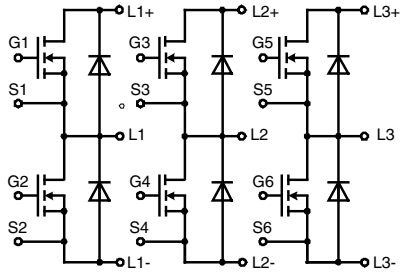
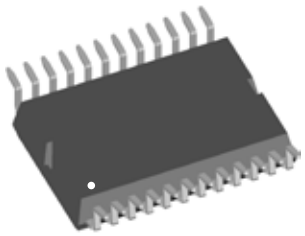
Three phase full Bridge

with Trench MOSFETs
in DCB isolated high current package

V_{DSS} = 40 V
I_{D25} = 180 A
$R_{DSon\ typ.}$ = 1.9 mΩ

Preliminary data





MOSFETs

Symbol	Conditions	Maximum Ratings	
V_{DSS}	T_{VJ} = 25°C to 150°C	40	V
V_{GS}		± 20	V
I_{D25}	T_C = 25°C	180	A
I_{D90}	T_C = 90°C	136	A
I_{D110}	T_C = 110°C	120	A
I_{F25}	T_C = 25°C (diode)	182	A
I_{F90}	T_C = 90°C (diode)	112	A
I_{F110}	T_C = 110°C (diode)	88	A

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
R_{DSon} [1]	on chip level at V_{GS} = 10 V	T_{VJ} = 25°C		1.9	2.5	mΩ
		T_{VJ} = 125°C		2.8	5.3	mΩ
$V_{GS(th)}$	V_{DS} = 20 V; I_D = 1 mA		2.5		4.5	V
I_{DSS}	V_{DS} = V_{DSS}; V_{GS} = 0 V	T_{VJ} = 25°C			5	µA
		T_{VJ} = 125°C		50		µA
I_{GSS}	V_{GS} = ± 20 V; V_{DS} = 0 V				0.2	µA
Q_g	V_{GS} = 10 V; V_{DS} = 20 V; I_D = 100 A			110		nC
Q_{gs}				33		nC
Q_{gd}				30		nC
$t_{d(on)}$	inductive load V_{GS} = +10/0 V; V_{DS} = 15 V I_D = 135 A; R_G = 39 Ω; T_J = 125°C			150		ns
t_r				240		ns
$t_{d(off)}$				350		ns
t_f				170		ns
E_{on}				0.12		mJ
E_{off}				0.51		mJ
E_{recoff}				0.003		mJ
R_{thJC}					1.0	K/W
R_{thJH}	with heat transfer paste (IXYS test setup)			1.3	1.6	K/W

[1] $V_{DS} = I_D \cdot (R_{DS(on)} + R_{Pin\ to\ Chip})$

Applications

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

Features

- 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

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

20110307b

Source-Drain Diode

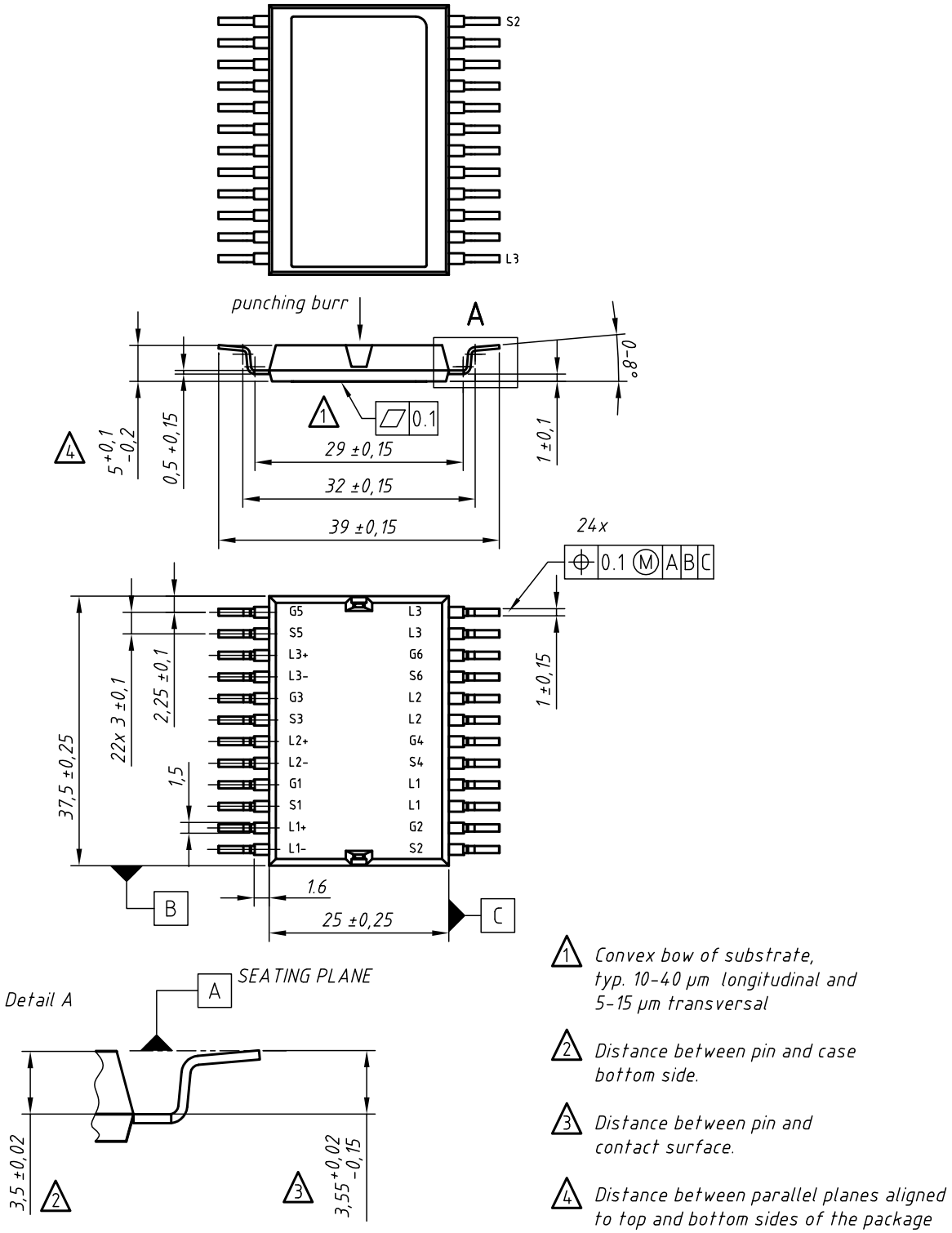
Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_{SD}	(diode) I_F = 100 A; V_{GS} = 0 V		0.9	1.2	V
t_{rr}	I_F = 100 A; -di$_F$/dt = 600 A/µs V_R = 15 V; T_J = 125°C		38		ns
Q_{RM}			0.31		µC
I_{RM}			14		A

Component

Symbol	Conditions	Maximum Ratings	
I_{RMS}	per pin in main current paths (P+, N-, L1, L2, L3) may be additionally limited by external connections 2 pins for output L1, L2, L3	75	A
T_J		-55...+175	°C
T_{stg}		-55...+125	°C
V_{ISOL}	$I_{ISOL} \leq$ 1 mA, 50/60 Hz, f = 1 minute	1000	V~
F_C	mounting force with clip	50 - 250	N

Symbol	Conditions	Characteristic Values min.	typ.	max.	
$R_{pin\ to\ chip}$ [1)]	L+ to L1/L2/L3 or L- to L1/L2/L3		0.9		mΩ
C_P	coupling capacity between shorted pins and back side metallization		160		pF
Weight			25		g

[1)] $V_{DS} = I_D \cdot (R_{DS(on)} + R_{Pin\ to\ Chip})$



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

2 Distance between pin and case bottom side.

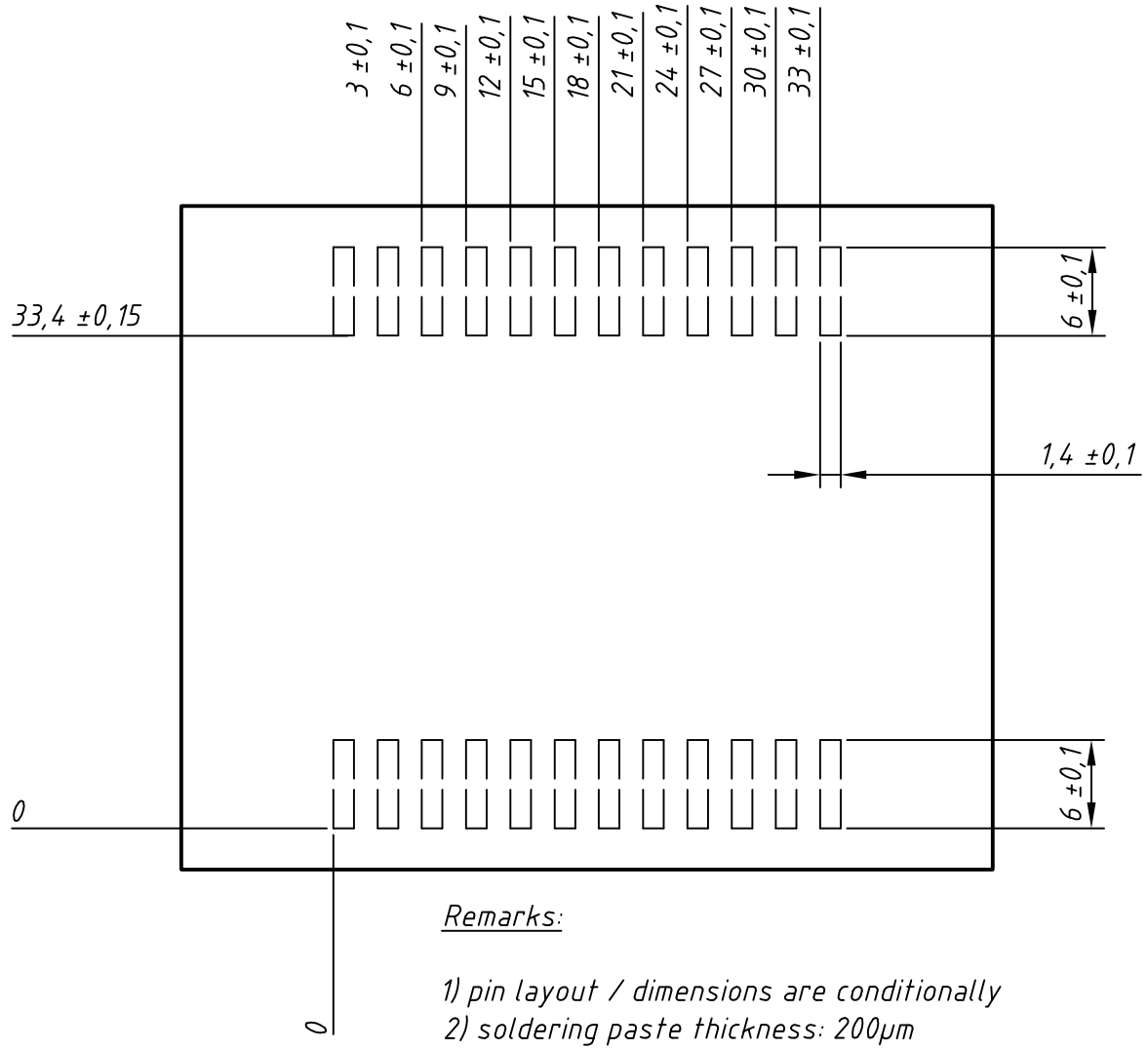
3 Distance between pin and contact surface.

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

Leads	Ordering	Part Name & Packing Unit Marking	Part Marking	Delivering Mode	Base Qty.	Ordering Code
SMD	Standard	GMM 3x180-004X2 - SMD	GMM 3x180-004X2	Blister	28	509042

IXYS reserves the right to change limits, test conditions and dimensions. 20110307b



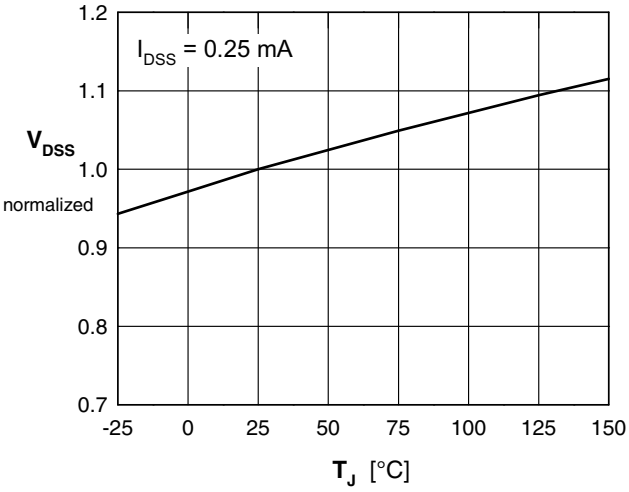


Fig. 1 Drain source breakdown voltage V_{DSS} vs. junction temperature T_{VJ}

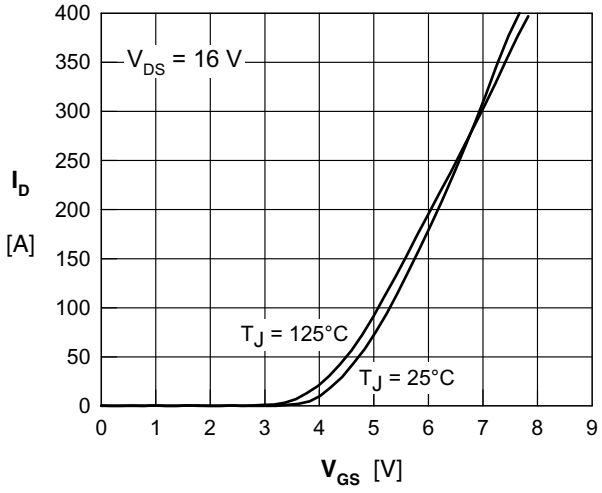


Fig. 2 Typical transfer characteristic

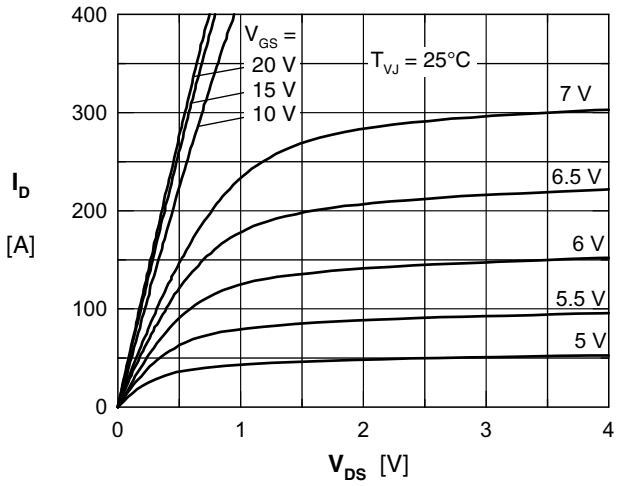


Fig. 3 Typical output characteristic

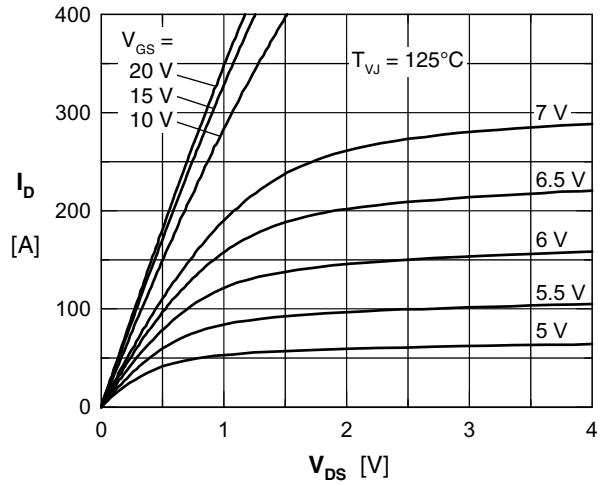


Fig. 4 Typical output characteristic

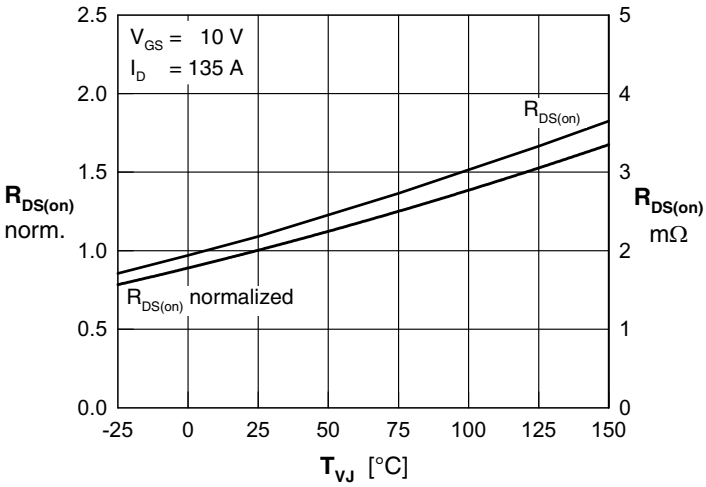


Fig. 5 Typ. drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_J

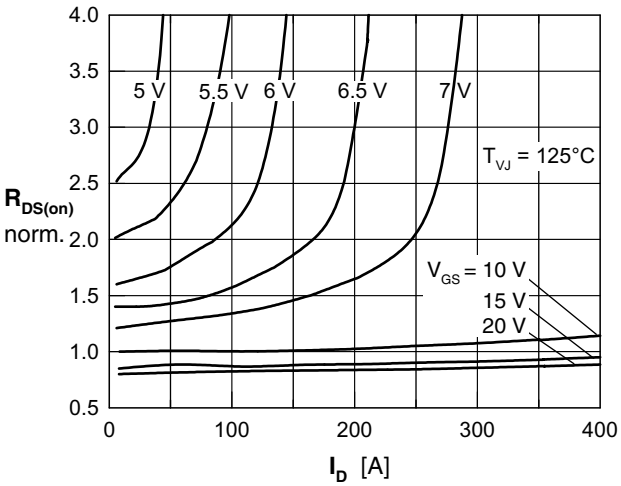


Fig. 6 Typ. drain source on-state resistance $R_{DS(on)}$ versus I_D

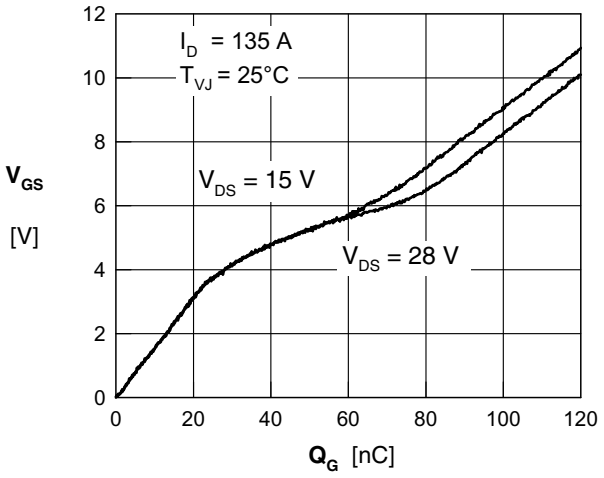


Fig. 7 Gate charge characteristics

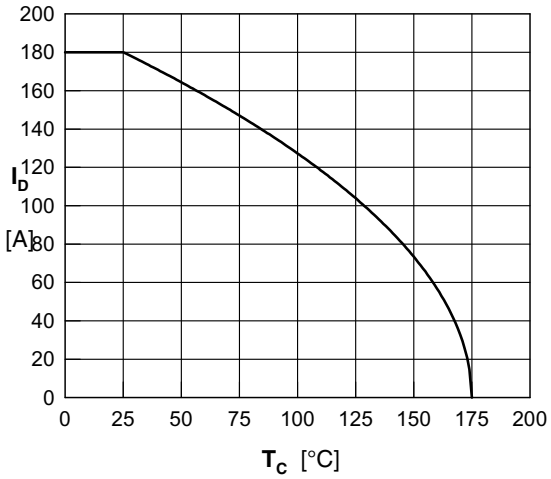


Fig. 8 Drain current I_D vs. temperature T_C

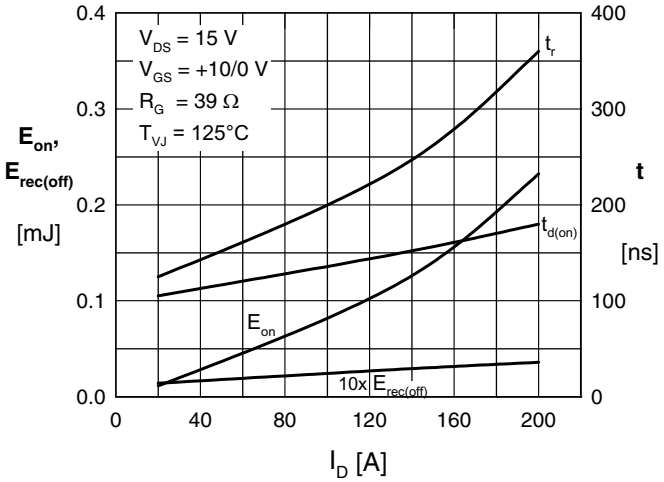


Fig. 9 Typ. turn-on energy & switching times vs. collector current, inductive switching

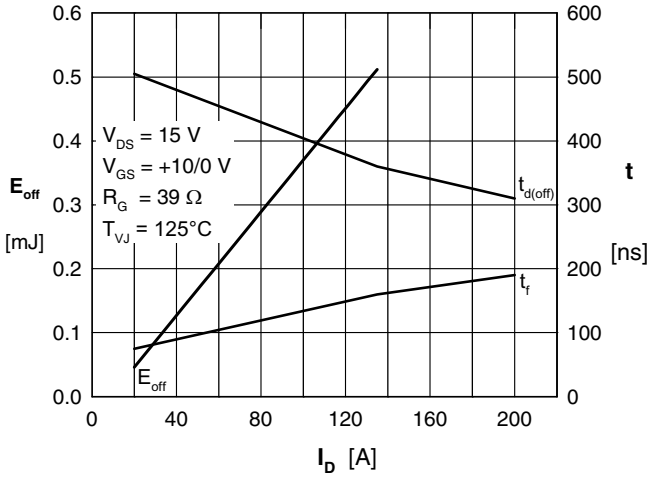


Fig. 10 Typ. turn-off energy & switching times vs. collector current, inductive switching

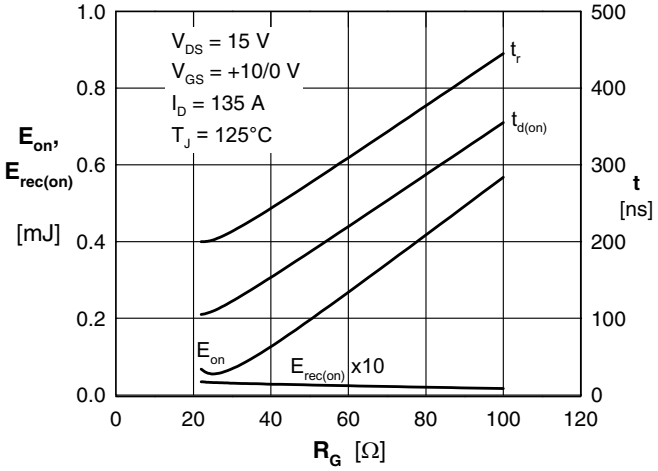


Fig. 11 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

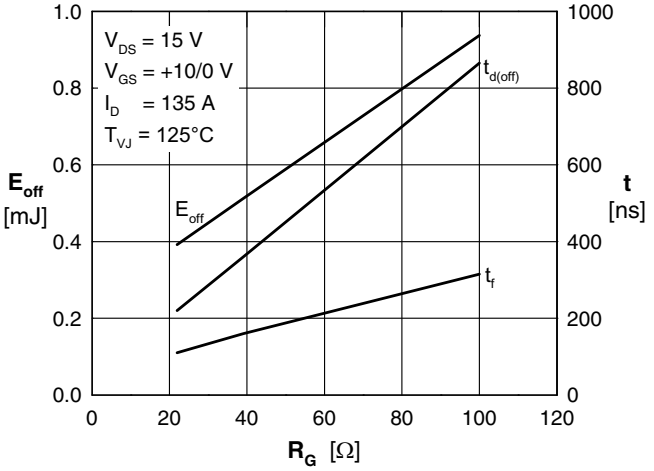


Fig. 12 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

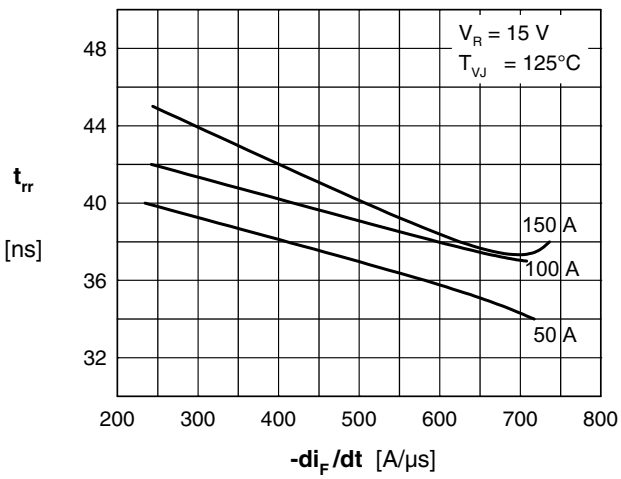


Fig. 13 Typ. reverse recovery time t_{rr} of the body diodes versus di/dt

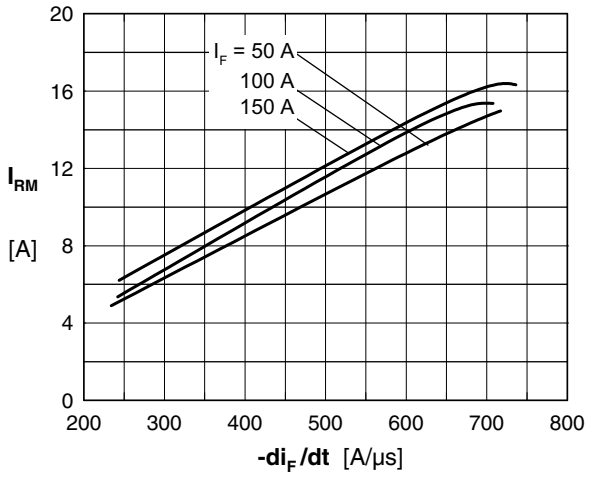


Fig. 14 Typ. reverse recovery current I_{RM} of the body diodes versus di/dt

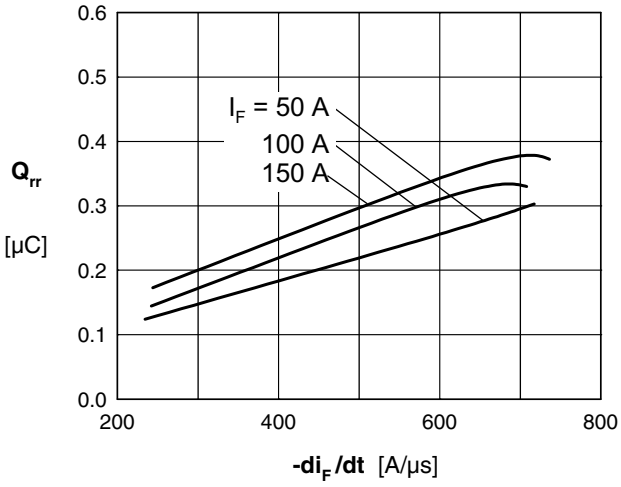


Fig. 15 Typ. reverse recovery charge Q_{rr} of the body diodes versus di/dt

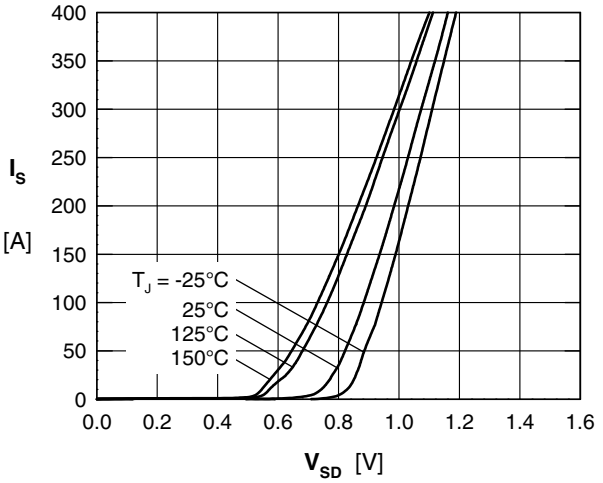


Fig. 16 Typ. source current I_S versus source drain voltage V_{SD} (body diode)

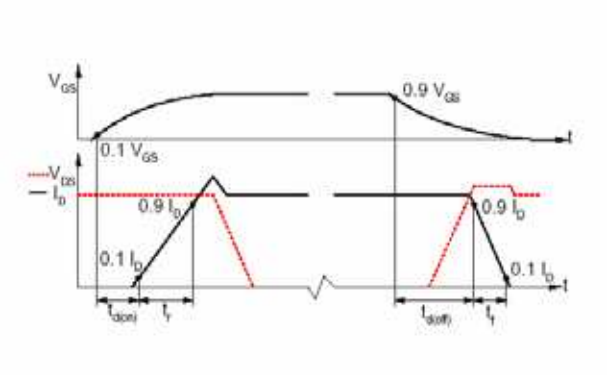


Fig. 17 Definition of switching times