Three phase full Bridge

with Trench MOSFETs
in DCB-isolated high-current package

V_{DSS} = 100 V
I_{D25} = 120 A
$R_{DSon\ typ.}$ = 3.2 mΩ

Part number
MTI85W100GC
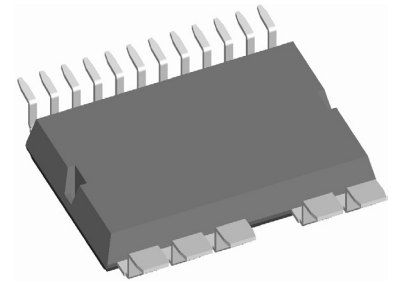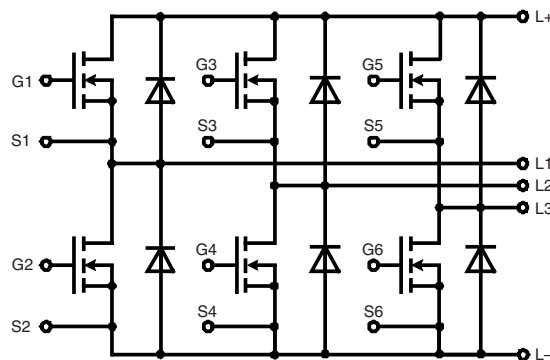
Surface Mount Device

Features / Advantages:

- MOSFETs in trench technology:
  – low R_{DSon}
  – optimized intrinsic reverse diode
- Package:
  – high level of integration
  – high current capability (300 A max.)
  – 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

Terms & Conditions of usage

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend
- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

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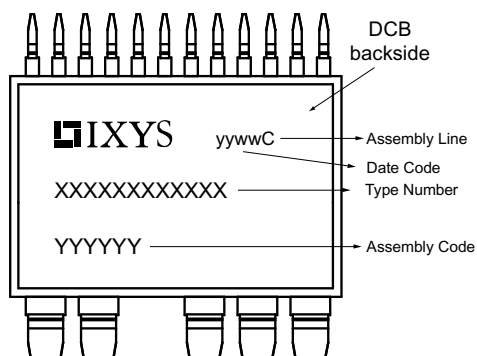
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MOSFETs

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	$T_C = 25°C$				120	A
I_{D90}		$T_C = 90°C$				90	A
I_{F25}	forward current	$T_C = 25°C$					A
I_{F90}		$T_C = 90°C$					A
$R_{DS(on)}$ [1]	static drain source on resistance	on-chip level at $I_D = 80$ A; $V_{GS} = 10$ V	$T_{VJ} = 25°C$		3.2	4	mΩ
			$T_{VJ} = 125°C$		5.4		mΩ
$V_{GS(th)}$	gate threshold voltage	$I_D = 150$ μA; $V_{DS} = V_{GS}$	$T_{VJ} = 25°C$	2.0		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					Ω
Q_g	total gate charge	$V_{GS} = 10$ V; $V_{DS} = 50$ V; $I_D = 80$ A			88		nC
Q_{gs}	gate source charge				30		nC
Q_{gd}	gate drain (Miller) charge				18		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{GS} = 10$ V; $V_{DS} = 50$ V $I_D = 80$ A; $R_G = 39$ Ω	$T_{VJ} = 125°C$		90		ns
t_r	current rise time				55		ns
$t_{d(off)}$	turn-off delay time				480		ns
t_f	current fall time				40		ns
E_{on}	turn-on energy per pulse				130		μJ
E_{off}	turn-off energy per pulse				390		μJ
$E_{rec(off)}$	turn-off reverse recovery losses				10		μJ
R_{thJC}	thermal resistance junction to case					1.2	K/W
R_{thJH}	thermal resistance junction to heatsink	with heat transfer paste (IXYS test setup)			1.5		K/W
		[1] $V_{DS} = I_D \cdot (R_{DS(on)} + 2 \cdot R_{Pin\ to\ Chip})$					

Source-Drain Diode

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
V_{SD}	source drain voltage	$I_F = 80$ A; $V_{GS} = 0$ V	$T_{VJ} = 25°C$		0.9	1.2	V
Q_{RM}	reverse recovery charge	$V_R = 50$ V; $I_F = 80$ A; $R_G = 39$ Ω di/dt = 1500 A/μs	$T_{VJ} = 125°C$		1.3		μC
I_{RM}	max. reverse recovery current				44		A
t_{rr}	reverse recovery time				45		ns

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Package ISOPLUS-DIL®

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per pin in main current paths (P+, N–, L1, L2, L3) may be additionally limited by external connections (PCB tracks)			300	A
T_{stg}	storage temperature		-55		125	°C
T_{op}	operation temperature		-55		150	°C
T_{VJ}	virtual junction temperature		-55		175	°C
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	$V_{DS} = I_D \cdot (R_{DS(on)} + 2 \cdot R_{pin\ to\ chip})$		0.6		mΩ
C_P	coupling capacity	between shorted pins and back side metallization		160		pF
F_C	mounting force with clip		50		250	N
Weight				13		g

DCB backside

Assembly Line
Date Code
Type Number
Assembly Code

yywwC
XXXXXXXXXXXX
YYYYYY

Part number

M = MOSFET
T = Trench
I = Infineon Trench
85 = Current Rating [A]
W = 6-Pack
100 = Reverse Voltage [V]
GC = ISOPLUS-DIL

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MTI85W100GC-SMD	MTI85W100GC	Tube	13	516941

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Outlines ISOPLUS-DIL®

Detail A — A *SEATING PLANE*

$3,5 \pm 0,02$ ② $3,55 {+0,02 \atop -0,15}$ ③

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*
- *Test specification GNP631102*

punching burr   A

① ☐ 0.1

$29 \pm 0,15$
$32 \pm 0,15$
$39 \pm 0,15$

$5 {+0,1 \atop -0,2}$ $0,5 \pm 0,15$ $1 \pm 0,1$ ④ $0-8°$

17x
⊕ 0.1 Ⓜ A B C

$37,5 \pm 0,25$ $11x \, 3 \pm 0,1$ $2,25 \pm 0,1$ $1 \pm 0,15$ $1,5$

G1 S1 G2 S2 G3 S3 G4 S4 G5 S5 G6 S6

L+ L− L1 L2 L3

$12 \pm 0,1$ $3x \, 6 \pm 0,1$ $4 \pm 0,15$ $4,5$

B $2,1$ C
$25 \pm 0,25$

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

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Fig. 1 Drain source breakdown voltage
V_{DSS} vs. junction temperature T_{VJ}
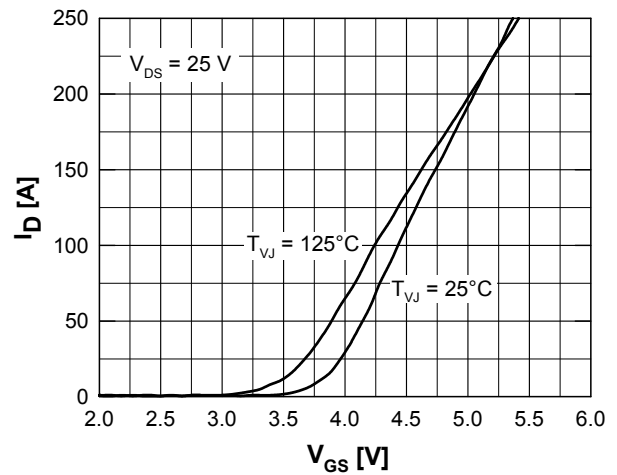
Fig. 2 Typ. transfer characteristics
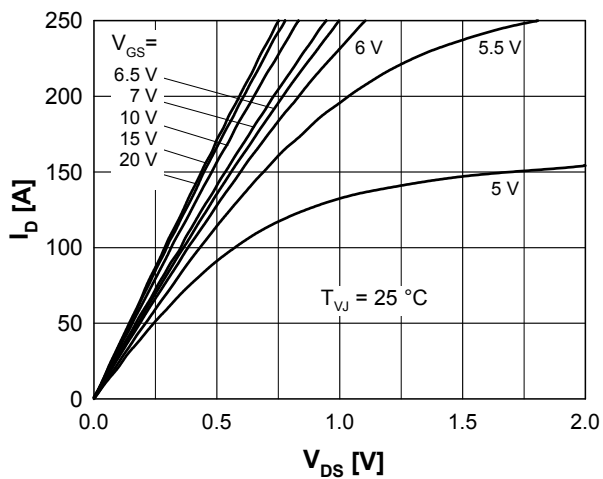
Fig. 3 Typ. output characteristics (25 °C)
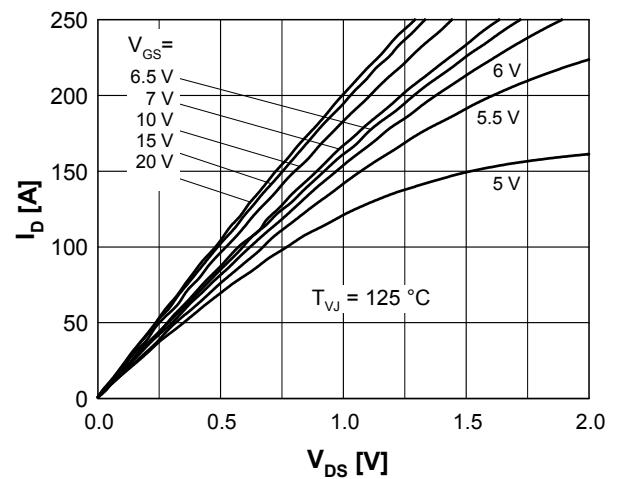
Fig. 4 Typ. output characteristics (125 °C)
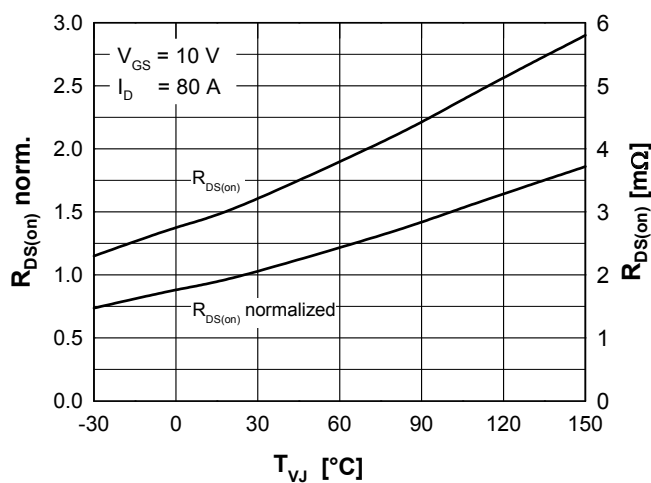
Fig. 5 Drain source on-state resistance
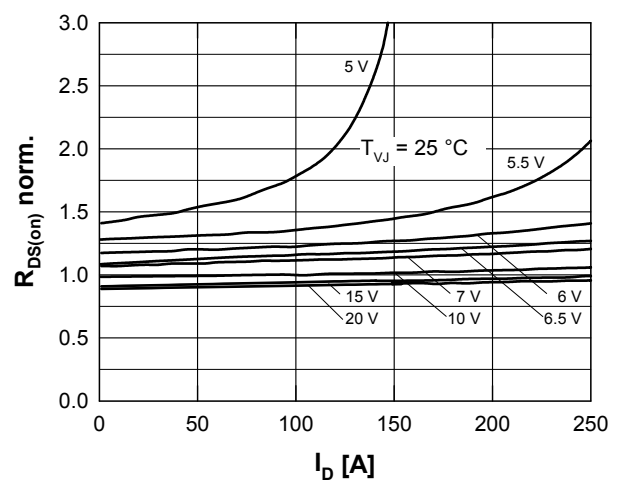versus junction temperature

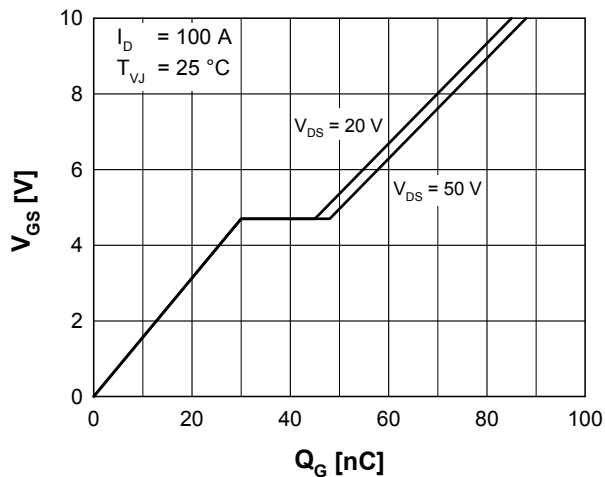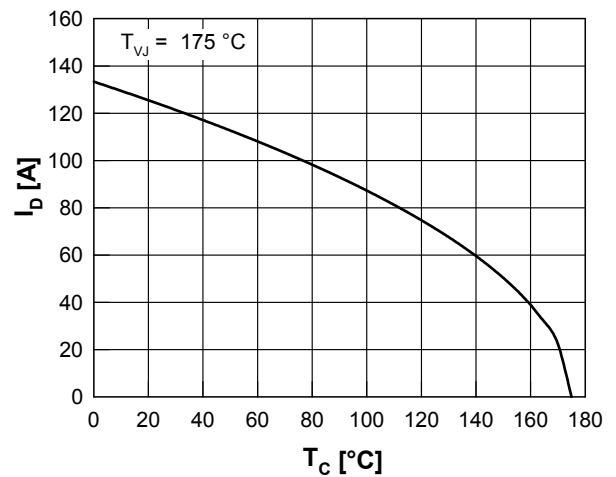Fig. 6 Drain source on-state resistance
versus I_D

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Fig. 7 Typical turn on gate charge

Fig. 8 Drain current I_D vs. case temperature T_C (chip capability)
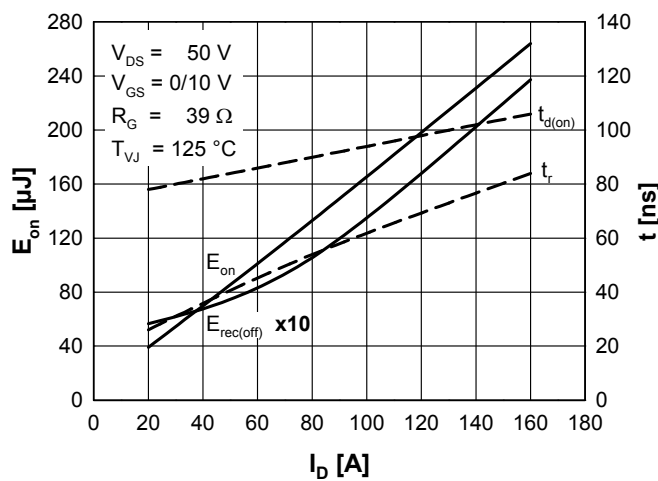
Fig. 9 Typ. turn-on energy and switching times versus drain current, inductive switching
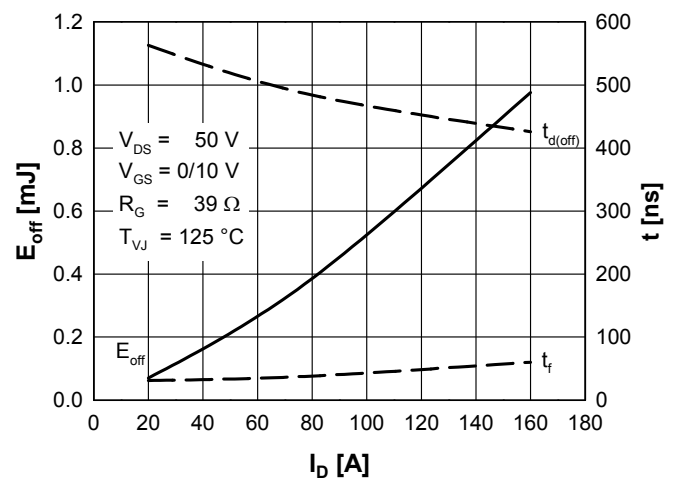
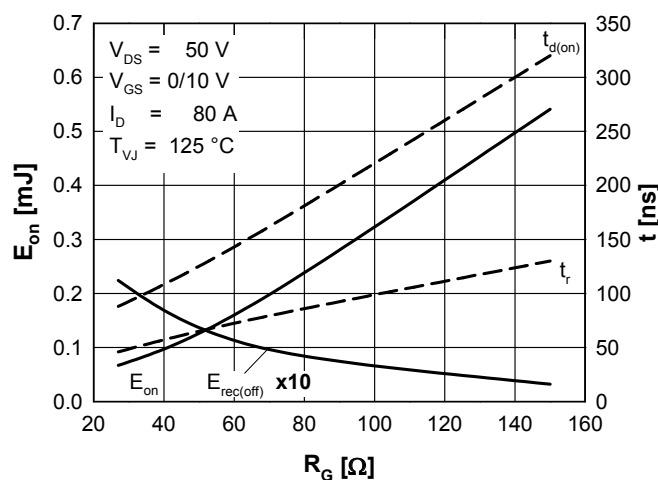Fig. 10 Typ. turn-off energy and switching times versus drain-current, inductive switching

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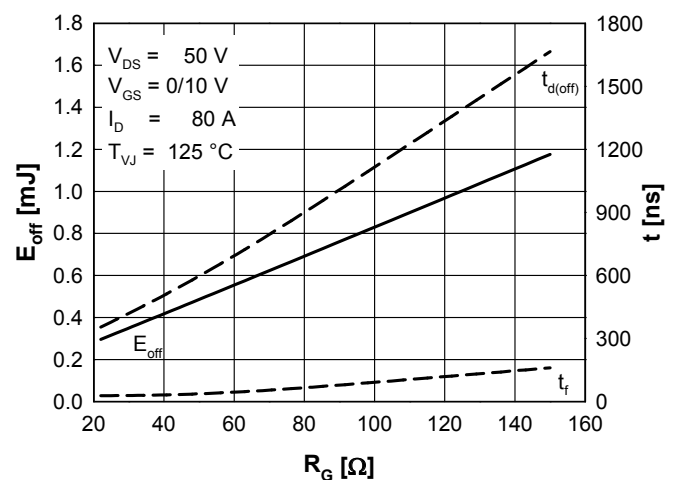

Fig. 12 Typ. turn-off energy and switching times versus gate resistor, inductive switching
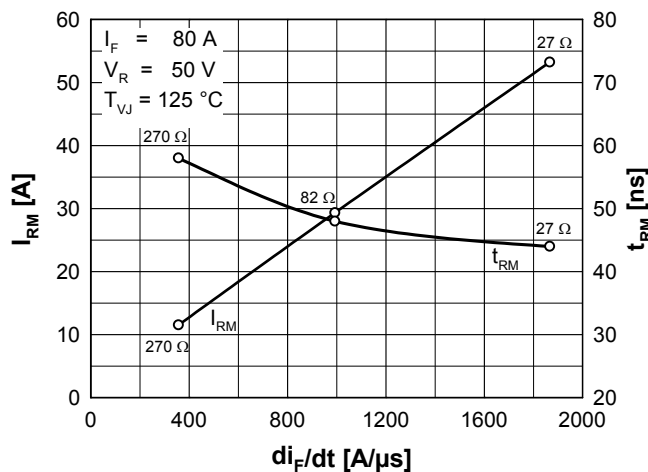
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Fig. 13 Reverse recovery time t_{RM} of the
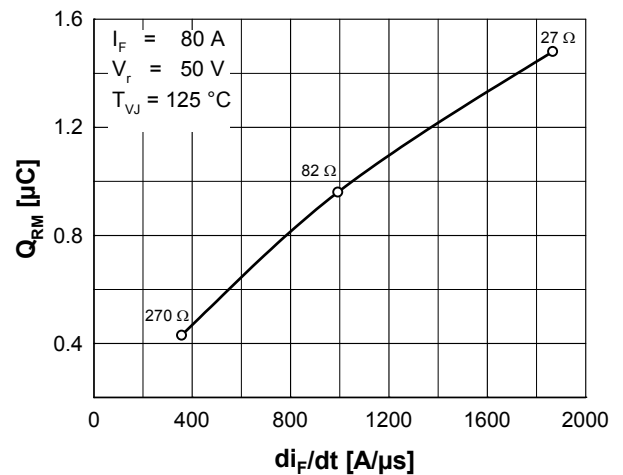body diode vs. di_F/dt

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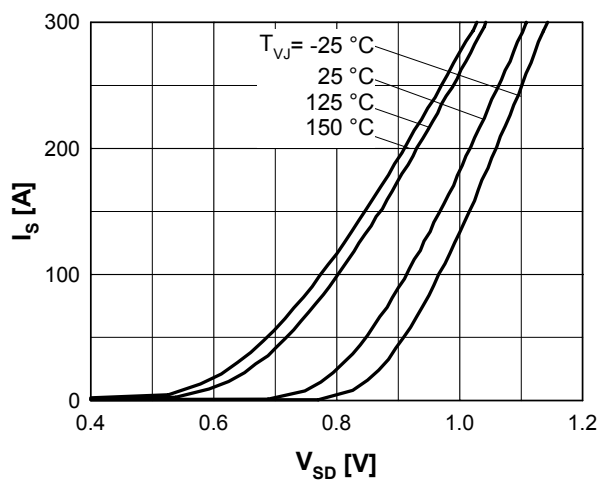of the body diode vs. di_F/dt

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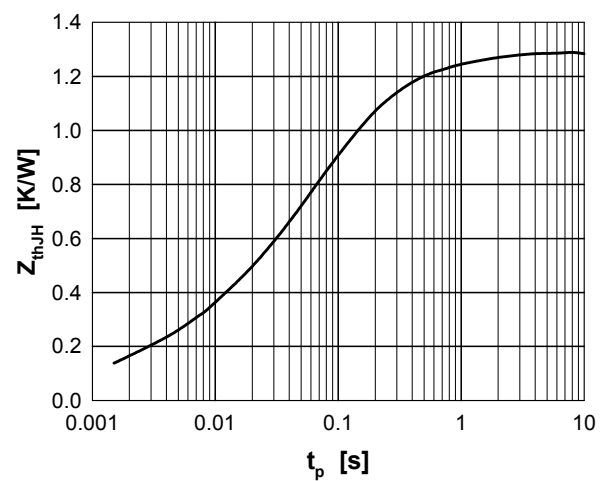V_{SD} (body diode)

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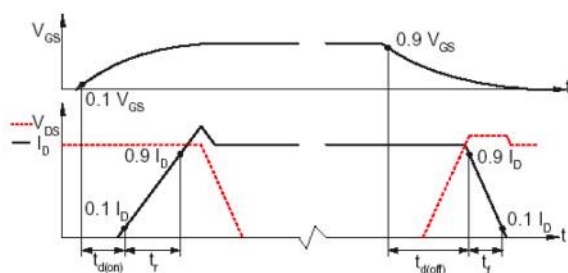heatsink Z_{thJH} with heat transfer paste
(IXYS test setup)

Fig. 17   Definition of switching times

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