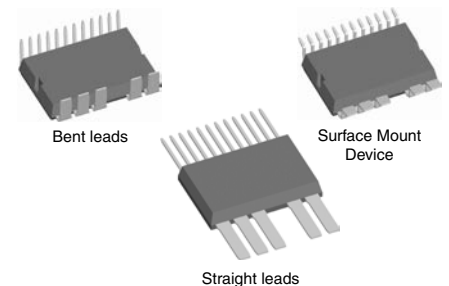
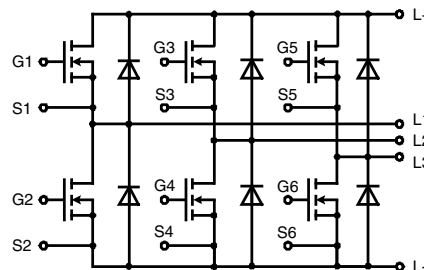


# Three phase full Bridge

with Trench MOSFETs  
in DCB isolated high current package

$V_{DSS} = 75 \text{ V}$   
 $I_{D25} = 125 \text{ A}$   
 $R_{DSon \text{ typ.}} = 3.7 \text{ m}\Omega$



MOSFETs			
Symbol	Conditions	Maximum Ratings	
$V_{DSS}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}$	75	V
$V_{GS}$		$\pm 20$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	125	A
$I_{D90}$	$T_C = 90^\circ\text{C}$	90	A
$I_{F25}$	$T_C = 25^\circ\text{C (diode)}$	130	A
$I_{F90}$	$T_C = 90^\circ\text{C (diode)}$	85	A

## 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 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

## Package options

- 3 lead forms available
  - straight leads (SL)
  - SMD lead version (SMD)
  - bent leads (BL)

Symbol	Conditions	Characteristic Values			
		$(T_{VJ} = 25^\circ\text{C, unless otherwise specified})$			
		min.	typ.	max.	
$R_{DSon}$	on chip level at				m $\Omega$
	$V_{GS} = 10 \text{ V}; I_D = 60 \text{ A}$				
			3.7	5.5	
			8.4		m $\Omega$
$V_{GS(th)}$	$V_{DS} = 20 \text{ V}; I_D = 1 \text{ mA}$	2		4	V
$I_{DSS}$	$V_{DS} = V_{DSS}; V_{GS} = 0 \text{ V}$		0.1	1	$\mu\text{A}$
					mA
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}; V_{DS} = 0 \text{ V}$			0.2	$\mu\text{A}$
$Q_g$	$V_{GS} = 10 \text{ V}; V_{DS} = 55 \text{ V}; I_D = 125 \text{ A}$		100		nC
$Q_{gs}$			19		nC
$Q_{gd}$			28		nC
$t_{d(on)}$	$V_{GS} = 10 \text{ V}; V_{DS} = 30 \text{ V}$ $I_D = 80 \text{ A}; R_G = 39 \Omega$ inductive load		80		ns
$t_r$			80		ns
$t_{d(off)}$			510		ns
$t_f$			100		ns
$E_{on}$			0.12		mJ
$E_{off}$			0.40		mJ
$E_{recoff}$		0.02		mJ	
$R_{thJC}$			0.9		K/W
$R_{thJH}$	with heat transfer paste		1.2		K/W

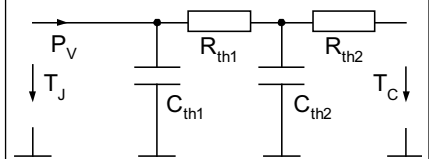
**Source-Drain Diode**

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
( $T_J = 25^\circ\text{C}$ , unless otherwise specified)					
$V_{SD}$	(diode) $I_F = 60\text{ A}$ ; $V_{GS} = 0\text{ V}$		0.9	1.2	V
$t_{rr}$			70		ns
$Q_{RM}$	$I_F = 80\text{ A}$ ; $-di_F/dt = 800\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$		1.1		$\mu\text{C}$
$I_{RM}$			30		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	300	A
$T_{VJ}$		-40...+175	$^\circ\text{C}$
$T_{stg}$		-55...+125	$^\circ\text{C}$
$V_{ISOL}$	$I_{ISOL} \leq 1\text{ mA}$ , 50/60 Hz, $f = 1\text{ minute}$	1000	V~
$F_C$	mounting force with clip	50 - 250	N

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
$R_{pin\ to\ chip}$	with heatsink compound		0.6		$\text{m}\Omega$
$C_p$	coupling capacity between shorted pins and mounting tab in the case		160		pF
Weight	typ.		25		g

**Equivalent Circuits for Simulation**
**Thermal Response**


junction - case (typ.)

$$C_{th1} = 0.039\text{ J/K}; R_{th1} = 0.28\text{ K/W}$$

$$C_{th2} = 0.069\text{ J/K}; R_{th2} = 0.57\text{ K/W}$$



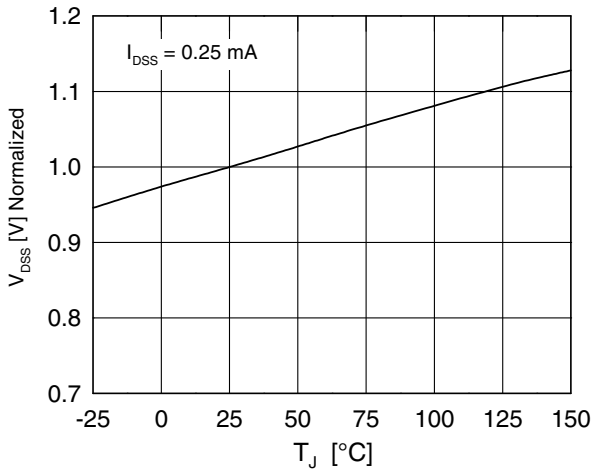


Fig. 1 Drain source breakdown voltage  $V_{DSS}$  vs. junction temperature  $T_{J}$

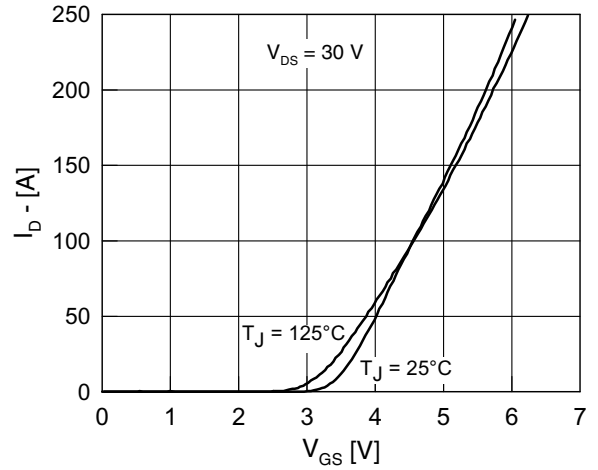


Fig. 2 Typical transfer characteristic

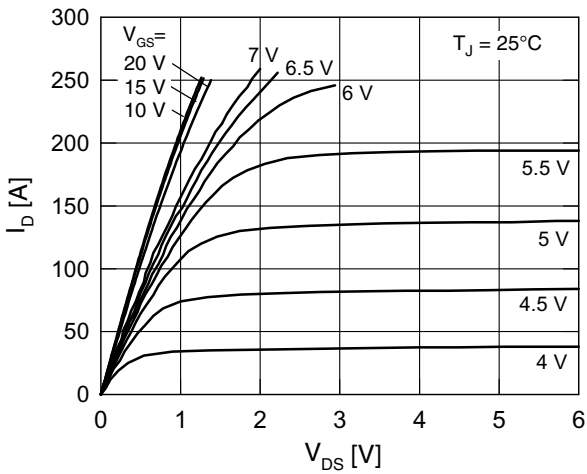


Fig. 3 Typical output characteristic

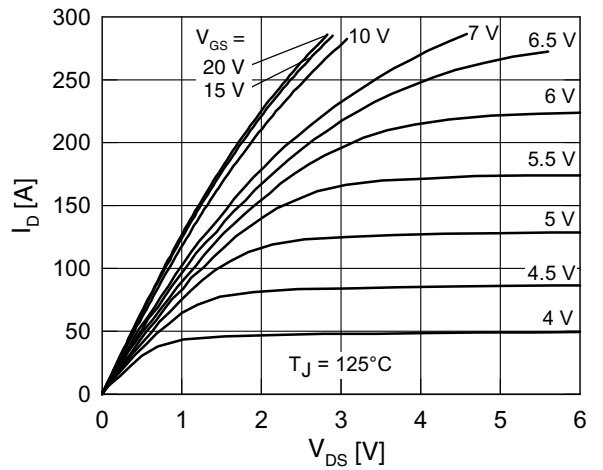


Fig. 4 Typical output characteristic

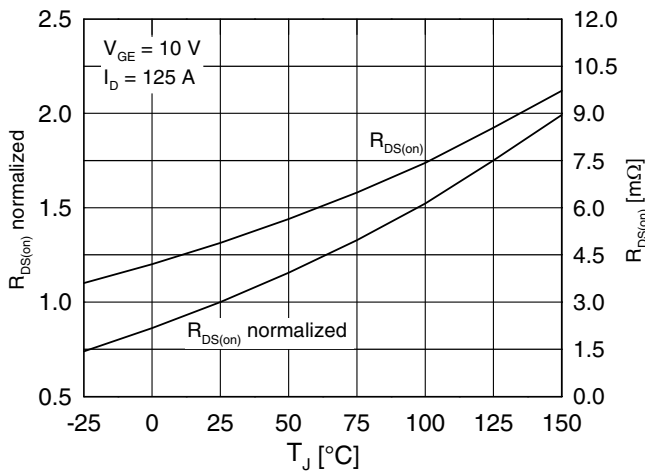


Fig. 5 Drain source on-state resistance  $R_{DS(on)}$  versus junction temperature  $T_J$

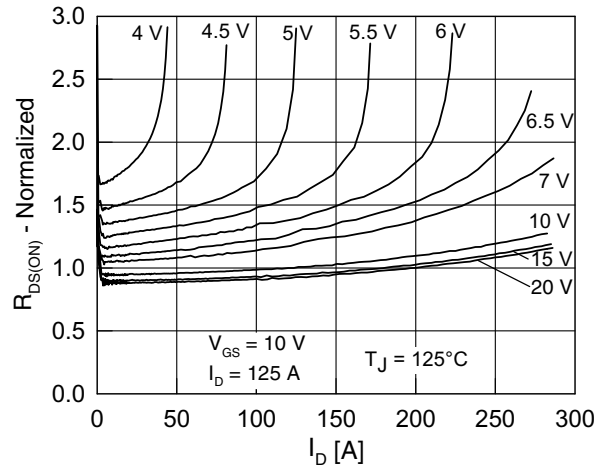


Fig. 6 Drain source on-state resistance  $R_{DS(on)}$  versus  $I_D$

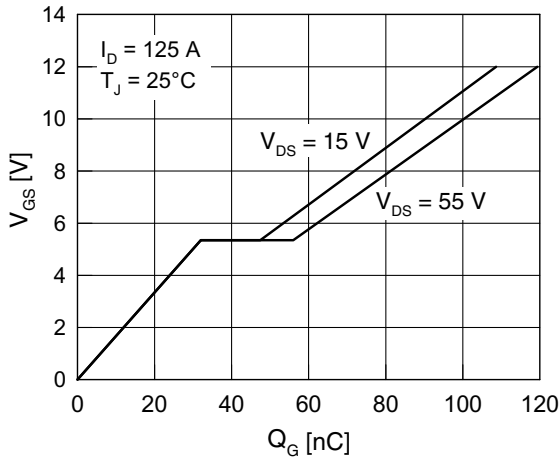


Fig. 7 Gate charge characteristic

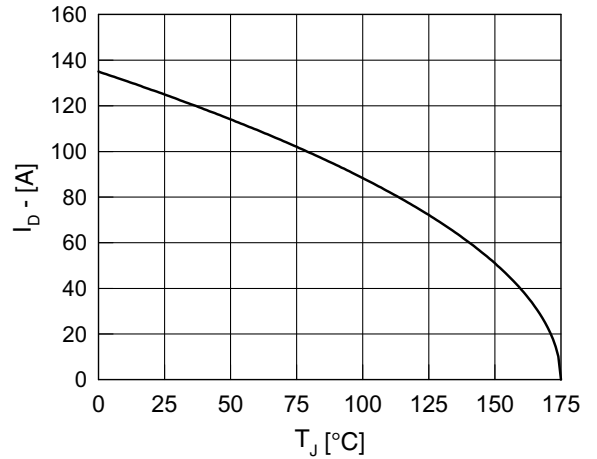


Fig. 8 Drain current  $I_D$  vs. case temperature  $T_C$

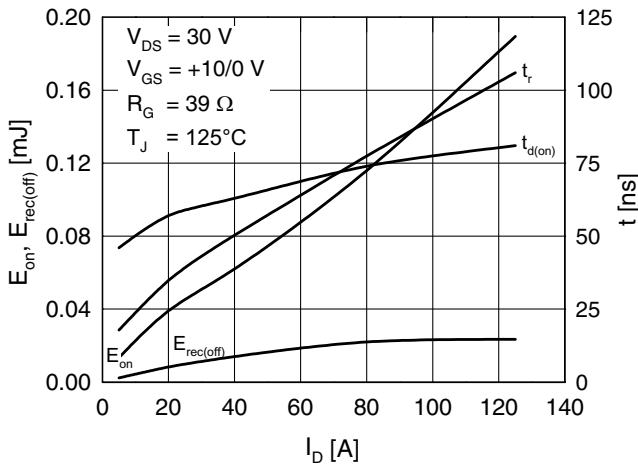


Fig. 9 Typ. turn-on energy & switching times vs. collector current, inductive switching

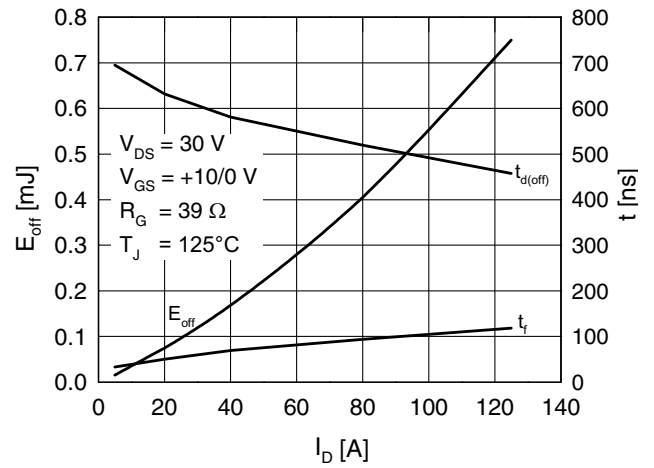


Fig. 10 Typ. turn-off energy & switching times vs. collector current, inductive switching

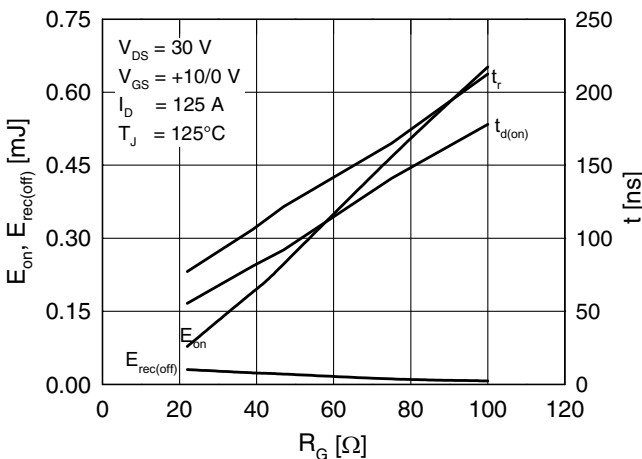


Fig. 11 Typ. turn-on energy & switching times vs. gate resistor, inductive switching

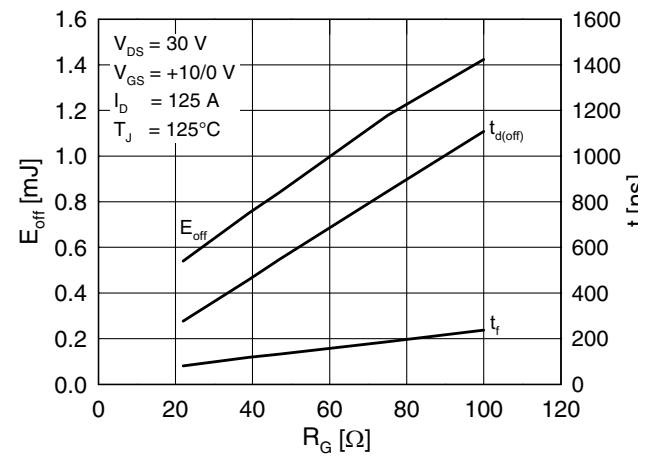


Fig. 12 Typ. turn-off energy & switching times vs. gate resistor, inductive switching

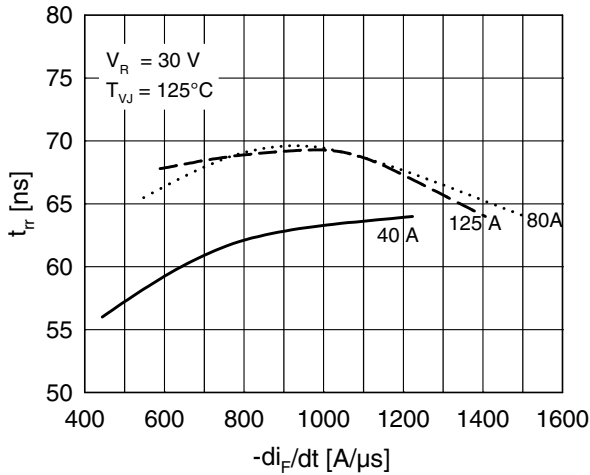


Fig. 13 Reverse recovery time  $t_{rr}$  of the body diode vs.  $di/dt$

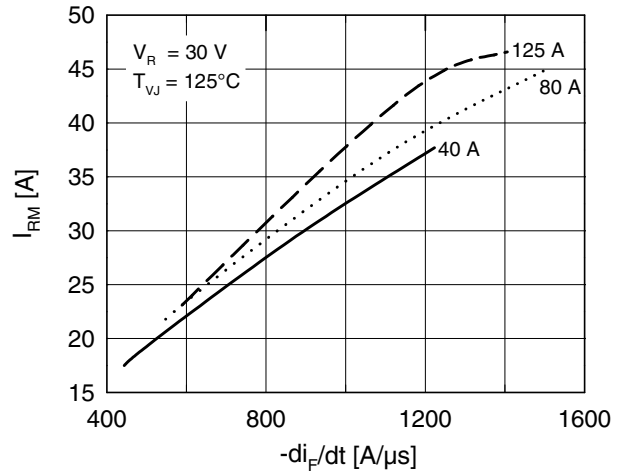


Fig. 14 Reverse recovery current  $I_{RM}$  of the body diode vs.  $di/dt$

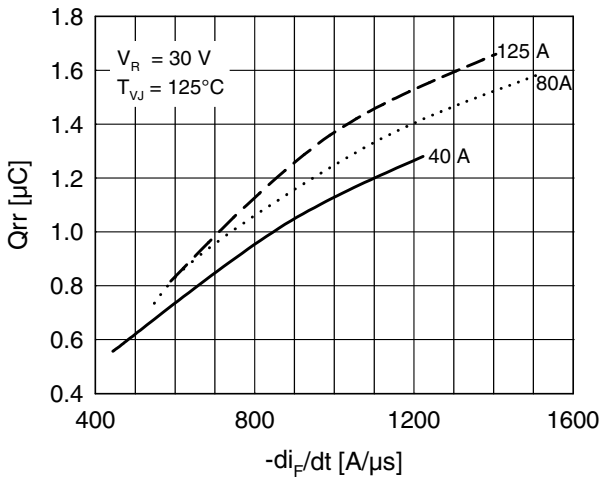


Fig. 15 Reverse recovery charge  $Q_{rr}$  of the body diode vs.  $di/dt$

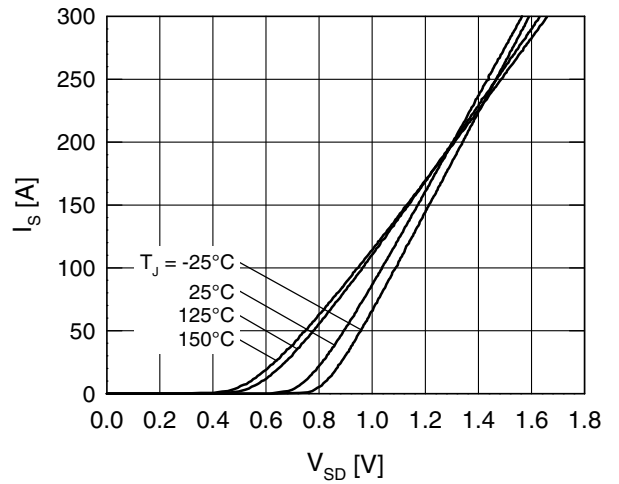


Fig. 16 Source current  $I_S$  vs. source drain voltage  $V_{SD}$  (body diode)

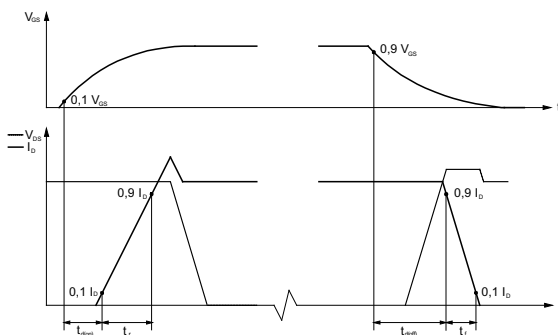


Fig. 17 Definition of switching times

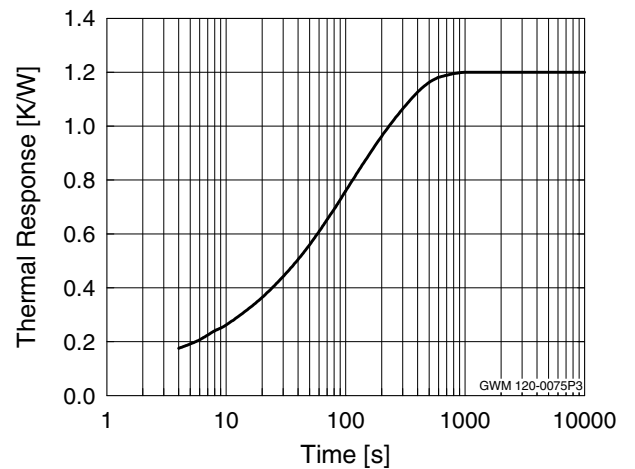


Fig. 18 Therm. impedance junction to case  $Z_{thJC}$