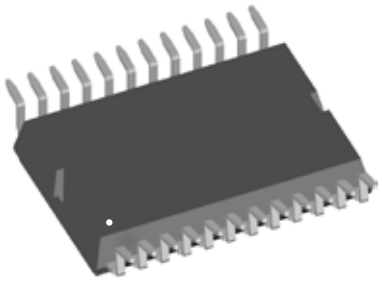
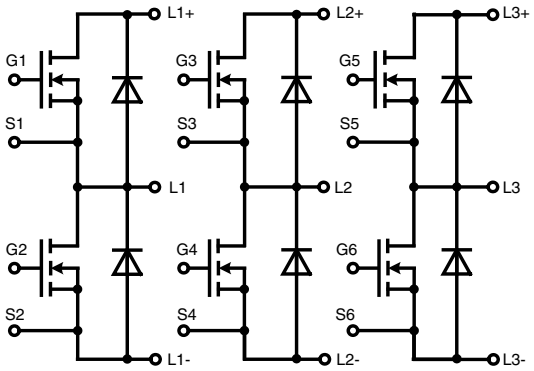
Three phase full Bridge

with Trench MOSFETs
in DCB-isolated high-current package

V_{DSS} = 100 V
I_{D25} = 190 A
$R_{DSon\ typ.}$ = 1.7 mΩ

Part number
MTI145WX100GD





Features / Advantages:

- MOSFETs in trench technology:
  - low R_{DSon}
  - optimized intrinsic reverse diode
- Package:
  - high level of integration
  - high current capability
  - aux. terminals for MOSFET control
  - terminals for soldering or welding connections
  - isolated DCB ceramic base plate with optimized heat transfer
- Space and weight savings

Applications:

AC drives

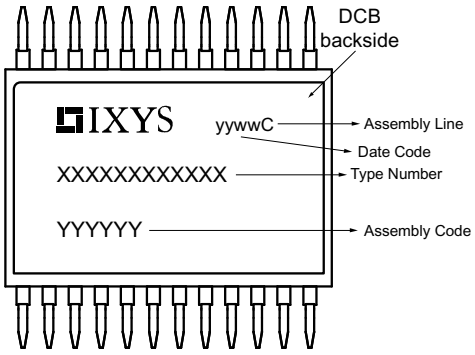
- in automobiles
  - electric power steering
  - starter generator
- in industrial vehicles
  - propulsion drives
  - fork lift drives
- in battery supplied equipment

Package: ISOPLUS-DIL®

- High level of integration
- RoHS compliant
- High current capability
- Aux. Terminals for MOSFET control
- Terminals for soldering or welding connections
- Space and weight savings

MOSFETs				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
V_{DSS}	*drain source breakdown voltage*		T_{VJ} = 25°C to 150°C			100	V
V_{GS}	*gate source voltage*					±15	V
V_{GSM}	*max. transient gate source voltage*					±20	V
I_{D25}	*continuous drain current*		T_C = 25°C			190	A
I_{D90}			T_C = 90°C			145	A
$R_{DS(on)}$ [1]	*static drain source on resistance*	on chip level at	T_{VJ} = 25°C		1.7	2.2	mΩ
		I_D = 100 A; V_{GS} = 10 V	T_{VJ} = 125°C		2.9		mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 275 µA; V_{DS} = V_{GS}	T_{VJ} = 25°C	2.0	2.7	3.5	V
I_{DSS}	*drain source leakage current*	V_{DS} = V_{DSS}; V_{GS} = 0 V	T_{VJ} = 25°C			1	µA
			T_{VJ} = 125°C		10	100	µA
I_{GSS}	*gate source leakage current*	V_{GS} = ±20 V; V_{DS} = 0 V				500	nA
R_G	*gate resistance*	on chip level			1.9		Ω
C_{iss}	*input capacitance*	V_{GS} = 0 V; V_{DS} = 50 V; f = 1 Mhz			11.1		nF
C_{oss}	*output capacitance*				1.94		nF
C_{rss}	*reverse transfer capacitance*				70		pF
Q_g	*total gate charge*	V_{GS} = 10 V; V_{DS} = 50 V; I_D = 100 A			155		nC
Q_{gs}	*gate source charge*				48		nC
Q_{gd}	*gate drain (Miller) charge*				27		nC
$t_{d(on)}$	*turn-on delay time*	inductive load	T_{VJ} = 125°C		135		ns
t_r	*current rise time*	V_{GS} = 10 V; V_{DS} = 50 V			75		ns
$t_{d(off)}$	*turn-off delay time*	I_D = 100 A; R_G = 27 Ω			600		ns
t_f	*current fall time*				40		ns
E_{on}	*turn-on energy per pulse*				200		µJ
E_{off}	*turn-off energy per pulse*				600		µJ
$E_{rec(off)}$	*turn-off reverse recovery losses*				36		µJ
R_{thJC}	*thermal resistance junction to case*					0.85	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heat transfer paste (IXYS test setup)			1.1	1.4	K/W
		[1] V_{DS} = I_D·($R_{DS(on)}$ + 2·$R_{Pin\ to\ Chip}$)					
Source-Drain Diode							
I_{F25}	*forward current*		T_C = 25°C			180	A
I_{F90}			T_C = 90°C			105	A
V_{SD}	*source drain voltage*	I_F = 100 A; V_{GS} = 0 V	T_{VJ} = 25°C		0.9	1.2	V
Q_{RM}	*reverse recovery charge*	V_R = 50 V; I_F = 100 A	T_{VJ} = 125°C		2		µC
I_{RM}	*max. reverse recovery current*	R_G = 27 Ω (di/dt = 1700 A/µs)			54		A
t_{rr}	*reverse recovery time*				60		ns

Package ISOPLUS-DIL®				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per pin in main current paths (L1+...L3+, L1-...L3-, L1...L3) may be additionally limited by external connections (PCB tracks) 2 pins for output L1, L2, L3				75	A
T_{stg}	*storage temperature*			-55		125	°C
T_{VJM}	*virtual junction temperature*			-55		175	°C
Weight					25		g
F_C	*mounting force with clip*			50		250	N
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS, $I_{ISOL} \leq 1$ mA	1200			V
		t = 1 minute		1000			V
$R_{pin\text{-}chip}$	*resistance terminal to chip*	$V_{DS} = I_D \cdot (R_{DS(on)} + 2 \cdot R_{pin\ to\ chip})$			0.5		mΩ
C_P	*coupling capacity*	between shorted pins and back side metallization			160		pF

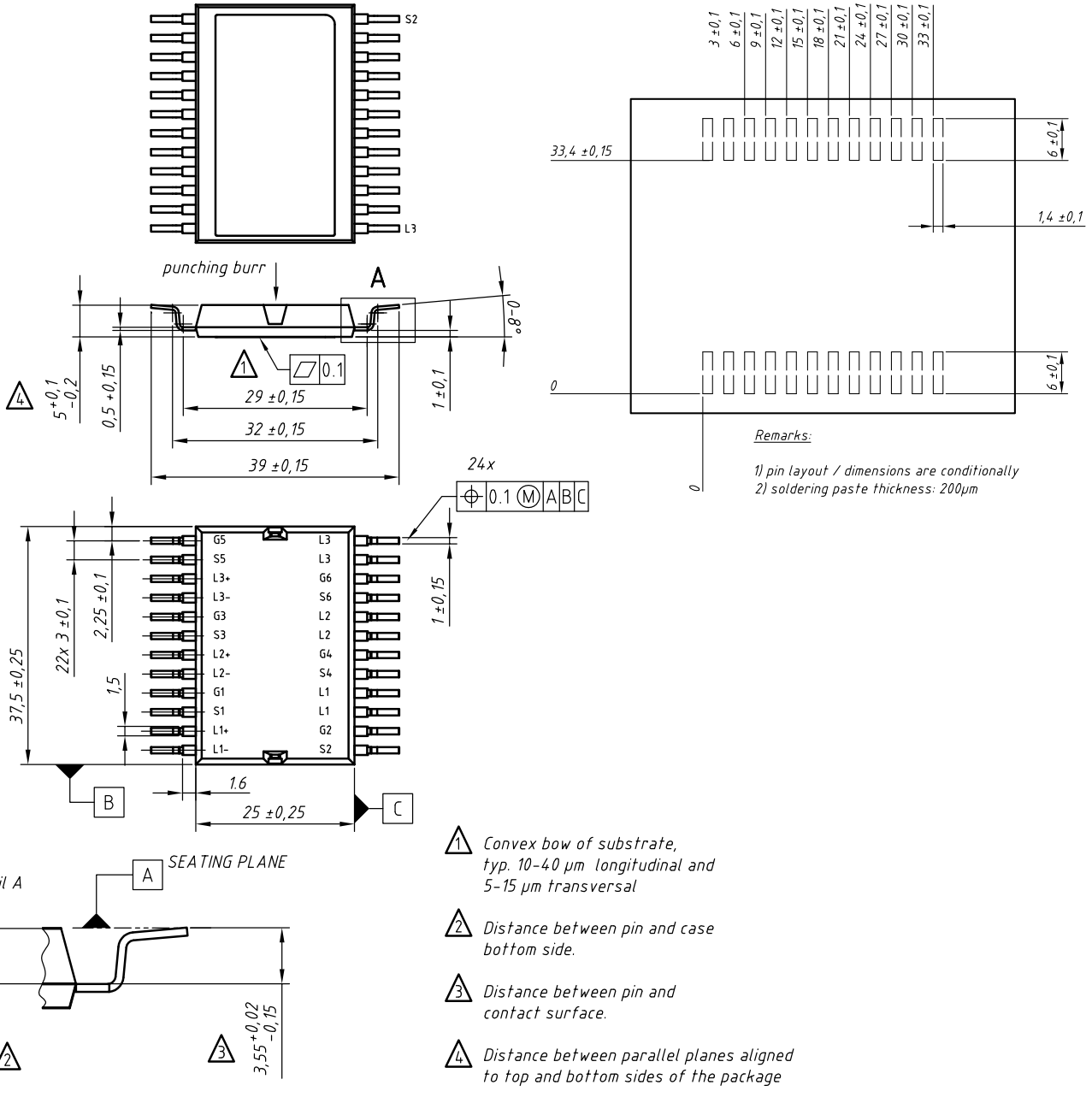


Part number

M = Module
T = Trench MOSFET
I = OPTIMOS
145 = Current Rating [A]
WX = 6-Pack with separated Phase Legs
100 = Reverse Voltage [V]
GD = ISOPLUS-DIL

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MTI145WX100GD-SMD	MTI145WX100GD	Blister	28	513435

Outlines ISOPLUS-DIL®



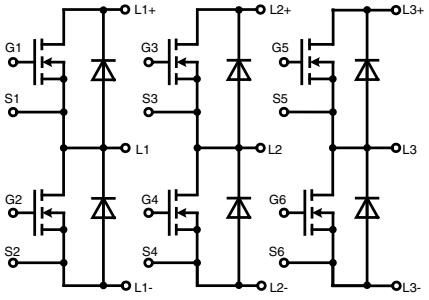
1 Convex bow of substrate, typ. 10-40 µm longitudinal and 5-15 µm transversal

2 Distance between pin and case bottom side.

3 Distance between pin and contact surface.

4 Distance between parallel planes aligned to top and bottom sides of the package

contact pin:
- galv. tin plating, per pin side: Sn 10...25 µm, undercoating Ni 0,2...1 µm
- stamping edges may be free of tin
- puching burr: ≤ 0,05mm



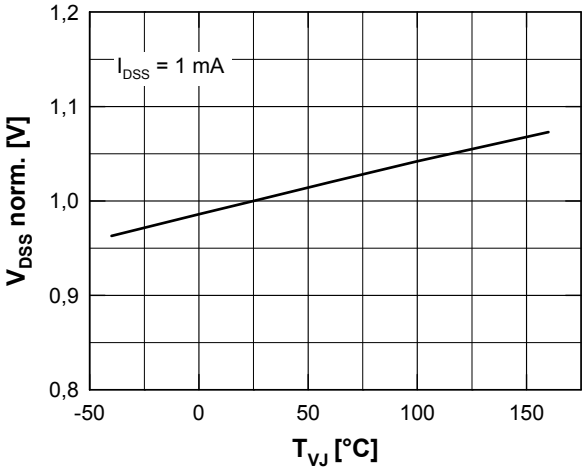


Fig. 1 Drain source breakdown voltage V_{DSS} vs. junction temperature T_{VJ}

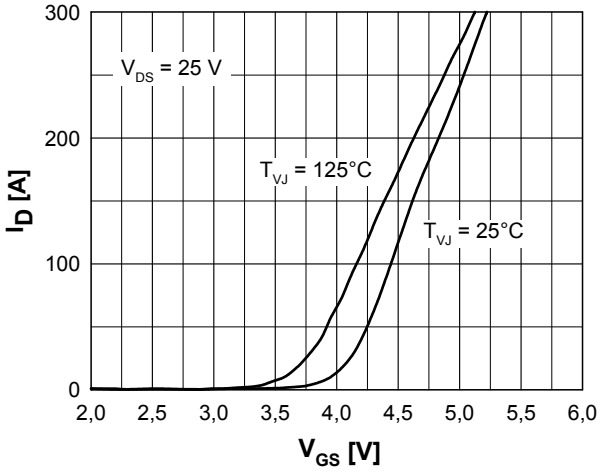


Fig. 2 Typ. transfer characteristics

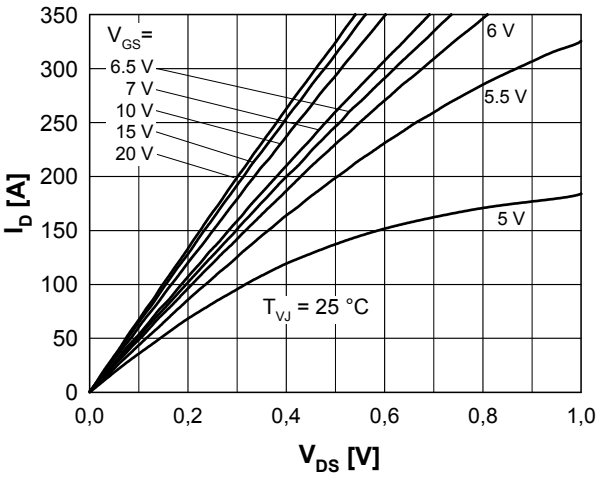


Fig. 3 Typ. output characteristics (25 °C)

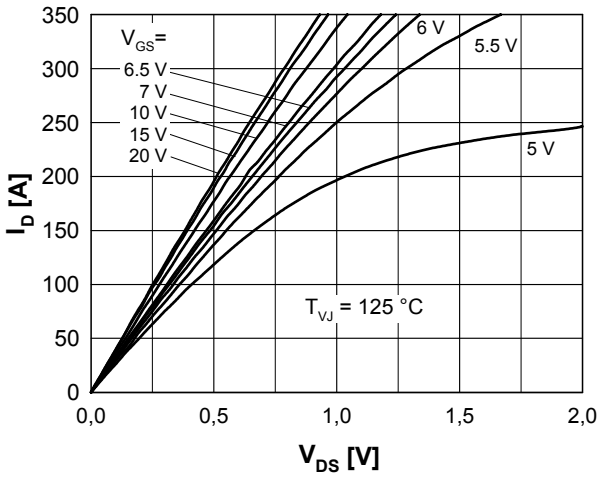


Fig. 4 Typ. output characteristics (125 °C)

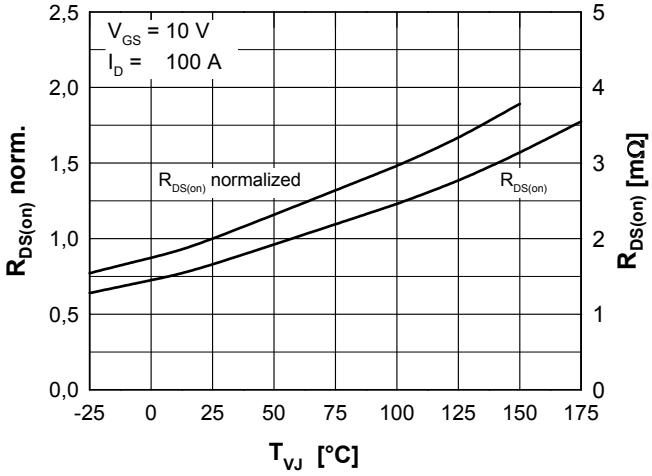


Fig. 5 Drain source on-state resistance versus junction temperature

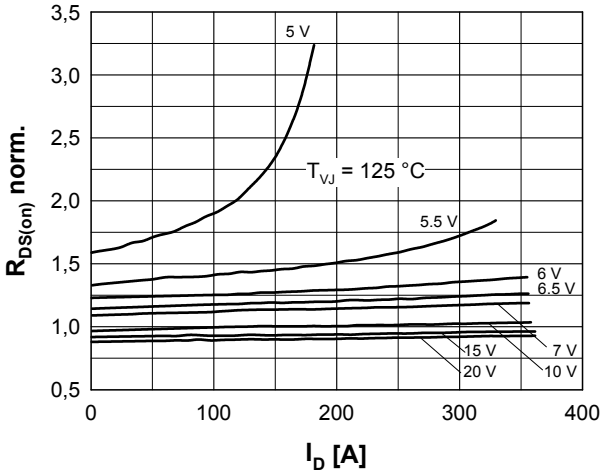


Fig. 6 Drain source on-state resistance versus I_D

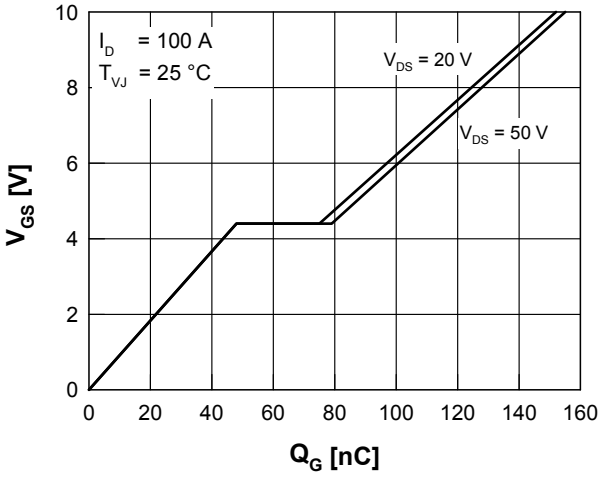


Fig. 7 Typical turn on gate charge

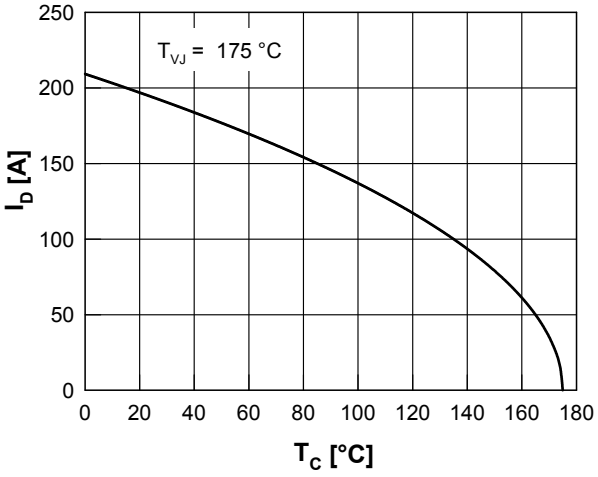


Fig. 8 Drain current I_D vs. case temperature T_C (chip capability)

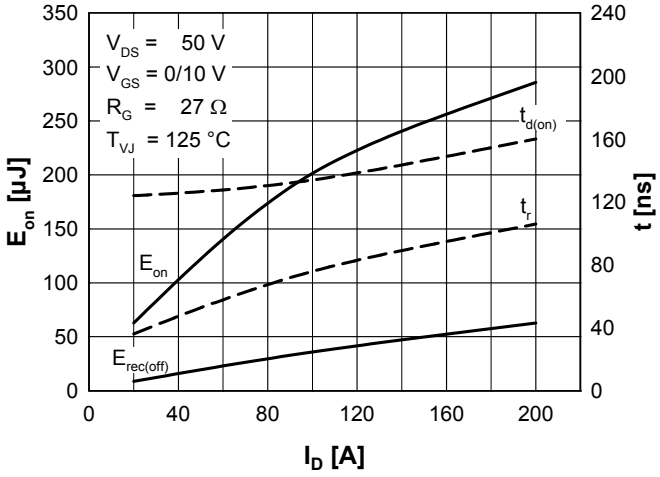


Fig. 9 Typ. turn-on energy and switching times versus drain current, inductive switching

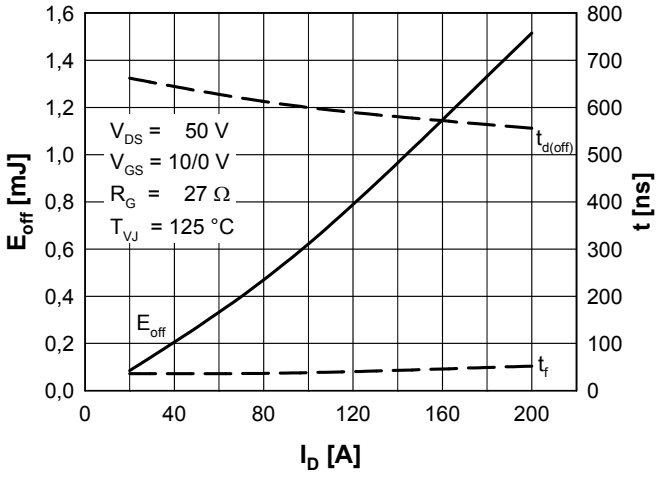


Fig. 10 Typ. turn-off energy and switching times versus drain-current, inductive switching

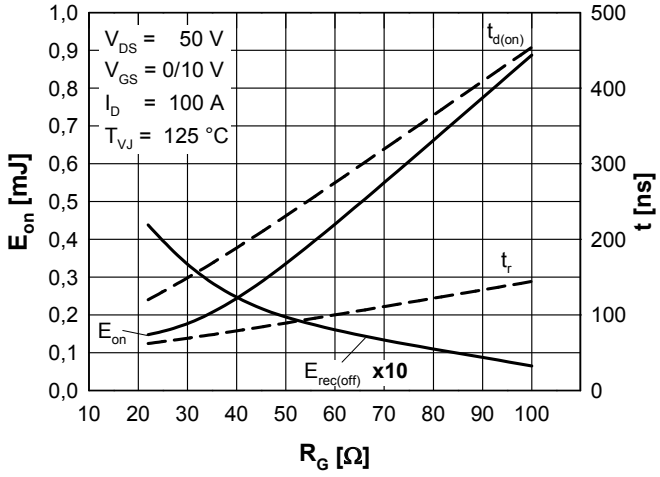


Fig. 11 Typ. turn-on energy and switching times versus gate resistor, inductive switching

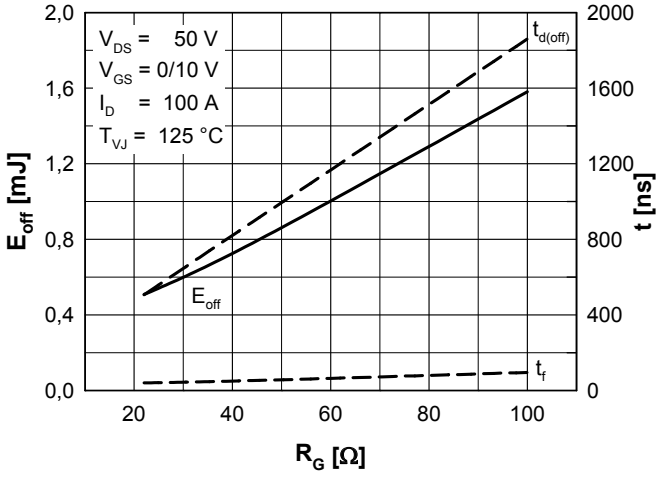


Fig. 12 Typ. turn-off energy and switching times versus gate resistor, inductive switching

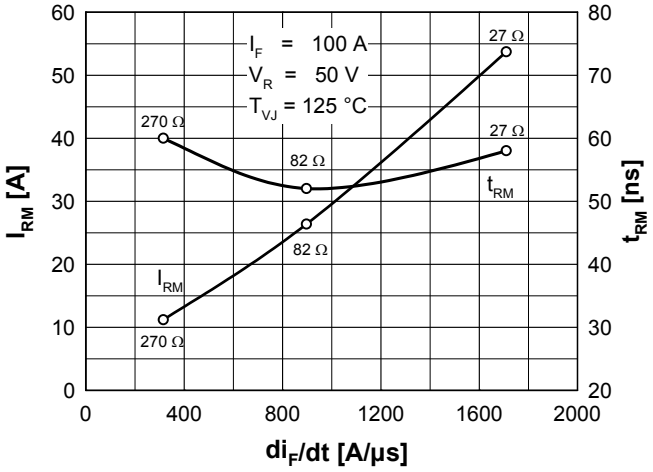


Fig. 13 Reverse recovery time t_{RM} of the body diode vs. di_F/dt

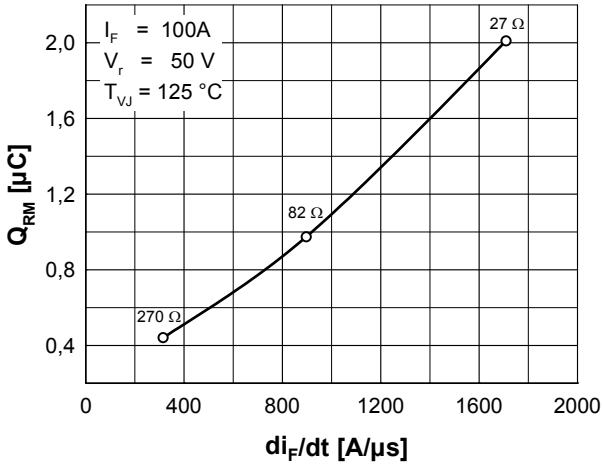


Fig. 14 Reverse recovery charge Q_{RM} of the body diode vs. di_F/dt

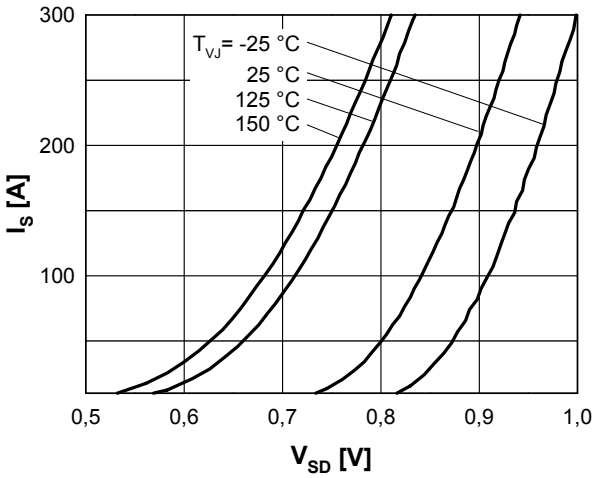


Fig.15 Source current I_S vs. source drain voltage V_{SD} (body diode)

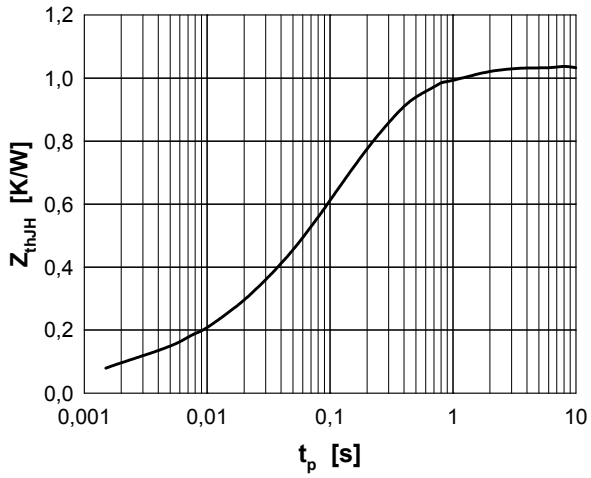


Fig. 16 Typ. thermal impedance junction to heatsink Z_{thJH} with heat transfer paste (IXYS test setup)

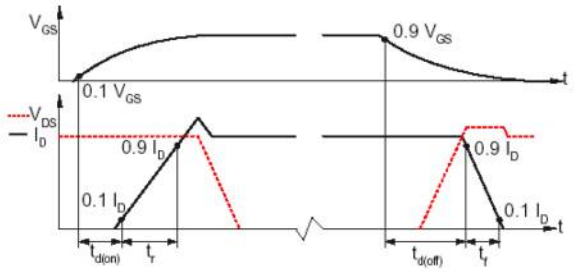


Fig. 17 Definition of switching times