V_{GS} = 0/10 V; V_{DS} = 380 V			6		ns
$t_{d(off)}$	I_D = 12 A; R_G = 10 Ω			75		ns
t_f				4		ns
E_{on}				0.09		mJ
E_{off}				0.01		mJ
$E_{rec\ off}$	no reverse recovery current due to absence of minority carrier injection					mJ
R_{thJC}					1.1	K/W
R_{thJH}	with heat transfer paste (IXYS test setup)			1.35		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
- SiC Boost Diode
  - no reverse recovery current

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

SiC Boost Diode D

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	9.5	A

Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	I_F = 8 A	T_{VJ} = 25°C		1.5	1.7	V
	I_F = 8 A	T_{VJ} = 150°C			1.9	A
I_R	V_R = V_{RRM}	T_{VJ} = 25°C		1	100	µA
		T_{VJ} = 150°C		10		µA
I_{FSM}	t = 10 ms (50 Hz), sine;	T_{VJ} = 25°C			59	A
Q_C	I_F = I_{Fmax}; V_R = 400 V; di/dt = 200 A/µs [1]	T_{VJ} = 150°C		19		nC
t_C					10	ns
R_{thJC}	with heat transfer paste (IXYS test setup)				3.1	K/W
R_{thJH}				4.0		K/W

[1] t_C is the time constant for the capacitive displacement current waveform (independent from T_J, I_{LOAD} and di/dt), different from t_{rr} which is dependent on T_J, I_{LOAD} and di/dt.
No reverse recovery time constant trr due to absence of minority carrier injection

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

IXYS reserves the right to change limits, test conditions and dimensions.

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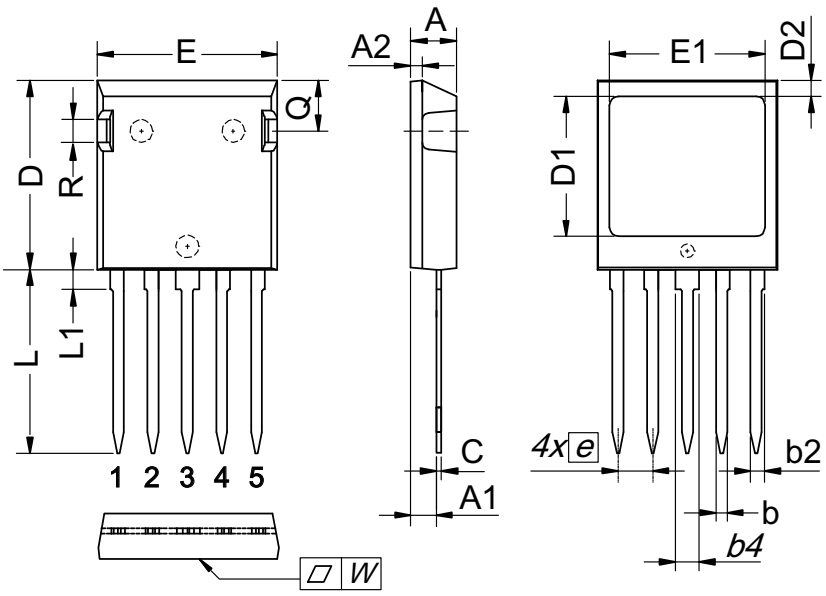
ISOPLUS i4™ Outline



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
E	19.56	20.29	0.770	0.799
E1	16.76	17.53	0.660	0.690
e	3.81 BSC		0.15 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 convexbow of substrate is typ. < 0.05 mm over plastic surface level ofdevice bottom side

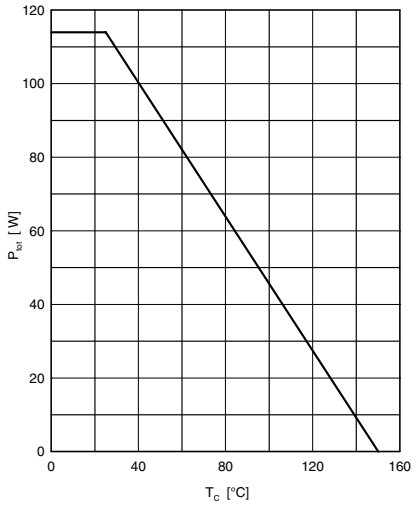


Fig. 1 Power dissipation

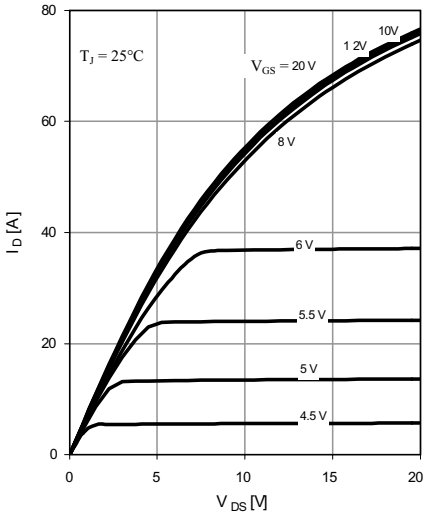


Fig. 2 Typ. output characteristics

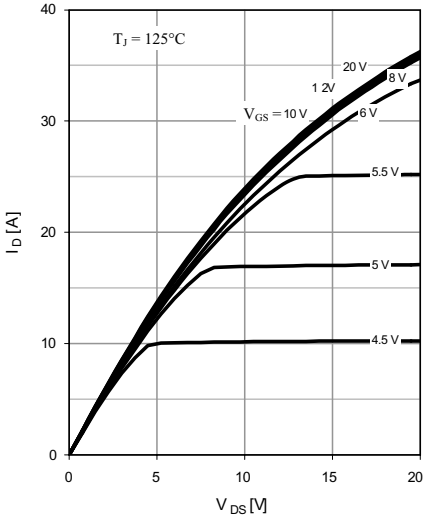


Fig. 3 Typ. output characteristics

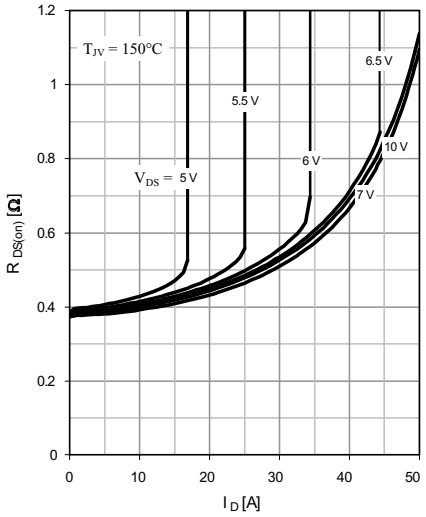


Fig. 4 Typ. drain-source on-state resistance

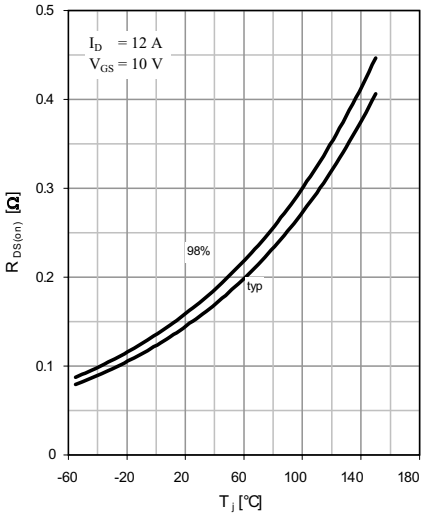


Fig. 5 Drain-source on-state resistance

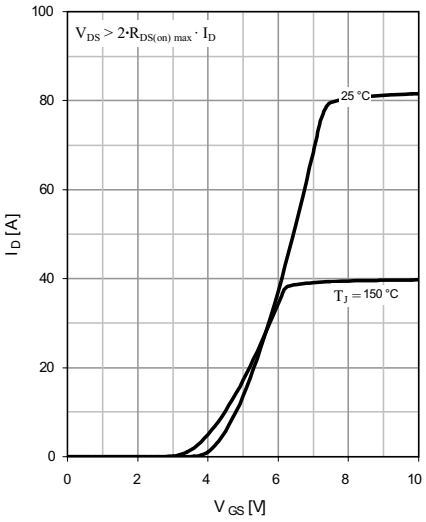


Fig. 6 Typ. transfer characteristics

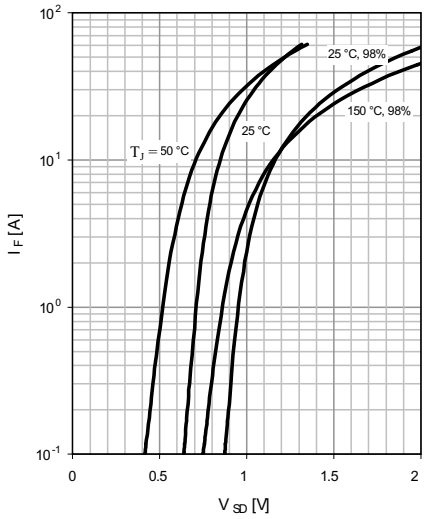


Fig. 7 Forward characteristic of reverse diode

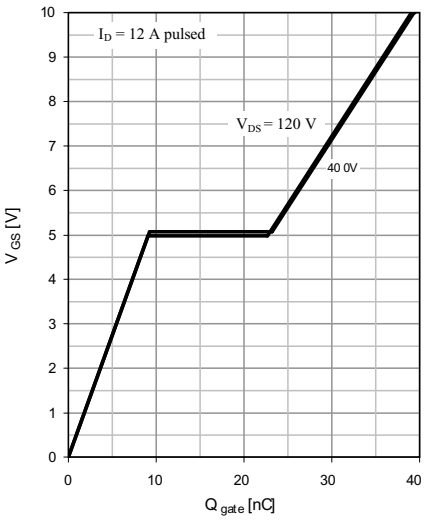


Fig. 8 Typ. gate charge

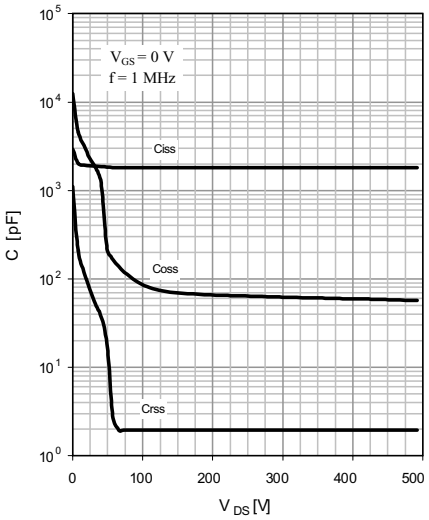


Fig. 9 Typ. capacitances

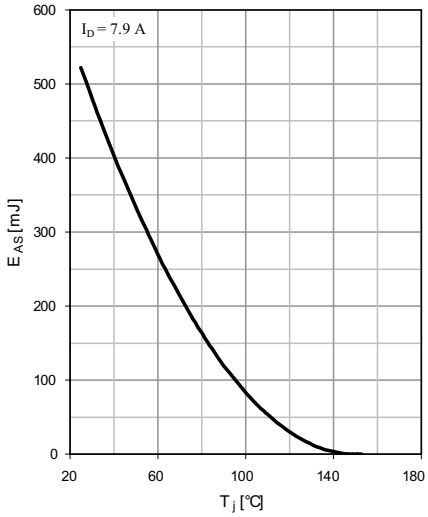


Fig. 10 Avalanche energy

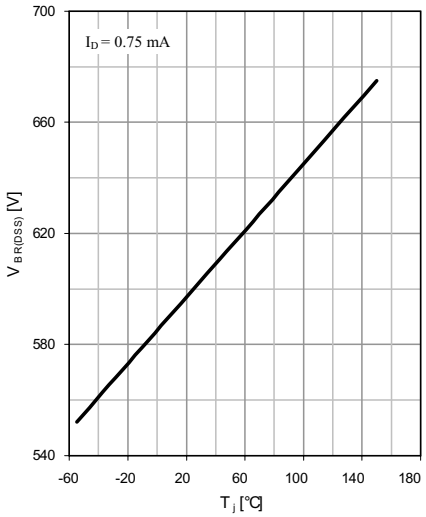


Fig. 11 Drain-source breakdown voltage

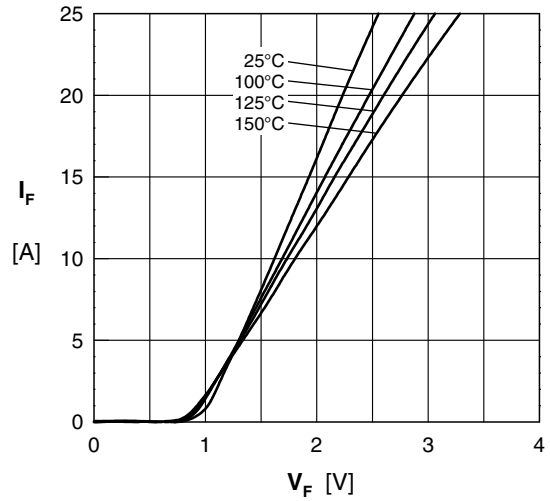


Fig. 12 Forward characteristic of boost diode

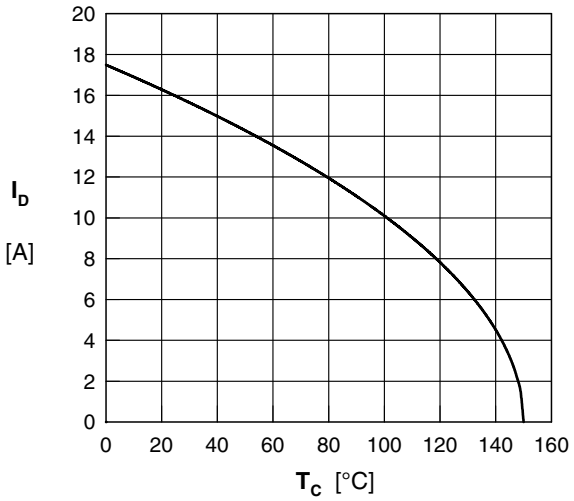


Fig. 13 Drain current I_D versus case temperature T_C

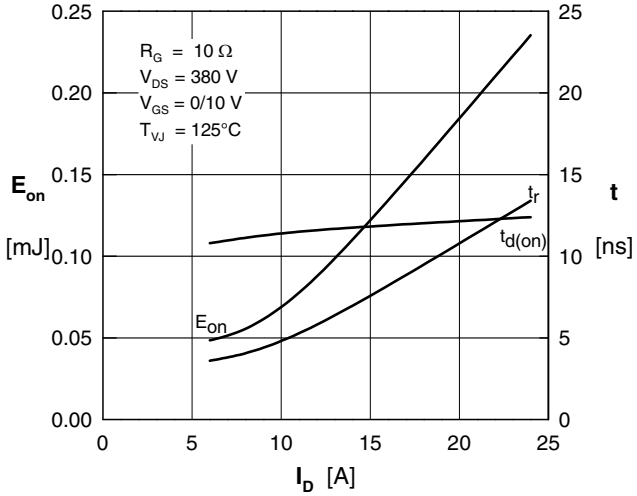


Fig. 14 Typ. turn-on energy and switching times versus drain current, inductive switching

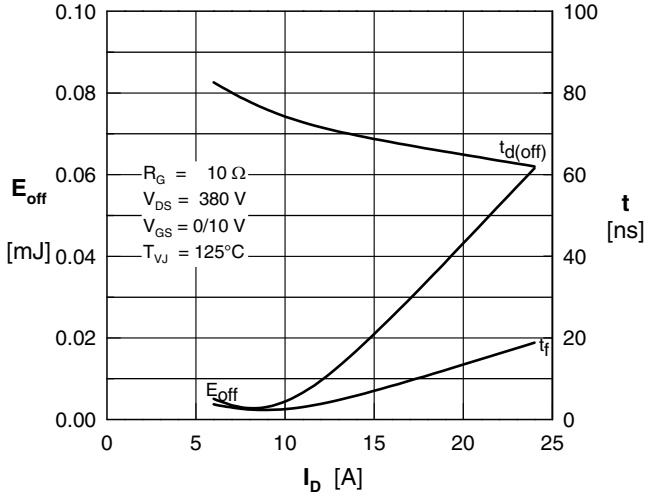


Fig. 15 Typ. turn-off energy and switching times versus drain current, inductive switching

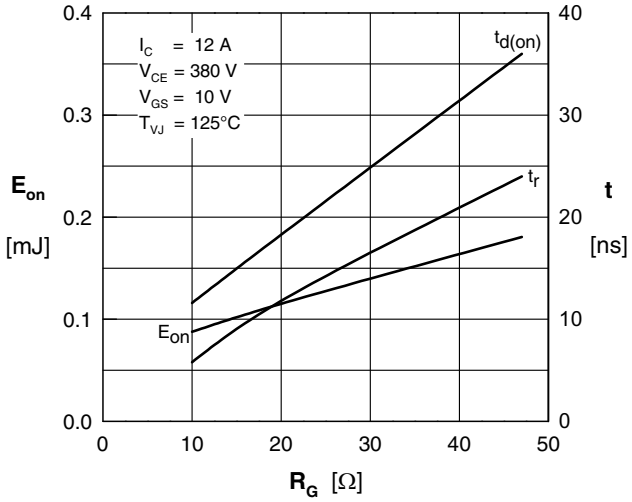


Fig. 16 Typ. turn-on energy and switching times versus gate resistor, inductive switching

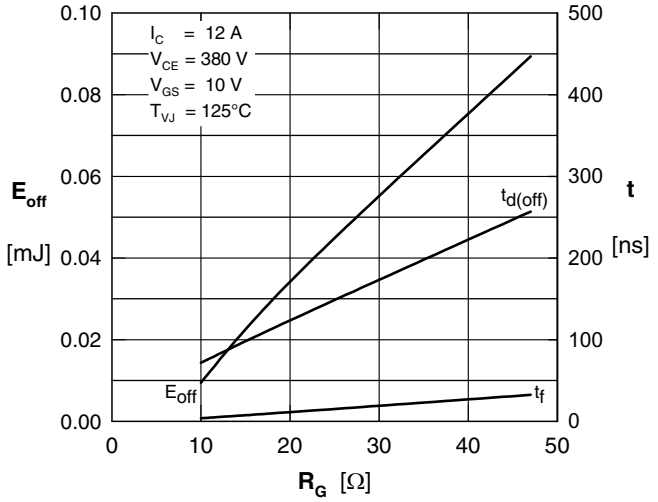


Fig. 17 Typ. turn-off energy and switching times versus gate resistor, inductive switching

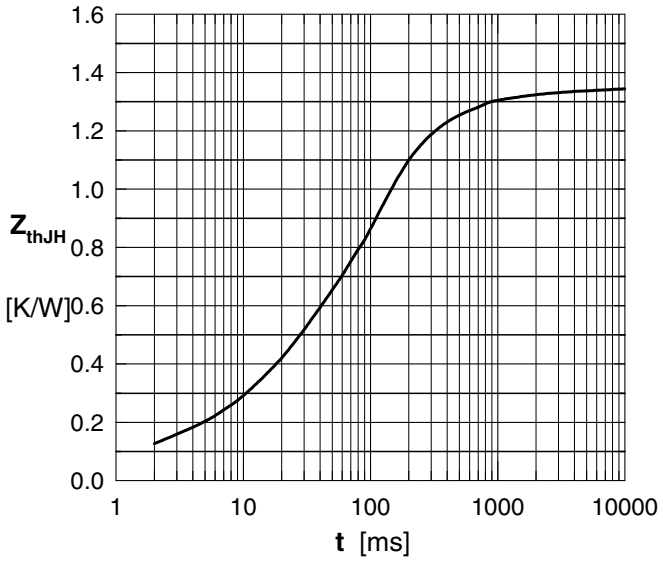


Fig. 18 Typ. transient thermal impedances of IGBT with heat transfer paste (IXYS test setup)

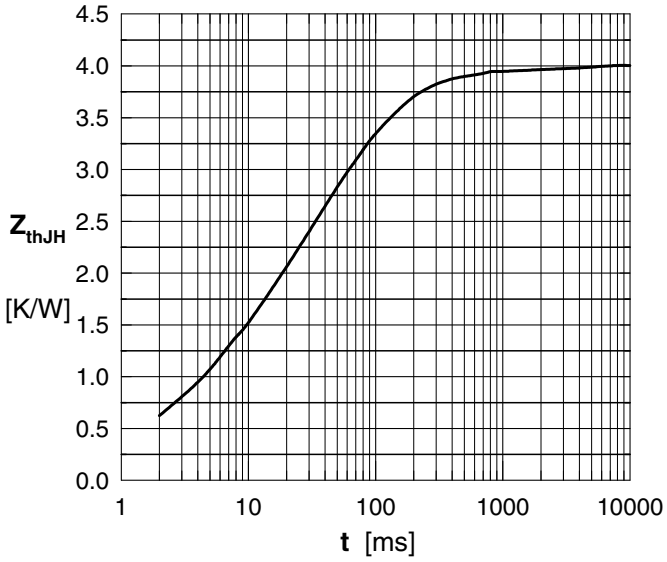


Fig. 19 Typ. transient thermal impedances of boost diode with heat transfer paste (IXYS test setup)

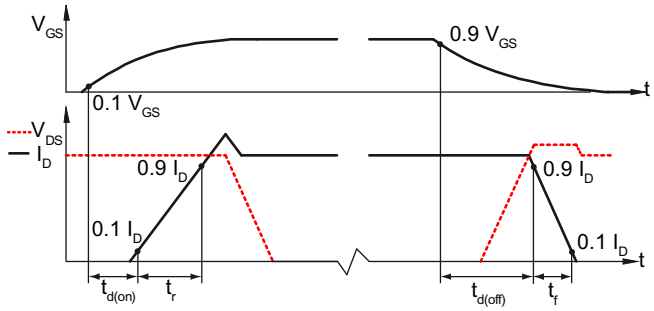


Fig. 20 Definition of switching times