IXYS

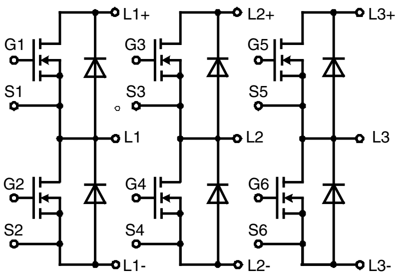
GMM 3x180-004X2

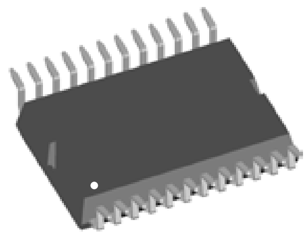
Three phase full Bridge

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 (T_{VJ} = 25°C, unless otherwise specified)		Characteristic Values 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} Q_{RM} I_{RM}	I_F = 100 A; $-di_F/dt$ = 600 A/μs V_R = 15 V; T_J = 125°C		38 0.31 14		ns μC A

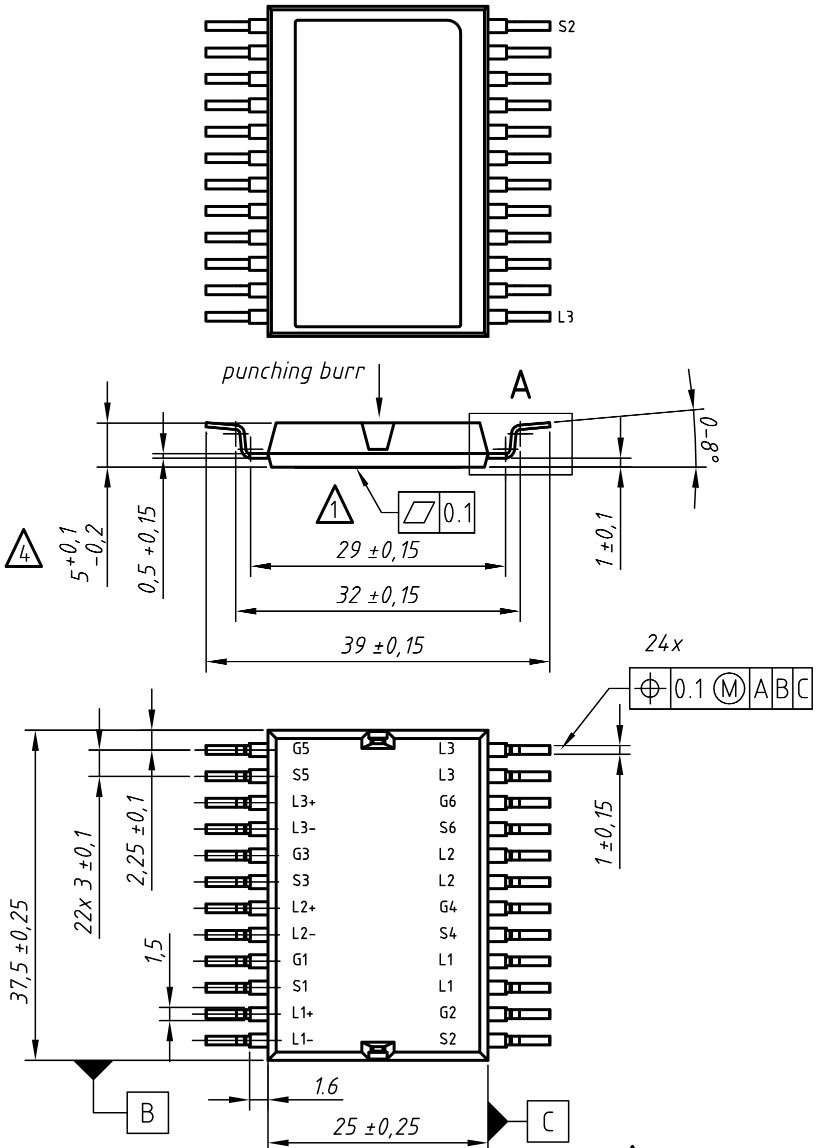
Component			
Symbol	**Conditions**	**Maximum Ratings**	
I_{RMS}	per pin in main current paths (P+, N-, L1, L2, L3) may be additionally limited by external connections 2 pins for output L1, L2, L3	75	A
T_J T_{stg}		-55...+175 -55...+125	°C °C
V_{ISOL}	$I_{ISOL} \leq$ 1 mA, 50/60 Hz, f = 1 minute	1000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

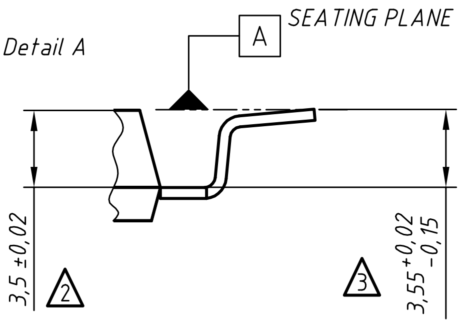
[1)] $V_{DS} = I_D \cdot (R_{DS(on)} + R_{Pin\ to\ Chip})$

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

20110307b



Detail A



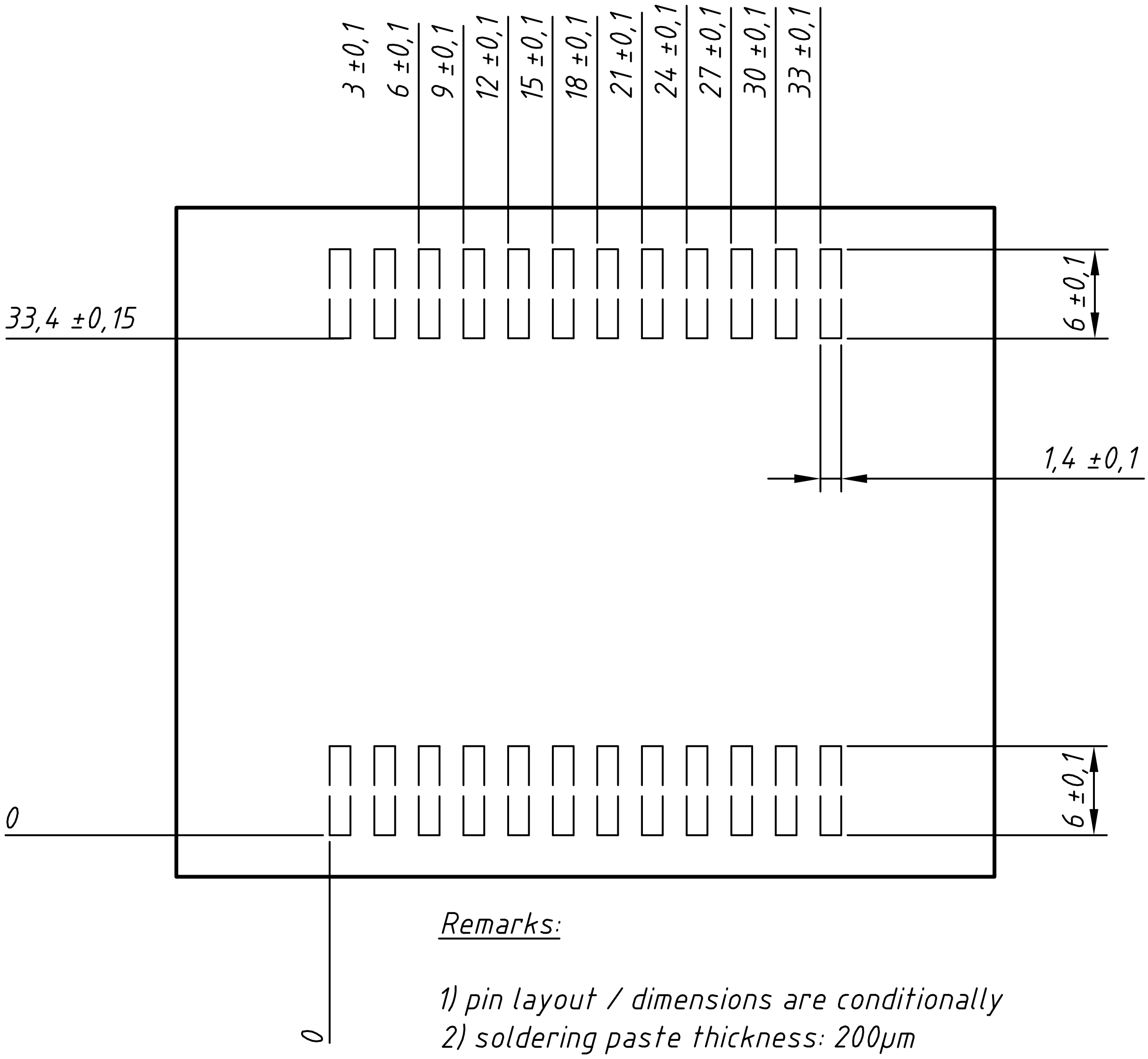
1. Convex bow of substrate, typ. 10-40 µm longitudinal and 5-15 µm transversal
2. Distance between pin and case bottom side.
3. Distance between pin and contact surface.
4. Distance between parallel planes aligned to top and bottom sides of the package

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



Remarks:

1) pin layout / dimensions are conditionally
2) soldering paste thickness: 200µm

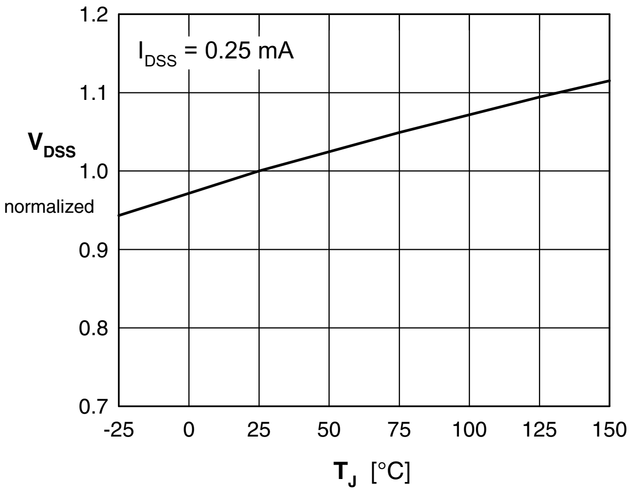


Fig. 1 Drain source breakdown voltage V_{DSS} vs. junction temperature T_{VJ}

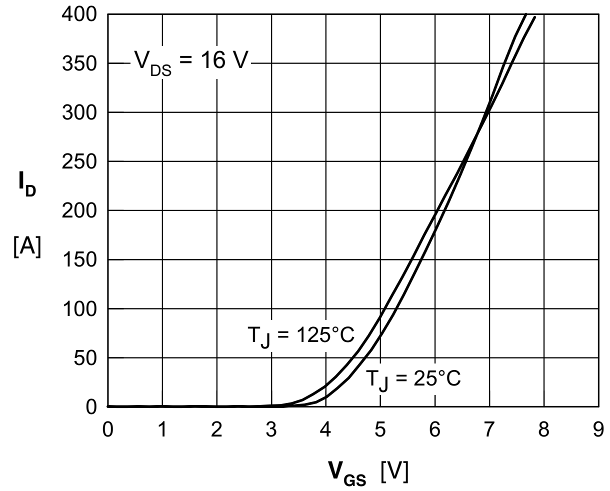


Fig. 2 Typical transfer characteristic

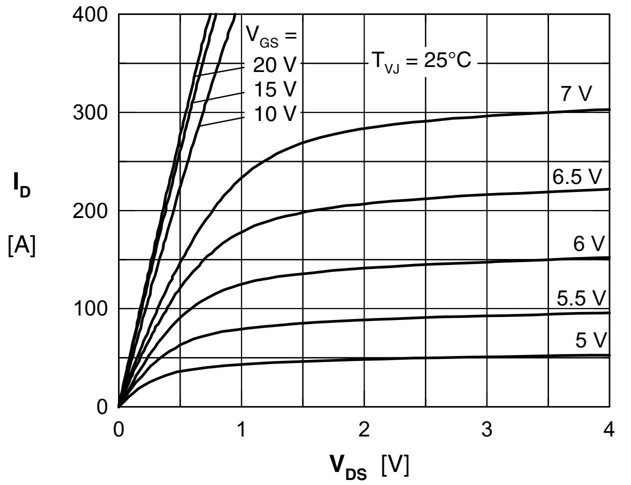


Fig. 3 Typical output characteristic

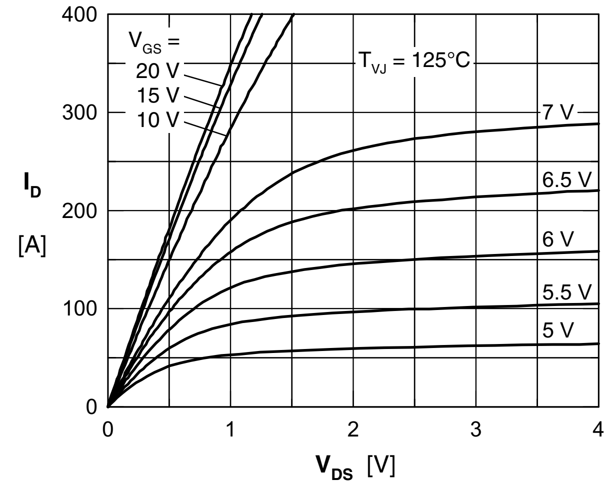


Fig. 4 Typical output characteristic

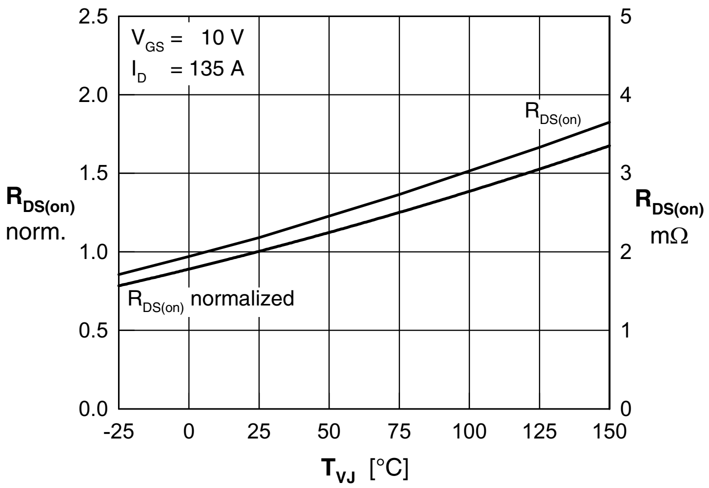


Fig. 5 Typ. drain source on-state resistance $R_{DS(on)}$ versus junction temperature T_J

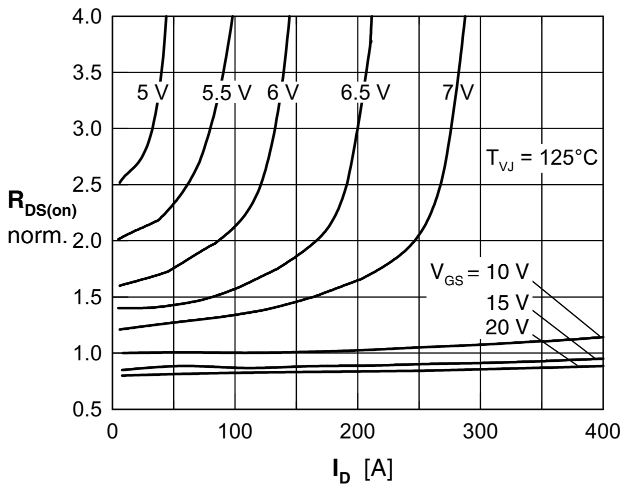


Fig. 6 Typ. drain source on-state resistance $R_{DS(on)}$ versus I_D

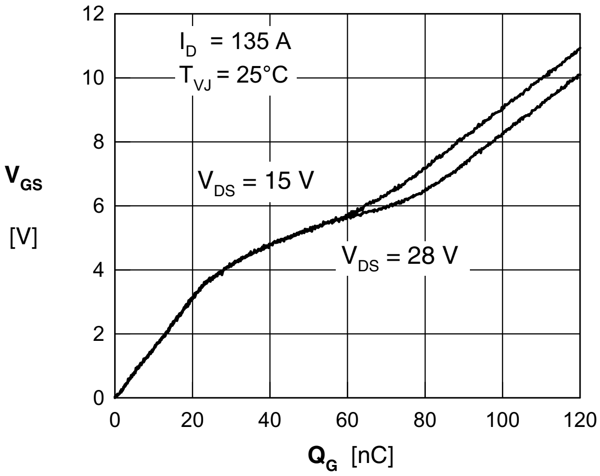


Fig. 7 Gate charge characteristics

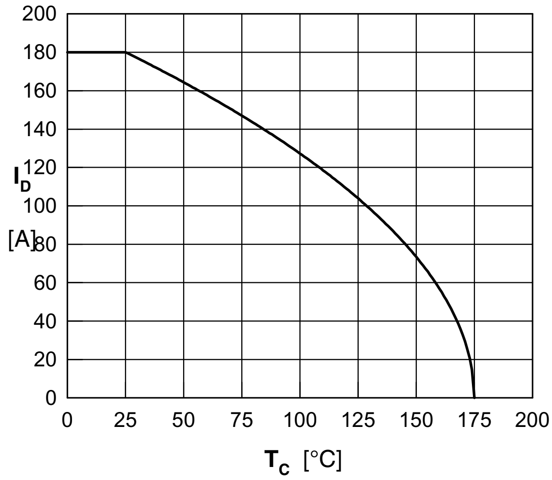


Fig. 8 Drain current I_D vs. temperature T_C

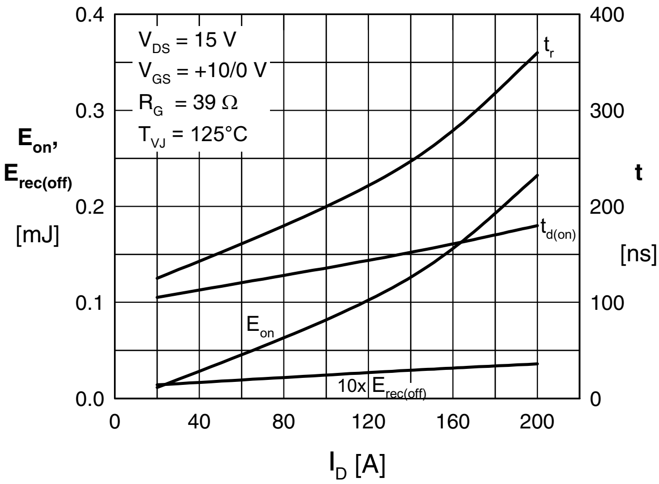


Fig. 9 Typ. turn-on energy & switching times vs. collector current, inductive switching

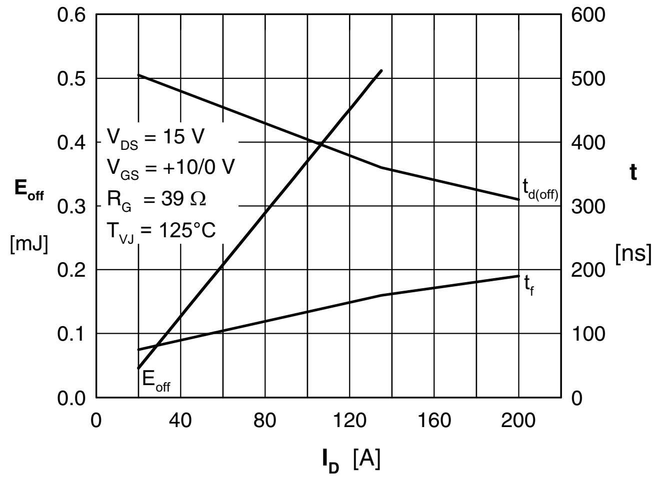


Fig. 10 Typ. turn-off energy & switching times vs. collector current, inductive switching

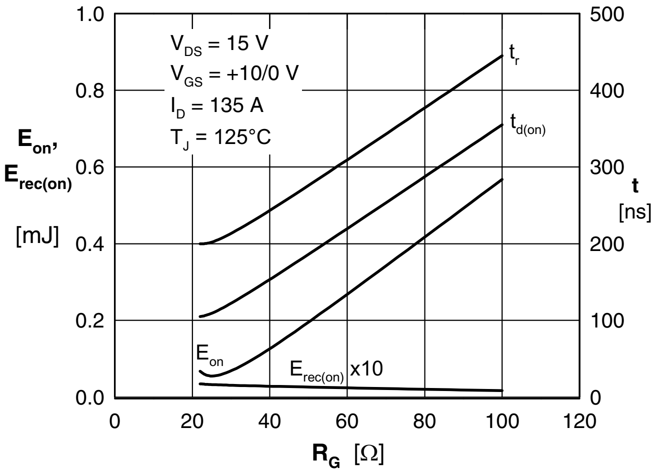


Fig. 11 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

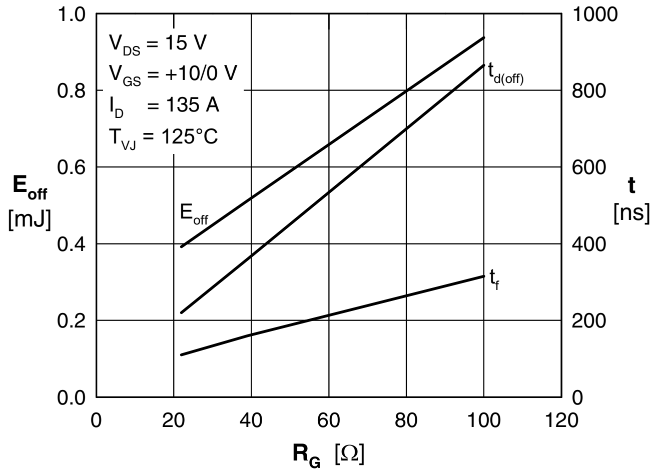


Fig. 12 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

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

20110307b

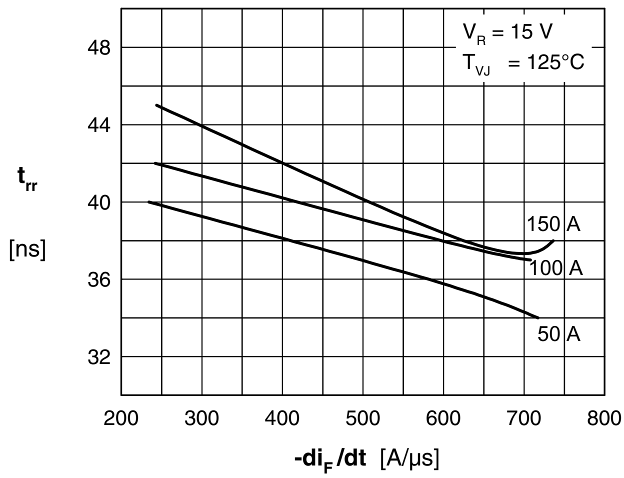


Fig. 13 Typ. reverse recovery time t_{rr} of the body diodes versus di/dt

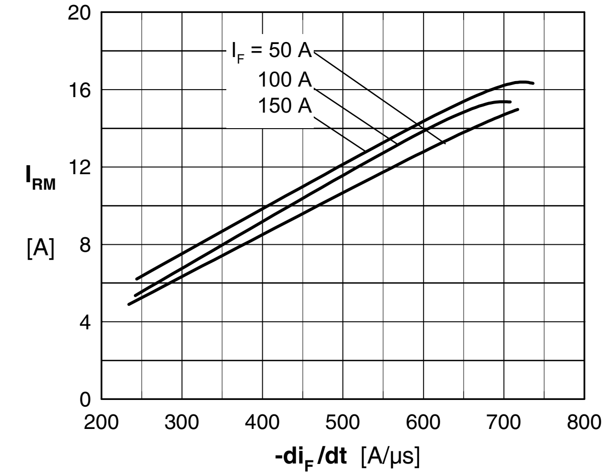


Fig. 14 Typ. reverse recovery current I_{RM} of the body diodes versus di/dt

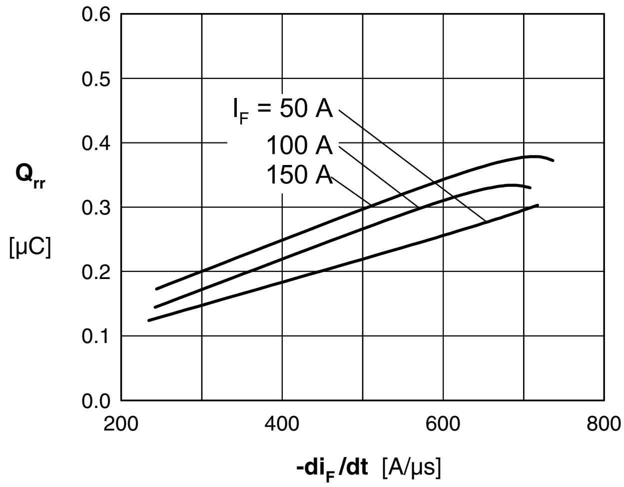


Fig. 15 Typ. reverse recovery charge Q_{rr} of the body diodes versus di/dt

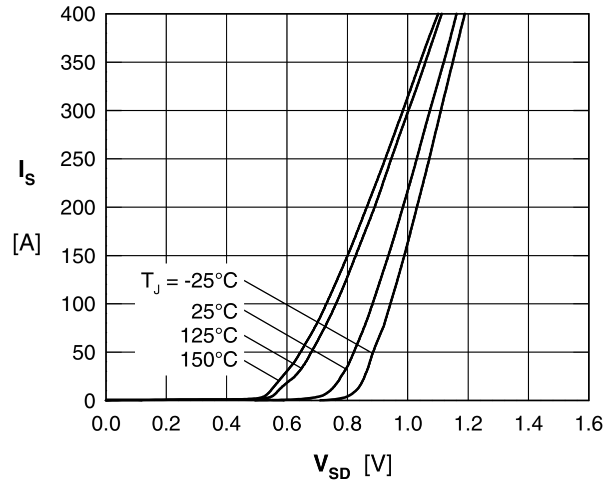


Fig. 16 Typ. source current I_S versus source drain voltage V_{SD} (body diode)

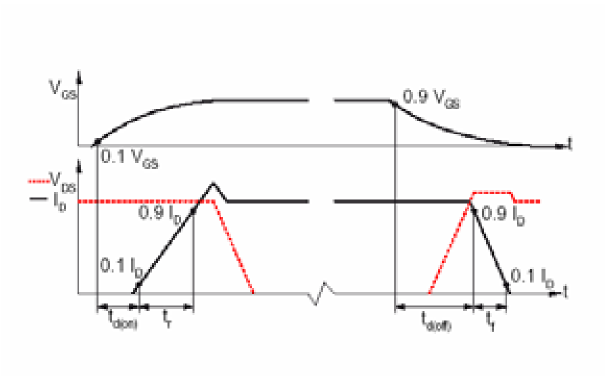


Fig. 17 Definition of switching times

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

20110307b