

SEMITRANS™ 3

Trench IGBT Modules

SKM 400GB176D

SKM 400GAL176D

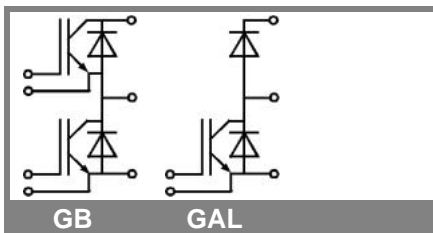
Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

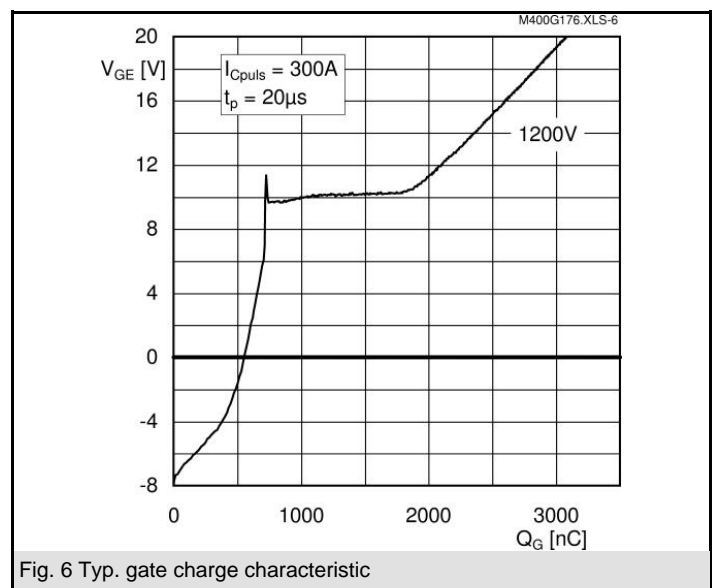
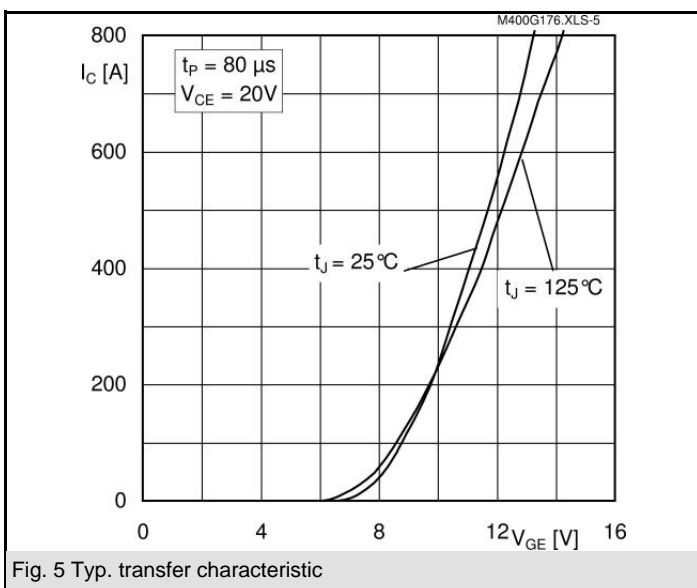
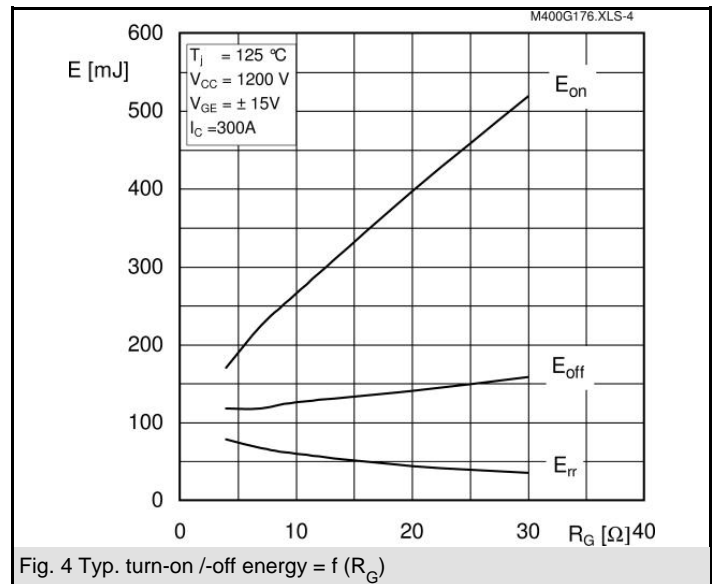
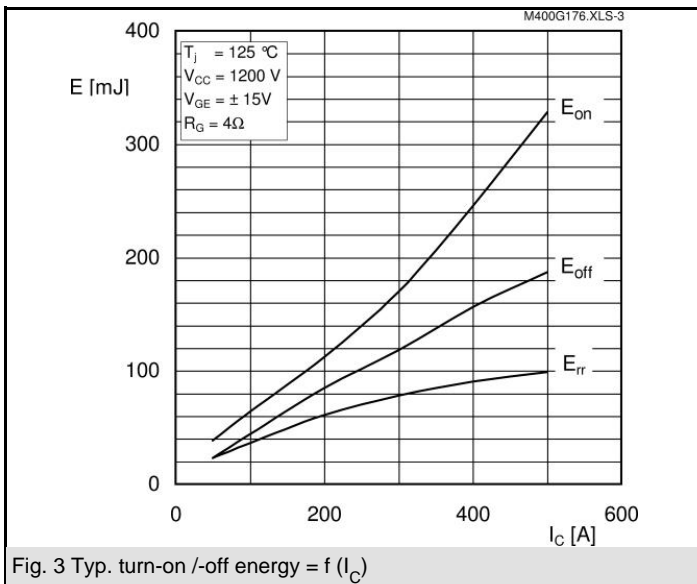
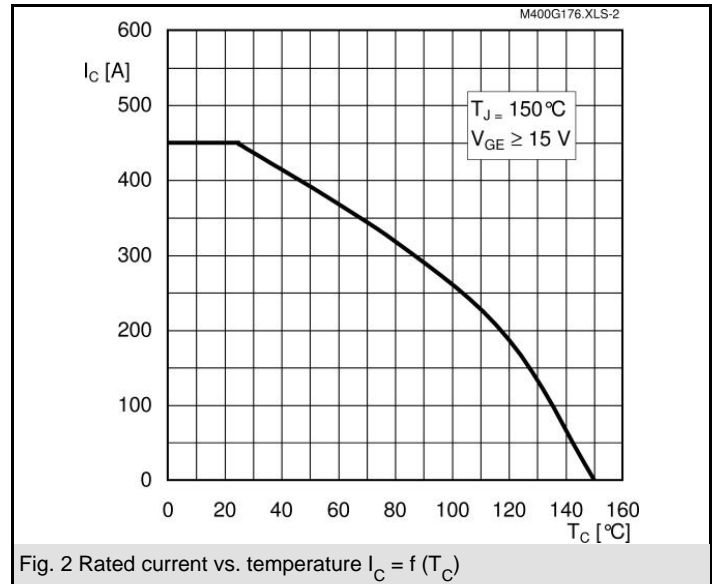
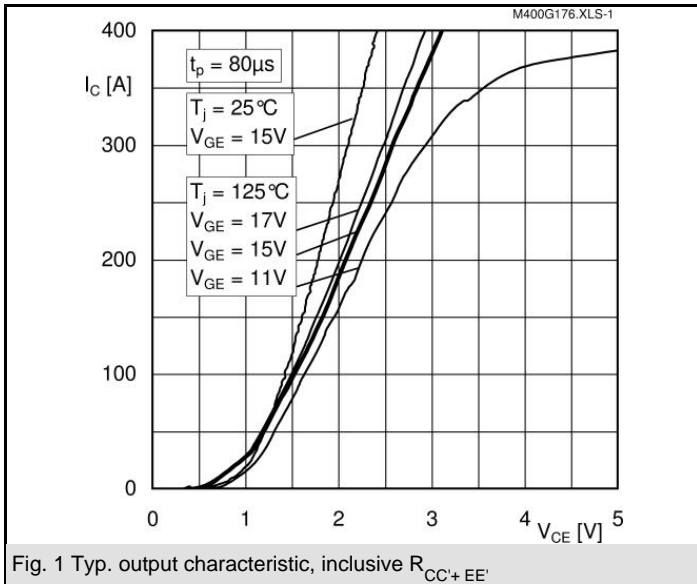
Typical Applications

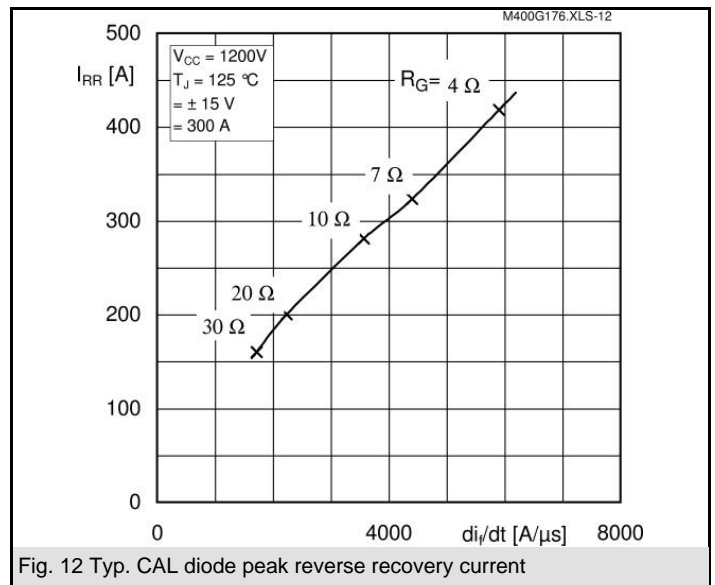
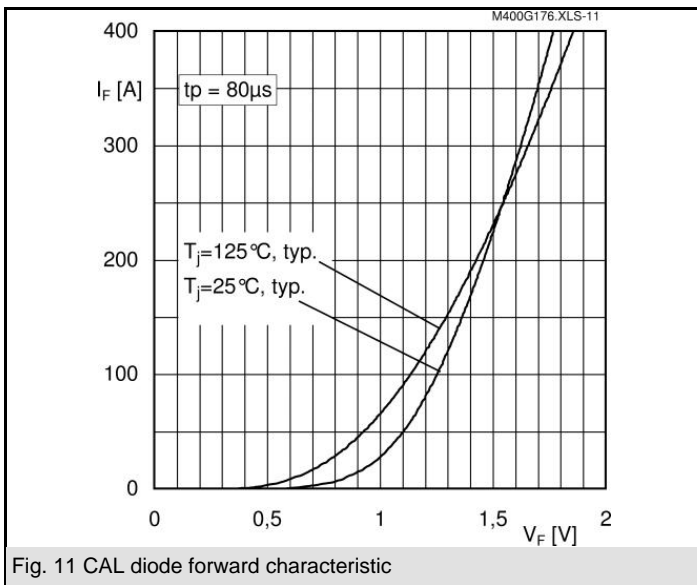
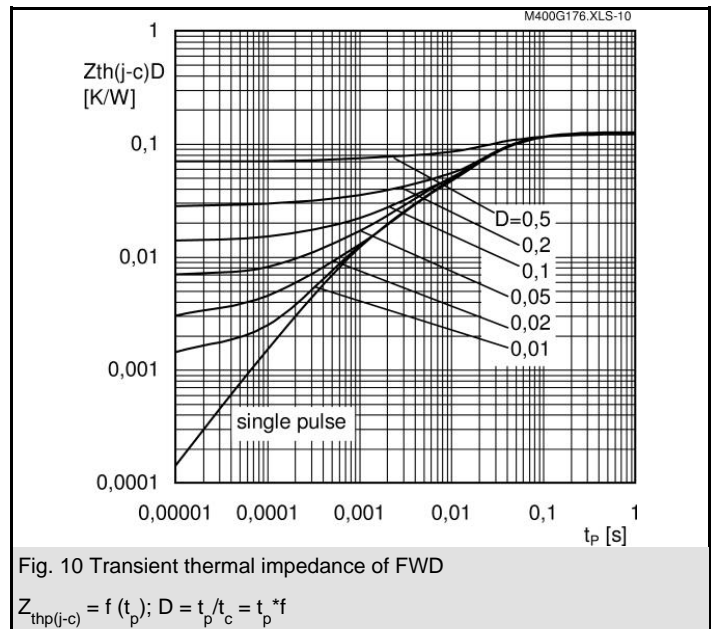
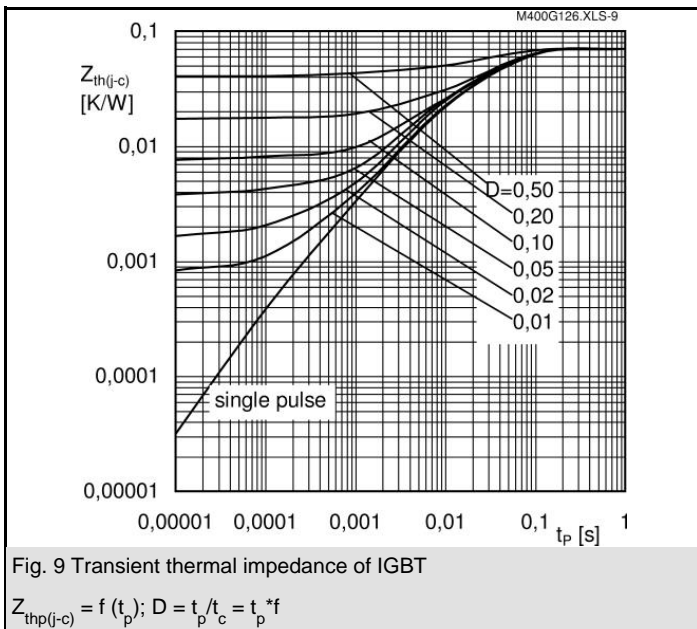
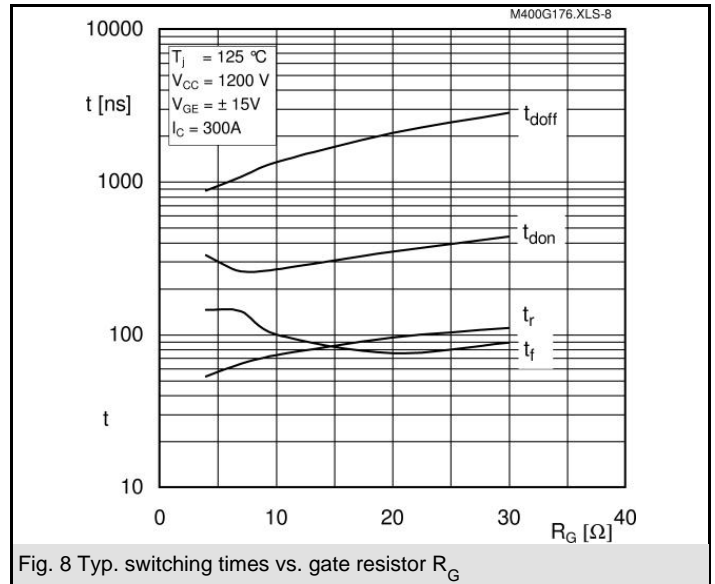
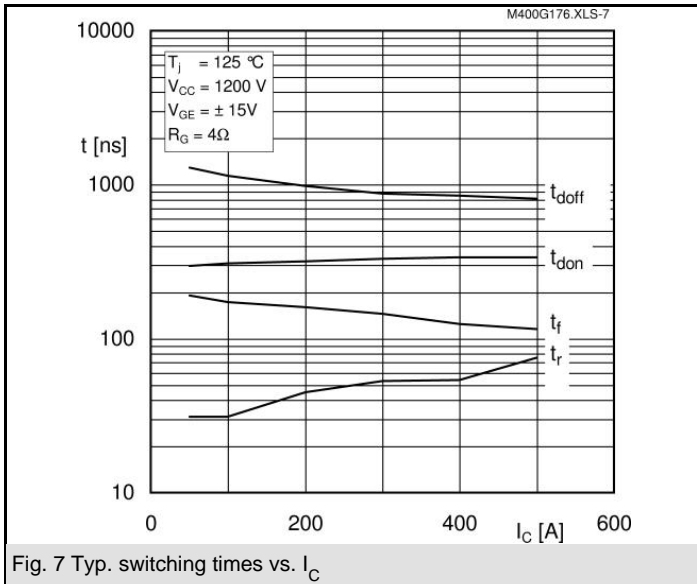
- AC inverter drives
- mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power



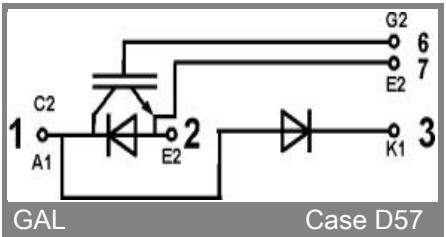
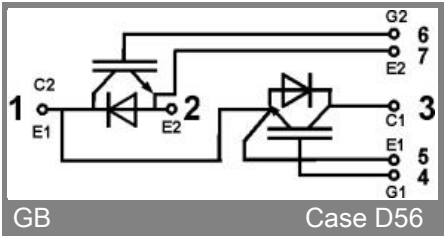
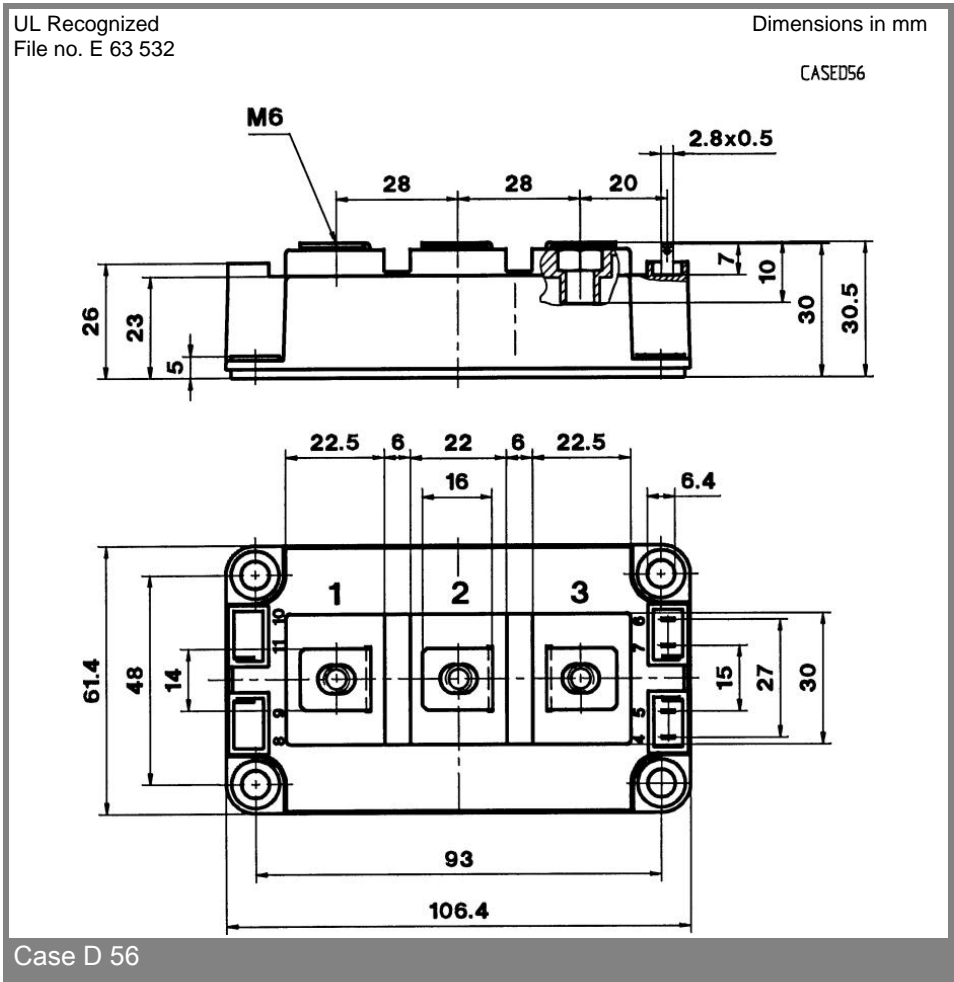
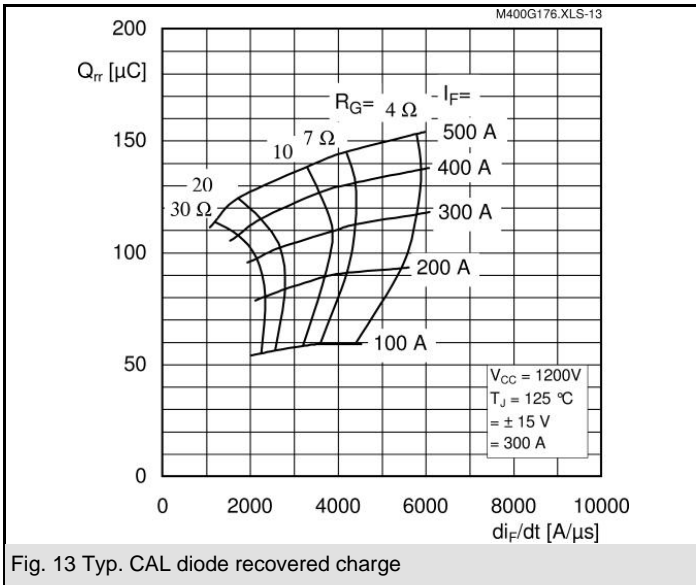
Absolute Maximum Ratings		$T_{case} = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1700	V
I_C	$T_c = 25 (80)^\circ\text{C}$	450 (320)	A
I_{CRM}	$T_c = 25 (80)^\circ\text{C}$, $t_p = 1 \text{ ms}$	900 (640)	A
V_{GES}		± 20	V
T_{vj} (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	$^\circ\text{C}$
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	$T_c = 25 (80)^\circ\text{C}$	420 (280)	A
I_{FRM}	$T_c = 25 (80)^\circ\text{C}$, $t_p = 1 \text{ ms}$	900 (640)	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 150^\circ\text{C}$	2200	A
Freewheeling diode			
I_F	$T_c = 25 (80)^\circ\text{C}$	420 (280)	A
I_{FRM}	$T_c = 25 (80)^\circ\text{C}$, $t_p = 1 \text{ ms}$	900 (640)	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 150^\circ\text{C}$	2200	A

Characteristics		$T_{case} = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12 \text{ mA}$	5,2	5,8	6,4	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25 (125)^\circ\text{C}$		0,15	0,45	mA
$V_{CE(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1 (0,9)	1,2 (1,1)	V
r_{CE}	$V_{GE} = 15 \text{ V}$, $T_j = 25 (125)^\circ\text{C}$		3,3 (5,2)	4,2 (6)	m Ω
$V_{CE(sat)}$	$I_C = 300 \text{ A}$, $V_{GE} = 15 \text{ V}$, chip level		2 (2,45)	2,45 (2,9)	V
C_{ies}	under following conditions		13,2		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25 \text{ V}$, $f = 1 \text{ MHz}$		0,6		nF
C_{res}			0,5		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25 (125)^\circ\text{C}$		0,35 (0,5)		m Ω
$t_{d(on)}$	$V_{CC} = 1200 \text{ V}$, $I_C = 300 \text{ A}$		330		ns
t_r	$R_{Gon} = R_{Goff} = 4 \Omega$, $T_j = 125^\circ\text{C}$		55		ns
$t_{d(off)}$	$V_{GE} \pm 15 \text{ V}$		880		ns
t_f			145		ns
$E_{on} (E_{off})$			170 (118)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_F = 300 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)^\circ\text{C}$		1,7 (1,8)	1,9 (2)	V
$V_{(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1,2 (0,9)	1,4 (1,1)	V
r_T	$T_j = 25 (125)^\circ\text{C}$		1,7 (3)	1,7 (3)	m Ω
I_{RRM}	$I_F = 300 \text{ A}$; $T_j = 125 ()^\circ\text{C}$		418		A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$		117		μC
E_{rr}	$V_{GE} = 0 \text{ V}$		78		mJ
FWD					
$V_F = V_{EC}$	$I_F = 300 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)^\circ\text{C}$		1,7 (1,8)	1,9 (2)	V
$V_{(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1,2 (0,9)	1,4 (1,1)	V
r_T	$T_j = 25 (125)^\circ\text{C}$		1,7 (3)	1,7 (3)	m Ω
I_{RRM}	$I_F = 300 \text{ A}$; $T_j = 125 ()^\circ\text{C}$		418		A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$		117		μC
E_{rr}	$V_{GE} = 0 \text{ V}$		78		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,07	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,125	K/W
$R_{th(j-c)FD}$	per FWD			0,125	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6	2,5		5	Nm
w				325	g





SKM 400GB176D ...



This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.