

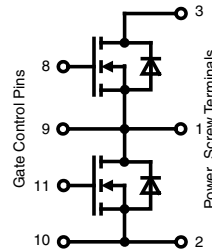
# Dual Power MOSFET Module

$$V_{DSS} = 75 \text{ V}$$

$$I_{D25} = 1560 \text{ A}$$

$$R_{DS(on)} = 0.38 \text{ m}\Omega$$

## Phaseleg Configuration



MOSFET T1 + T2						
Symbol	Conditions	Maximum Ratings				
$V_{DSS}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}$	75	V			
$V_{GS}$		$\pm 20$	V			
$I_{D25}$	$T_C = 25^\circ\text{C}$ ①	1560	A			
$I_{D80}$	$T_C = 80^\circ\text{C}$ ①	1240	A			
$I_{F25}$	$T_C = 25^\circ\text{C}$ (diode) ①	1560	A			
$I_{F80}$	$T_C = 80^\circ\text{C}$ (diode) ①	1240	A			
Symbol	Conditions	Characteristic Values				
	$(T_{VJ} = 25^\circ\text{C}, \text{ unless otherwise specified})$	min.	typ.	max.		
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}; I_D = I_{D80}; \text{ on chip level}$			0.38	m $\Omega$	
$V_{GS(th)}$	$V_{DS} = 20 \text{ V}; I_D = 2.5 \text{ mA}$	2		4	V	
$I_{DSS}$	$V_{DS} = V_{DSS}; V_{GS} = 0 \text{ V}$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		1.5	0.15	mA mA	
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}; V_{DS} = 0 \text{ V}$			3.0	$\mu\text{A}$	
$C_{iss}$	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}$		115		nF	
$C_{oss}$			12.8		nF	
$C_{rss}$			1.38		nF	
$Q_g$	$V_{GS} = 10 \text{ V}; V_{DS} = 37 \text{ V}; I_D = 1200 \text{ A}$		1950		nC	
$Q_{gs}$			580		nC	
$Q_{gd}$			450		nC	
$t_{d(on)}$	inductive load $V_{GS} = 10 \text{ V}; V_{DS} = 37 \text{ V}$ $I_D = 1200 \text{ A}; R_G = 1.8 \Omega$ $T_{VJ} = 25^\circ\text{C}$ $R_G = R_{G \text{ ext}} + R_{\text{out driver}}$		260		ns	
$t_r$			1680		ns	
$t_{d(off)}$			500		ns	
$t_f$			880		ns	
$E_{on}$			3		mJ	
$E_{off}$			54		mJ	
$E_{rec}$			0.06		mJ	
$t_{d(on)}$		inductive load $V_{GS} = 10 \text{ V}; V_{DS} = 37 \text{ V}$ $I_D = 1200 \text{ A}; R_G = 1.8 \Omega$ $T_{VJ} = 125^\circ\text{C}$ $R_G = R_{G \text{ ext}} + R_{\text{out driver}}$		260		ns
$t_r$				1680		ns
$t_{d(off)}$				520		ns
$t_f$			720		ns	
$E_{on}$			3.5		mJ	
$E_{off}$			49		mJ	
$E_{rec}$			0.08		mJ	
$R_{thJC}$	with heat transfer paste (IXYS test setup)		0.08		K/W	
$R_{thJH}$		0.094	0.13		K/W	

① additional current limitation by external leads

## Features

- Trench MOSFETs
  - low  $R_{DS(on)}$
  - 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

### Source Drain Diode

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

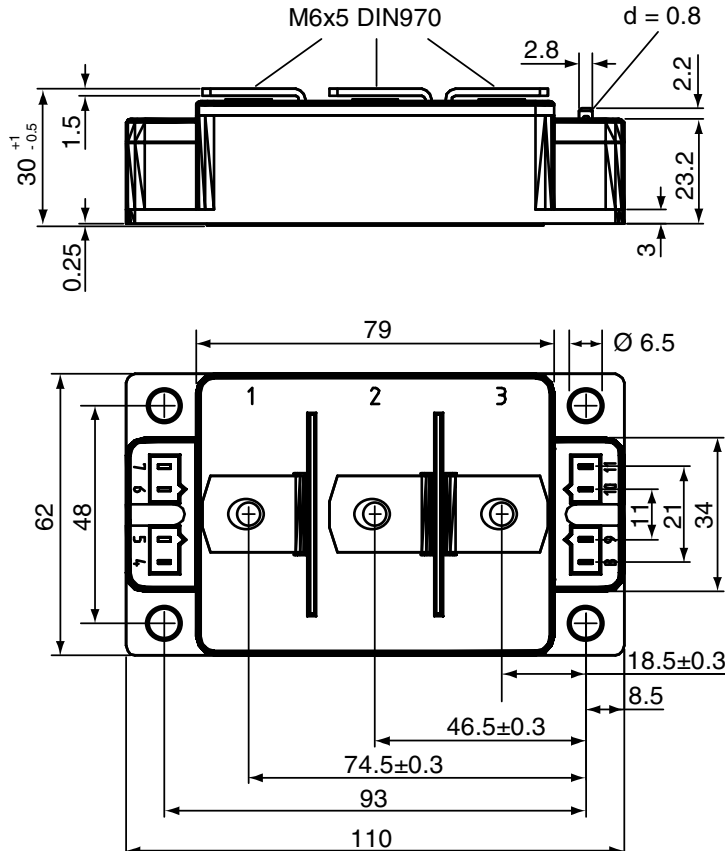
### Module

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

### Characteristic Values

	min.	typ.	max.	
$R_{pin\ to\ chip}^*)$		0.06		m $\Omega$
<b>Weight</b>		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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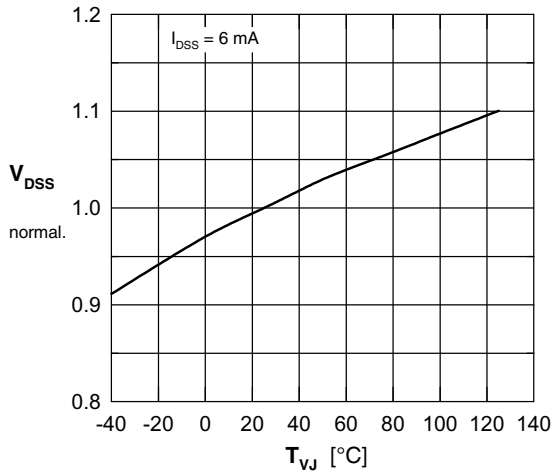


Fig. 1 Drain source breakdown voltage  $V_{DSS}$  versus junction temperature

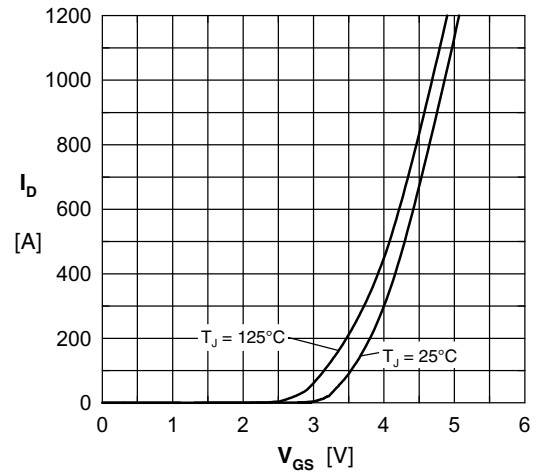


Fig. 2 Typical transfer characteristics

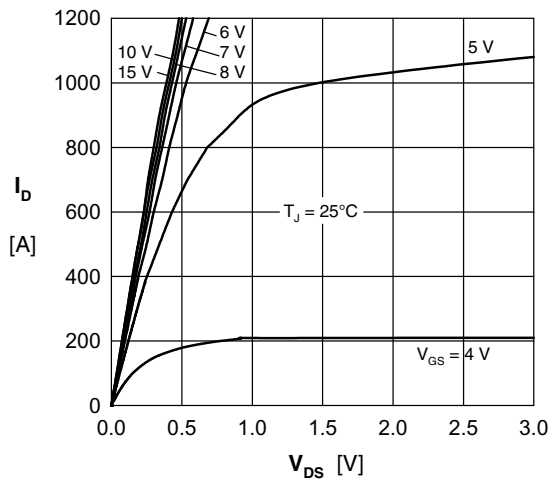


Fig. 3 Output characteristics at  $T_J = 25^\circ\text{C}$

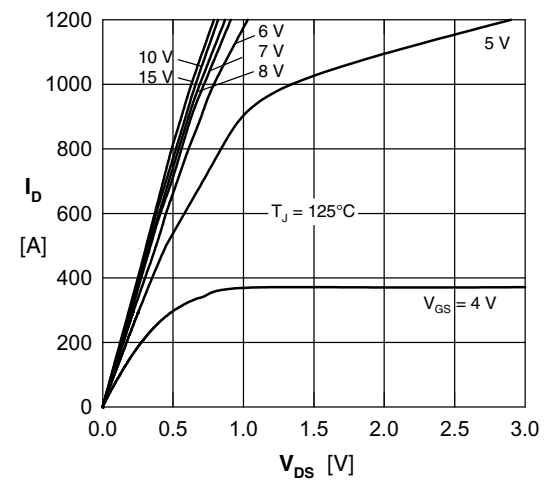


Fig. 4 Output characteristics at  $T_J = 125^\circ\text{C}$

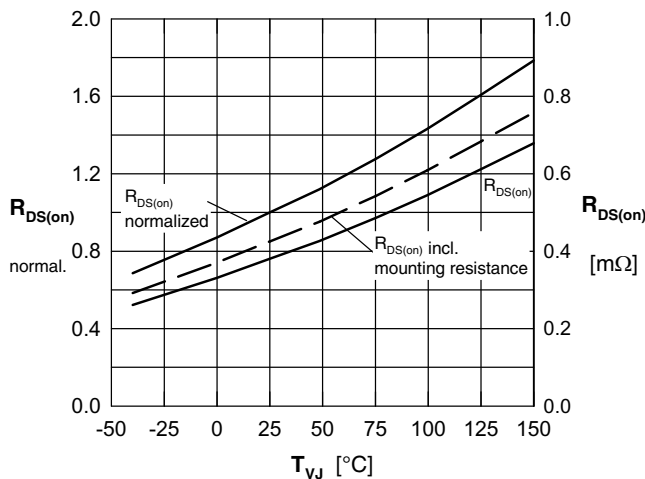


Fig. 5  $R_{DS(on)}$  normalized to  $I_D = 1150\text{ A}$  value vs. junction temperature

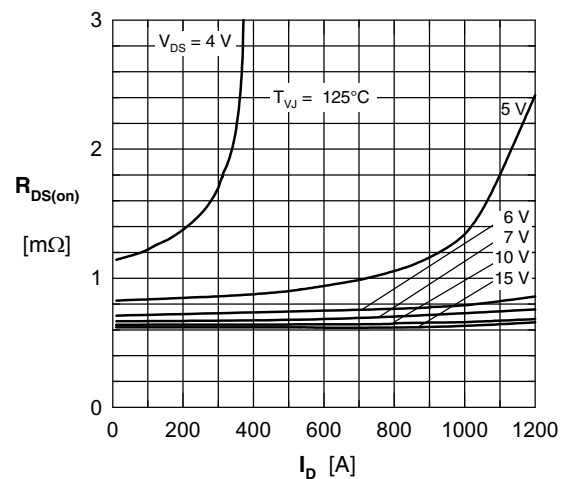


Fig. 6 Drain source on-state resistance versus  $I_D$

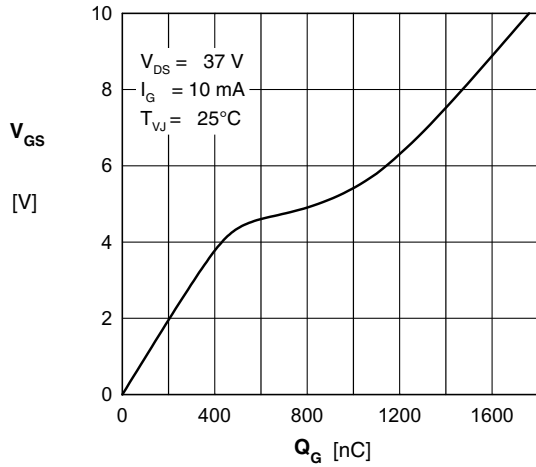


Fig. 7 Gate charge characteristics

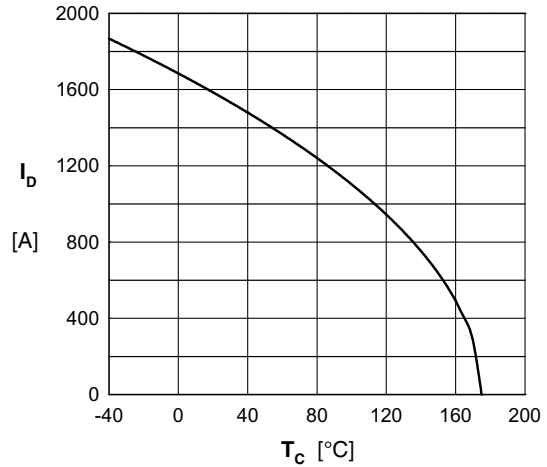
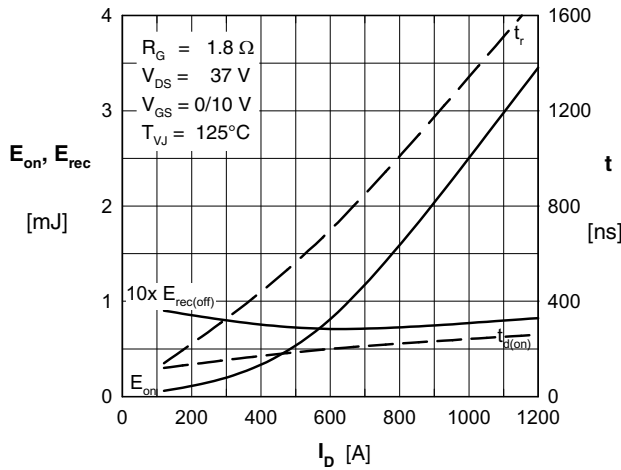

 Fig. 8 Drain current  $I_D$  versus case temperature  $T_C$ 


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

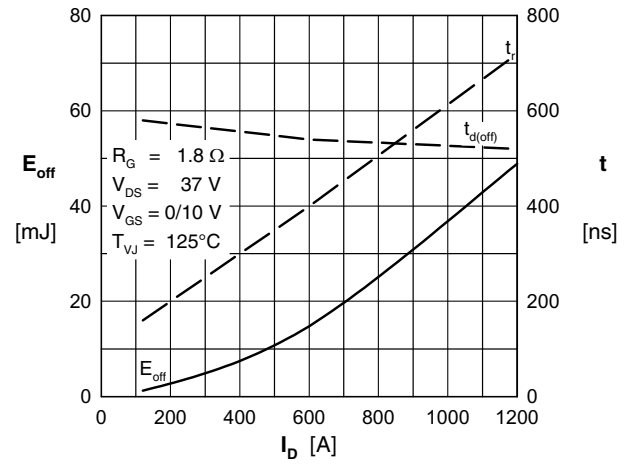


Fig. 10 Typ. turn-off energy and switching times versus drain current, inductive switching

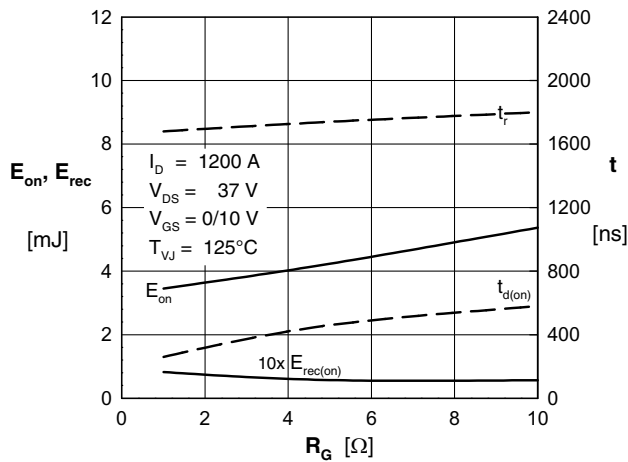


Fig. 11 Typ. turn-on energy and switching times versus gate resistor, inductive switching

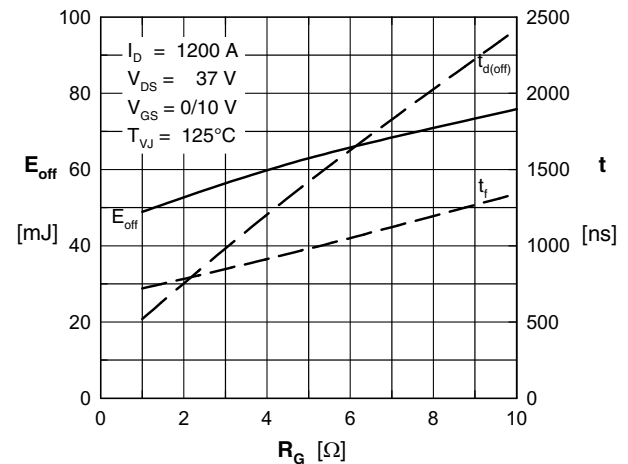


Fig. 12 Typ. turn-off energy and switching times versus gate resistor, inductive switching

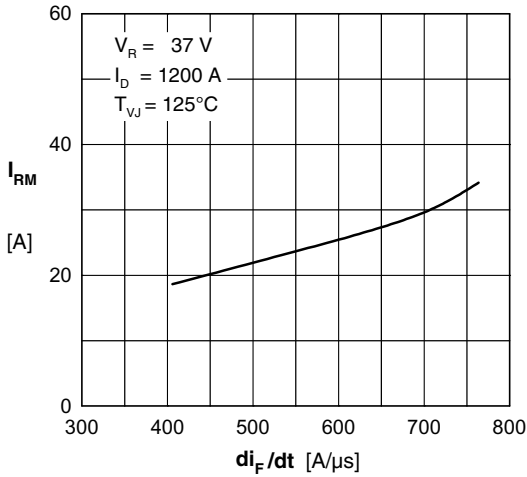


Fig. 13 Reverse recovery current  $I_{RM}$  of the body diode vs.  $di/dt$

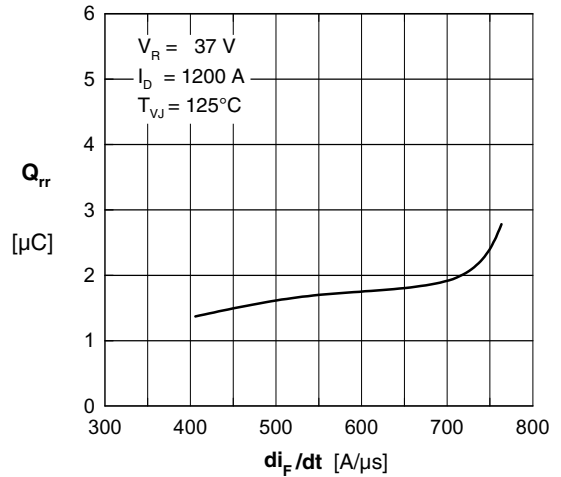


Fig. 14 Reverse recovery charge  $Q_{rr}$  of the body diode vs.  $di/dt$

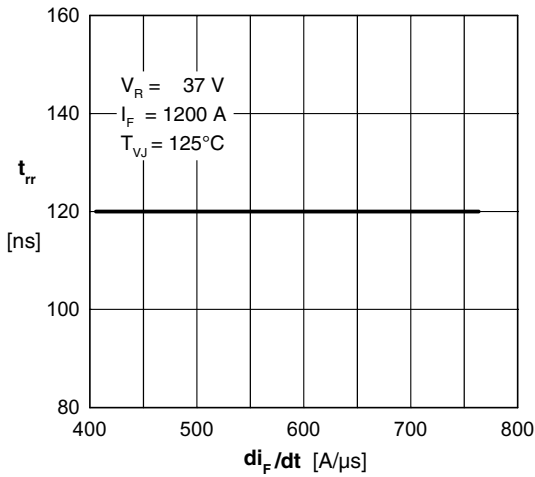


Fig. 15 Reverse recovery time  $t_{rr}$  of the body diode vs.  $di/dt$

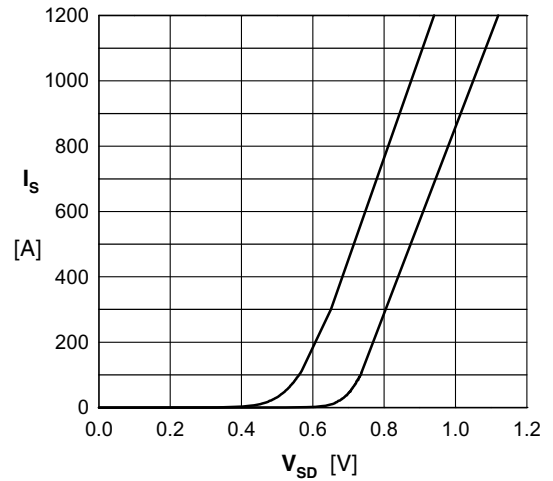


Fig. 16 Source current  $I_S$  vs. source drain voltage  $V_{SD}$  (body diode)

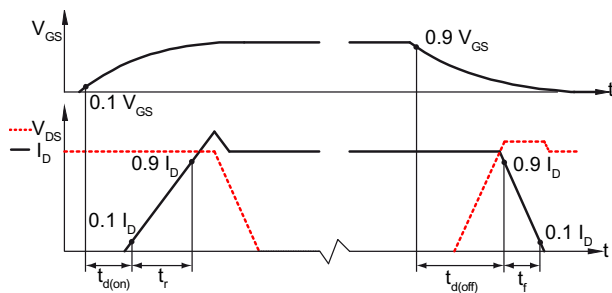


Fig. 17 Definition of switching times

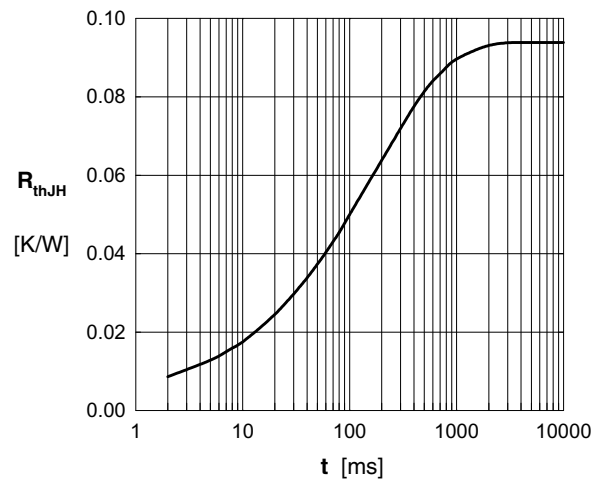


Fig. 18 Typ. transient thermal impedance