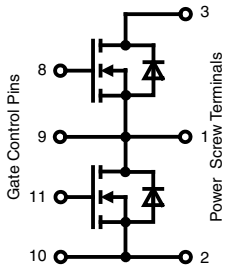
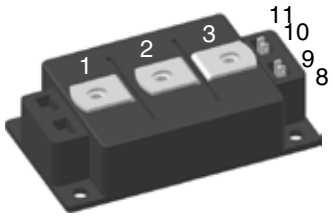
Dual Power MOSFET Module

V_{DSS} = 75 V
I_{D25} = 1560 A
$R_{DS(on)}$ = 0.38 mΩ

Phaseleg Configuration





MOSFET T1 + T2

Symbol	Conditions	Maximum Ratings	
V_{DSS}	T_{VJ} = 25°C to 150°C	75	V
V_{GS}		± 20	V
I_{D25}	T_C = 25°C ①	1560	A
I_{D80}	T_C = 80°C ①	1240	A
I_{F25}	T_C = 25°C (diode) ①	1560	A
I_{F80}	T_C = 80°C (diode) ①	1240	A

Symbol	Conditions (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
R_{DSon}	V_{GS} = 10 V; I_D = I_{D80}; on chip level			0.38	mΩ
$V_{GS(th)}$	V_{DS} = 20 V; I_D = 2.5 mA	2		4	V
I_{DSS}	V_{DS} = V_{DSS}; V_{GS} = 0 V T_{VJ} = 25°C			0.15	mA
	T_{VJ} = 125°C		1.5		mA
I_{GSS}	V_{GS} = ± 20 V; V_{DS} = 0 V			3.0	µA
C_{iss}	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz		115		nF
C_{oss}			12.8		nF
C_{rss}			1.38		nF
Q_g	V_{GS} = 10 V; V_{DS} = 37 V; I_D = 1200 A		1950		nC
Q_{gs}			580		nC
Q_{gd}			450		nC
$t_{d(on)}$	inductive load		260		ns
t_r	V_{GS} = 10 V; V_{DS} = 37 V		1680		ns
$t_{d(off)}$	I_D = 1200 A; R_G = 1.8 Ω T_{VJ} = 25°C		500		ns
t_f	R_G = $R_{G\ ext}$ + $R_{out\ driver}$		880		ns
E_{on}			3		mJ
E_{off}			54		mJ
E_{rec}			0.06		mJ
$t_{d(on)}$	inductive load		260		ns
t_r	V_{GS} = 10 V; V_{DS} = 37 V		1680		ns
$t_{d(off)}$	I_D = 1200 A; R_G = 1.8 Ω T_{VJ} = 125°C		520		ns
t_f	R_G = $R_{G\ ext}$ + $R_{out\ driver}$		720		ns
E_{on}			3.5		mJ
E_{off}			49		mJ
E_{rec}			0.08		mJ
R_{thJC}				0.08	K/W
R_{thJH}	with heat transfer paste (IXYS test setup)		0.094	0.13	K/W

① additional current limitation by external leads

Features

- Trench MOSFETs
  - low R_{DSon}
  - optimized 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 DCB ceramic base plate

Applications

- converters with high power density for
  - main and auxiliary AC drives of electric vehicles
  - 4 quadrant DC drives
  - power supplies with low input voltage, e.g. from fuel cells or solar cells

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Source Drain Diode

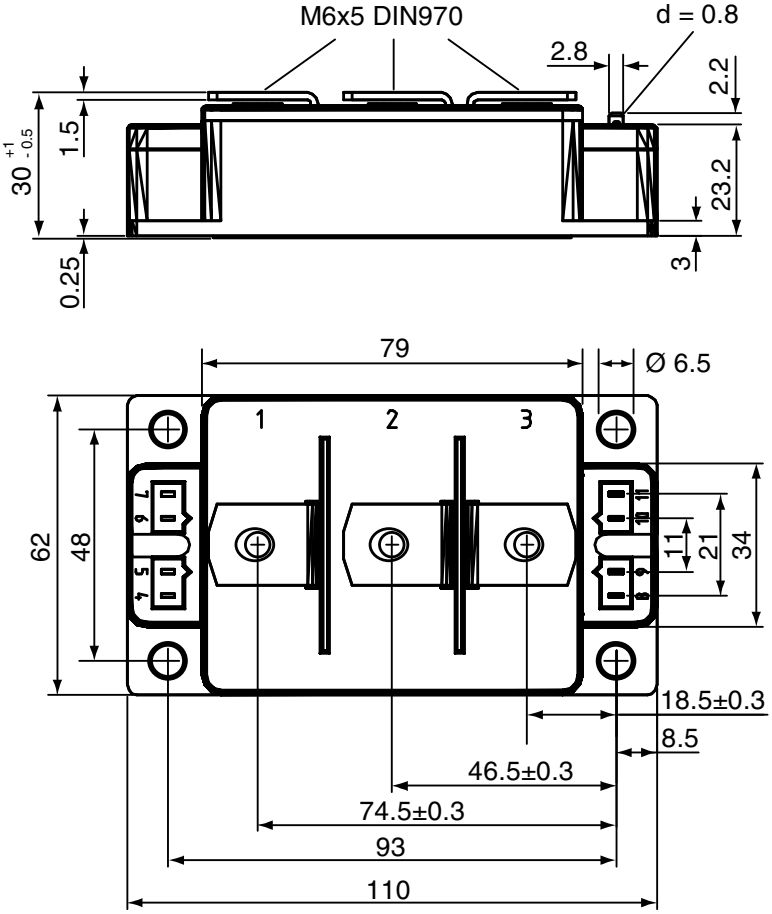
Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_{SD}	I_F = 1200 A; V_{GS} = 10 V;	T_{VJ} = 25°C		1.18		V
		T_{VJ} = 125°C		0.9		V
t_{rr}	V_{DS} = 37 V; I_F = 1200 A	T_{VJ} = 25°C		120		ns
Q_{rr}	di_F/dt = 800 A/µs			2.1		µC
I_{RM}				30		A
t_{rr}	V_{DS} = 50 V; I_F = 1000 A	T_{VJ} = 125°C		120		ns
Q_{rr}	di_F/dt = 760 A/µs			2.8		µC
I_{RM}				34		A

Module

Symbol	Conditions	Maximum Ratings	
I_{RMS}	per main terminal	500	A
T_{VJ}		-40...+175	°C
T_{stg}		-40...+125	°C
V_{ISOL}	$I_{ISOL} \leq$ 1 mA, 50/60 Hz	3600	V~
M_d	Mounting torque	2.25 - 2.75	Nm
	Terminal connection torque (M6)	4.5 - 5.5	Nm

	min.	Characteristic Values typ.	max.	
$R_{pin\ to\ chip}$ *)		0.06		mΩ
Weight		250		g

*) $V_{DS} = I_D \cdot (R_{DS(on)} + R_{pin\ to\ chip})$



Dimensions in mm (1 mm = 0.0394“)

Optional accessories for modules

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

- Type ZY180L with wire length 350mm
  - for pins 4 (yellow wire) and 5 (red wire)
  - for pins 11 (yellow wire) and 10 (red wire)
- Type ZY180R with wire length 350mm
  - for pins 7 (yellow wire) and 6 (red wire)
  - for pins 8 (yellow wire) and 9 (red wire)

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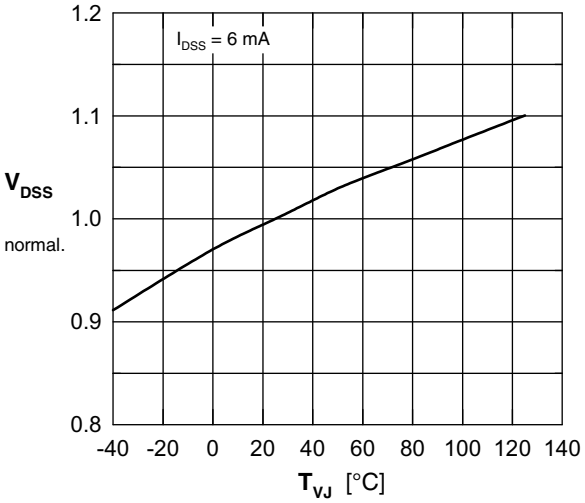

Fig. 1 Drain source breakdown voltage V_{DSS} versus junction temperature

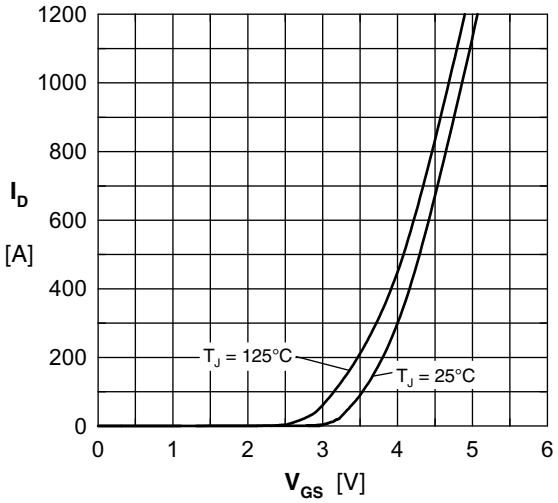

Fig. 2 Typical transfer characteristics

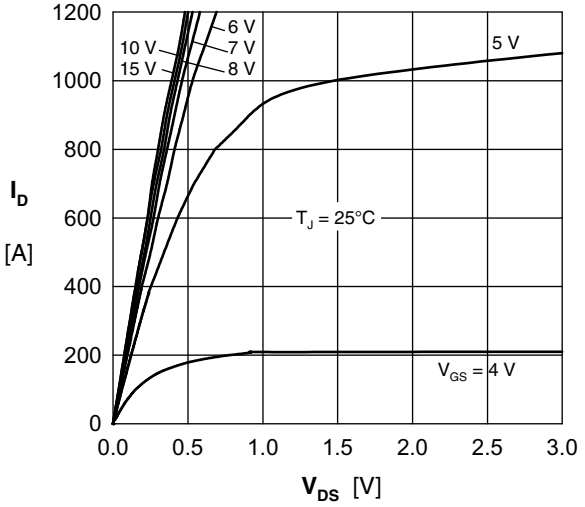

Fig. 3 Output characteristics at T_J = 25°C

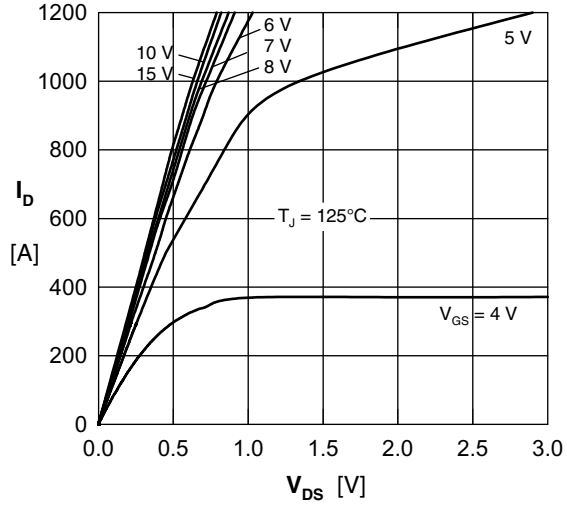

Fig. 4 Output characteristics at T_J = 125°C

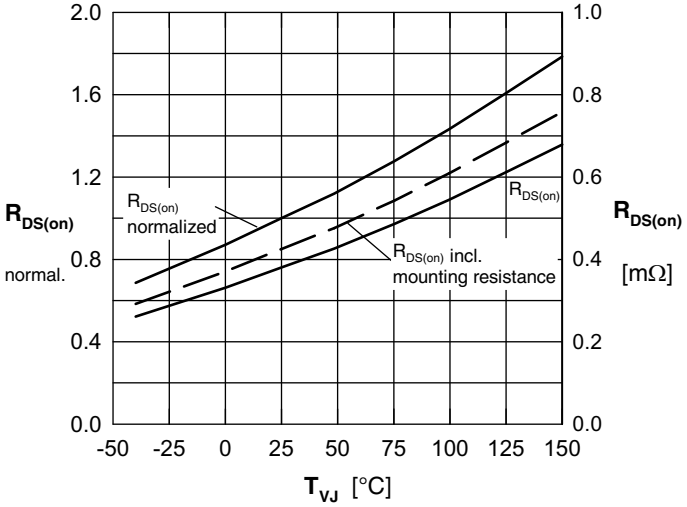

Fig. 5 $R_{DS(on)}$ normalized to I_D = 1150 A value vs. junction temperature

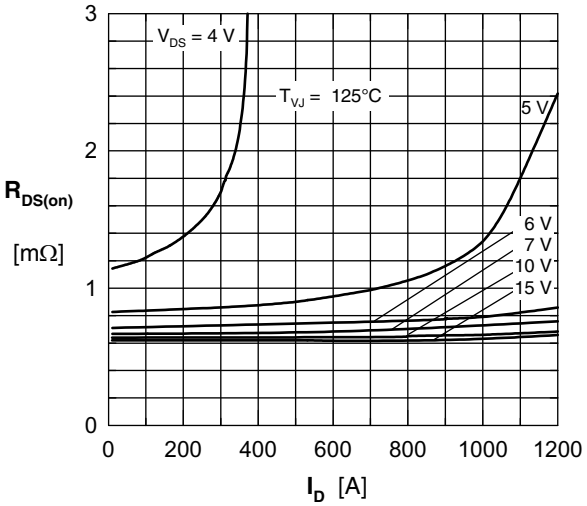

Fig. 6 Drain source on-state resistance versus I_D

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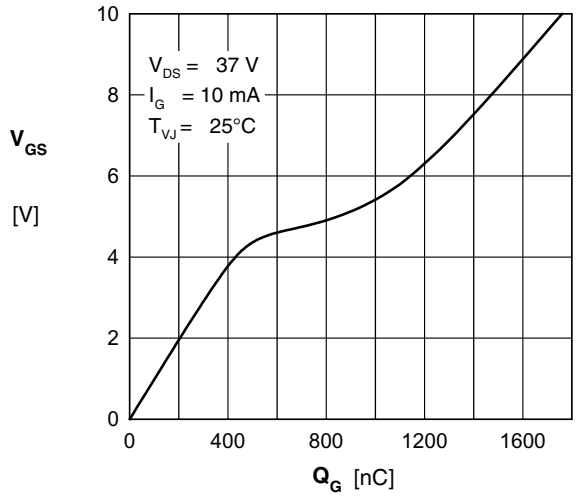

Fig. 7 Gate charge characteristics

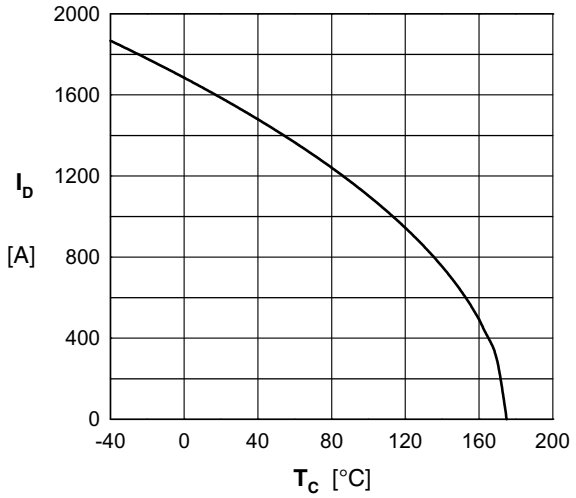

Fig. 8 Drain current I_D versus case temperature T_C

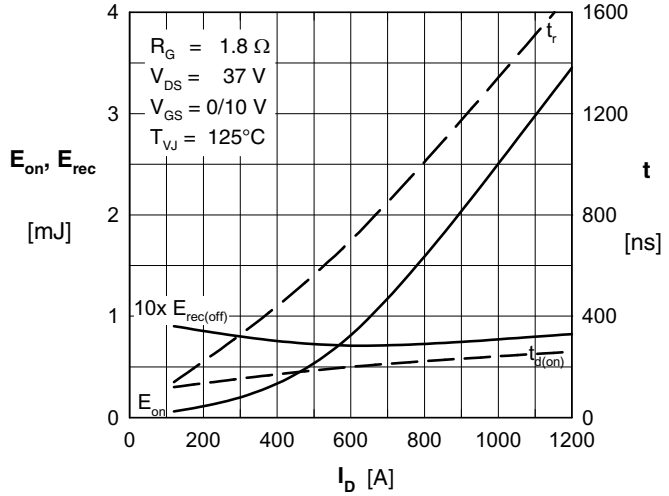

Fig. 9 Typ. turn-on energy and switching times versus drain current, inductive switching

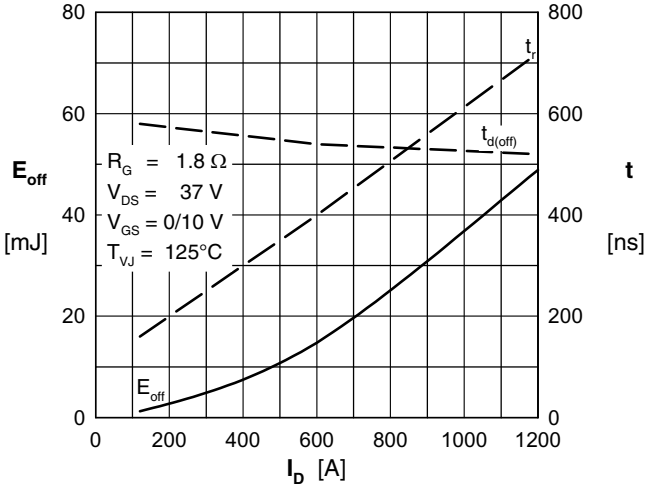

Fig. 10 Typ. turn-off energy and switching times versus drain current, inductive switching

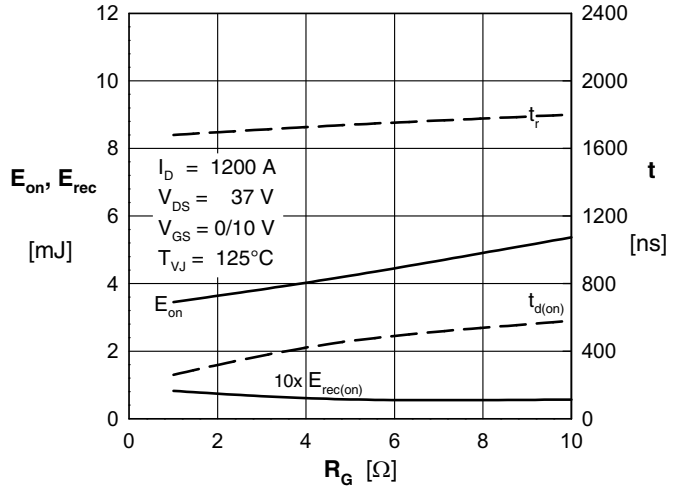

Fig. 11 Typ. turn-on energy and switching times versus gate resistor, inductive switching

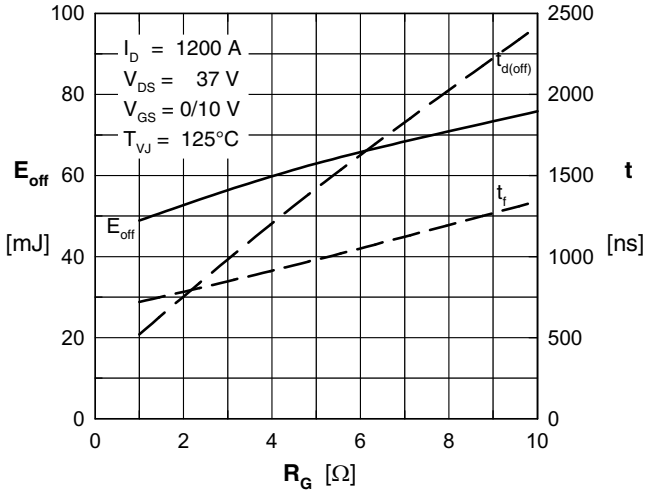

Fig. 12 Typ. turn-off energy and switching times versus gate resistor, inductive switching

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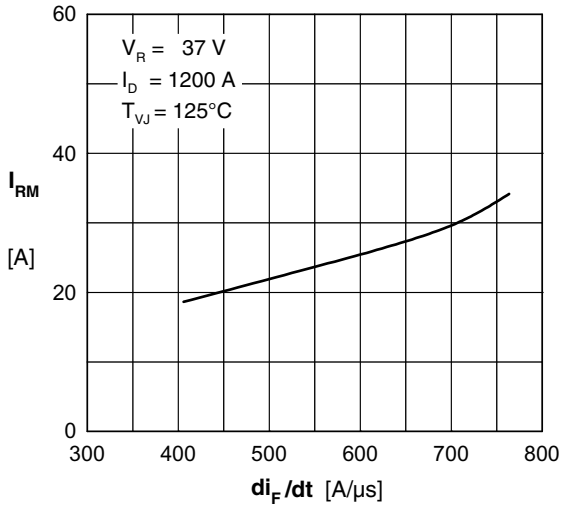

Fig. 13 Reverse recovery current I_{RM} of the body diode vs. di/dt

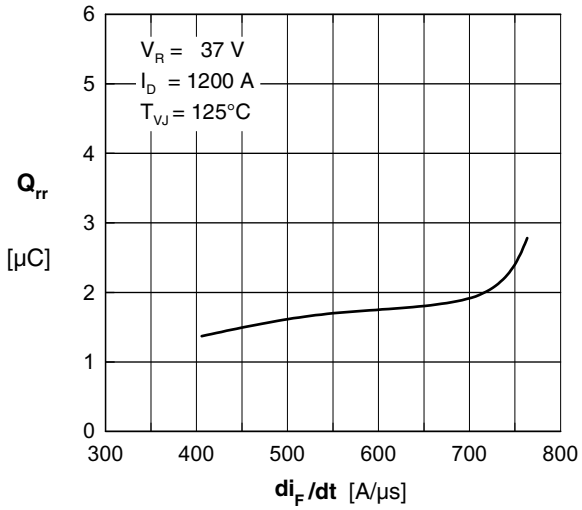

Fig. 14 Reverse recovery charge Q_{rr} of the body diode vs. di/dt

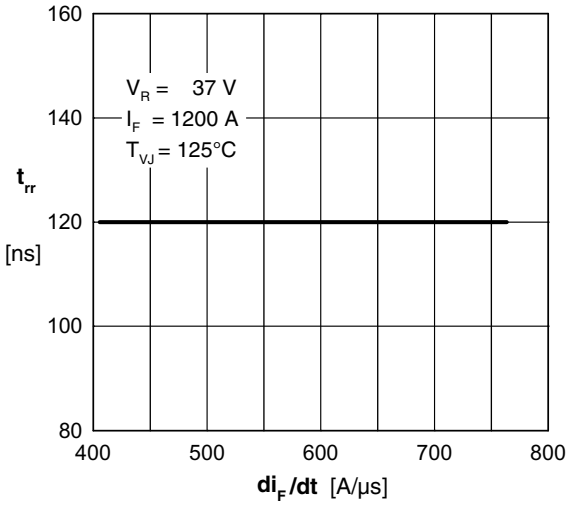

Fig. 15 Reverse recovery time t_{rr} of the body diode vs. di/dt

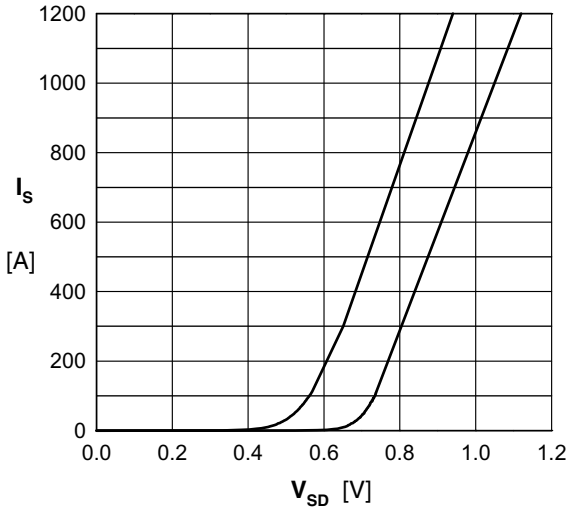

Fig. 16 Source current I_S vs. source drain voltage V_{SD} (body diode)

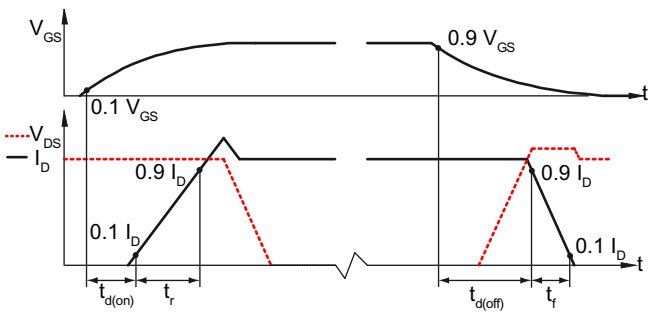

Fig. 17 Definition of switching times

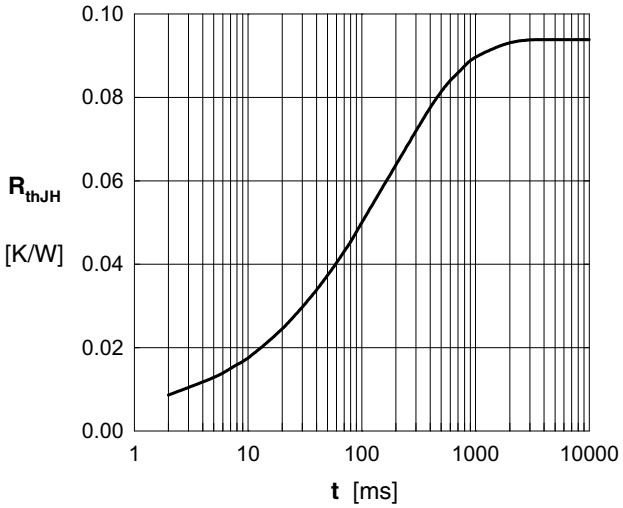

Fig. 18 Typ. transient thermal impedance

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