SKiM 220GD176D H4

SKiM® 4

IGBT Modules

SKiM 220GD176D H4

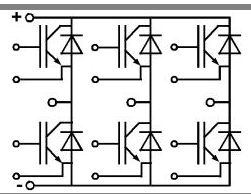
Preliminary Data

Features

- Homogenous Si
- Trench = Trenchgate Technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6x I_C

Typical Applications*

- AC inverter drives mains 575 - 750 V AC
- public transport (auxiliary syst.)



GD

Absolute Maximum Ratings		T_c = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		1700	V
I_C	T_s = 25 (70) °C	220 (165)	A
I_{CRM}	t_p = 1 ms	440	A
V_{GES}		± 20	V
T_j (T_{stg})		- 40 ...+ 150 (125)	°C
T_{cop}	max. case operating temperature	125	°C
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	T_s = 25 (70) °C	220 (165)	A
I_{FRM}	t_p = 1 ms	440	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	2200	A

Characteristics		T_c = 25 °C, unless otherwise specified			
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Units**
IGBT					
$V_{GE(th)}$	V_{GE} = V_{CE}; I_C = 10 mA	5,15	5,8	6,45	V
I_{CES}	V_{GE} = 0; V_{CE} = V_{CES}; T_j = 25 °C			0,3	mA
V_{CEO}	T_j = 0 °C		1 (0,9)	1,2 (1,1)	V
r_{CE}	T_j = °C		4 (6)	5	mΩ
V_{CEsat}	I_{Cnom} = 250 A; V_{GE} = 15 V, T_j = 25 (125) °C on chip level		2 (2,4)	2,45	V
C_{ies}	V_{GE} = 0; V_{CE} = 25 V; f = 1 MHz		22		nF
C_{oes}	V_{GE} = 0; V_{CE} = 25 V; f = 1 MHz		0,9		nF
C_{res}	V_{GE} = 0; V_{CE} = 25 V; f = 1 MHz		0,7		nF
L_{CE}				15	nH
$R_{CC'+EE'}$	resistance, terminal-chip T_c= 25 (125) °C		1,35 (1,75)		mΩ
$t_{d(on)}$	V_{CC} = 1200 V		330		ns
t_r	I_{Cnom} = 250 A		55		ns
$t_{d(off)}$	R_{Gon} = R_{Goff} = 4,8 Ω		880		ns
t_f	T_j = 125 °C		145		ns
E_{on} (E_{off})	V_{GE} ± 15 V		145 (100)		mJ
E_{on} (E_{off})	with SKHI 64; T_j = 125 °C; V_{CC} = 1200 V; I_C = 250 A				mJ
Inverse diode					
V_F = V_{EC}	I_{Fnom} = 250 A; V_{GE} = 15 V; T_j = 25 (125) °C		1,7 (1,8)	1,9 (2)	V
V_{TO}	T_j = 25 (125) °C		1,1 (0,9)	1,3 (1,1)	V
r_T	T_j = 25 (125) °C		3 (4,5)	3 (4,5)	mΩ
I_{RRM}	I_F = 200 A; T_j = 125 °C				A
Q_{rr}	V_{GE} = 0 V di/dt = A/µs				µC
E_{rr}	R_{Gon} = R_{Goff} = 4,8 Ω		(65)		mJ
Thermal characteristics					
$R_{th(j-s)}$	per IGBT			0,21	K/W
$R_{th(j-s)}$	per FWD			0,26	K/W
Temperature Sensor					
R_{TS}	T = 25 (100) °C		1 (1,67)		kΩ
tolerance	T = 25 (100) °C		3 (2)		%
Mechanical data					
M_1	to heatsink (M5)	2		3	Nm
M_2	for terminals (M6)	4		5	Nm
w				310	g

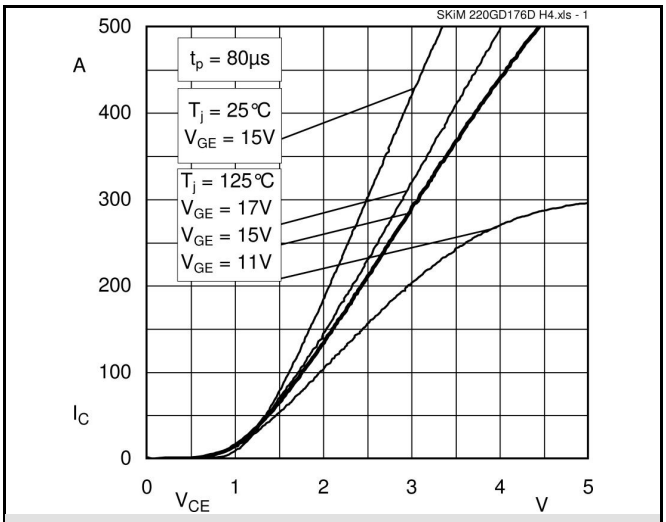


Fig. 1 Output characteristic, inclusive $R_{CC'+EE'}$

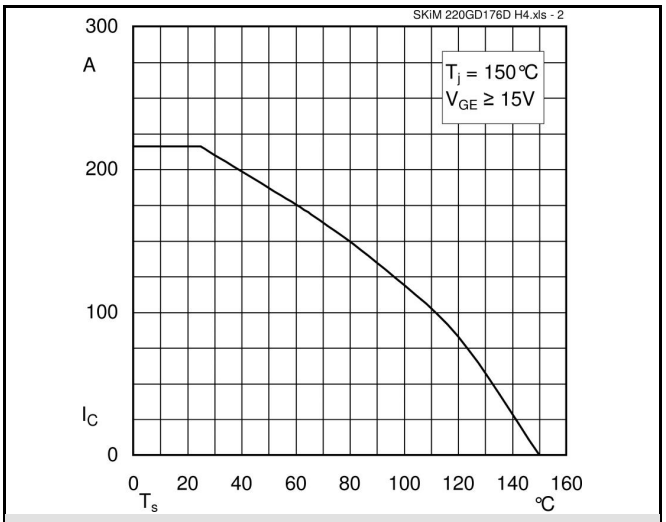


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

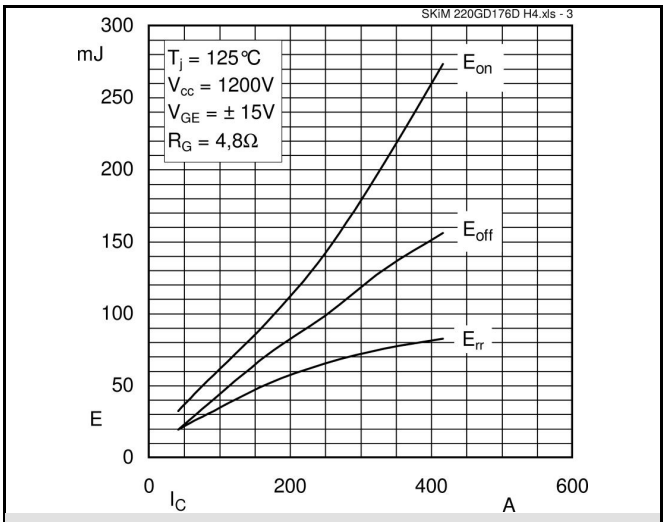


Fig. 3 Turn-on /-off energy = f (I_C)

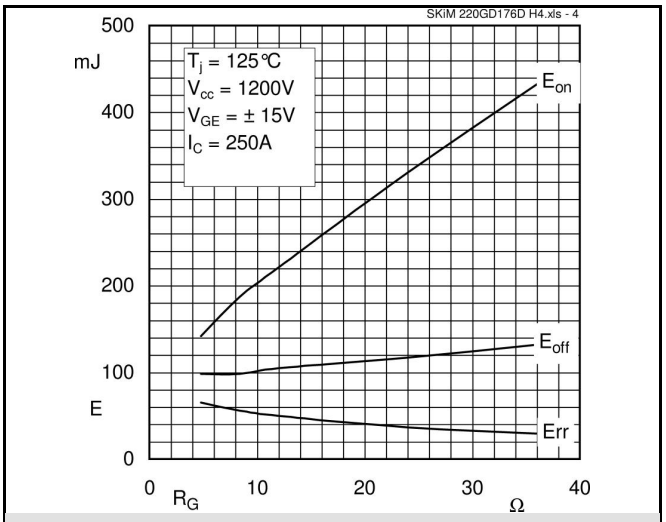


Fig. 4 Turn-on /-off energy = f (R_G)

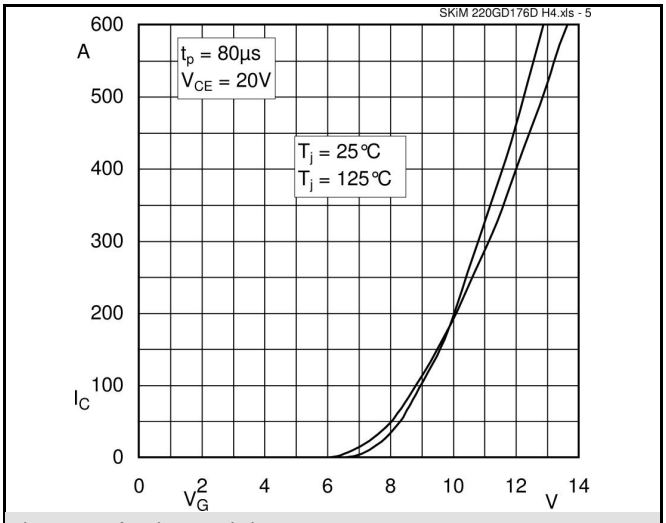


Fig. 5 Transfer characteristic

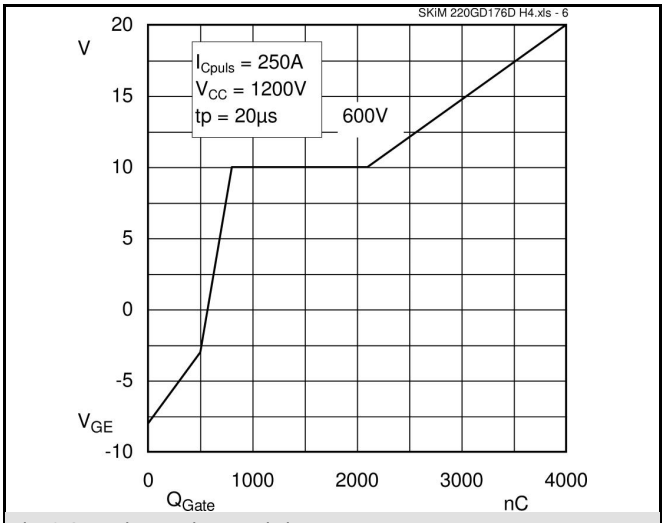


Fig. 6 Gate charge characteristic

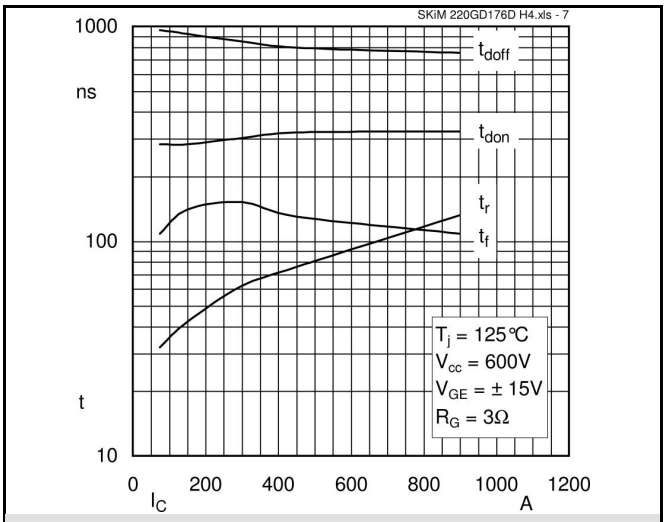


Fig. 7 Switching times vs. I_C

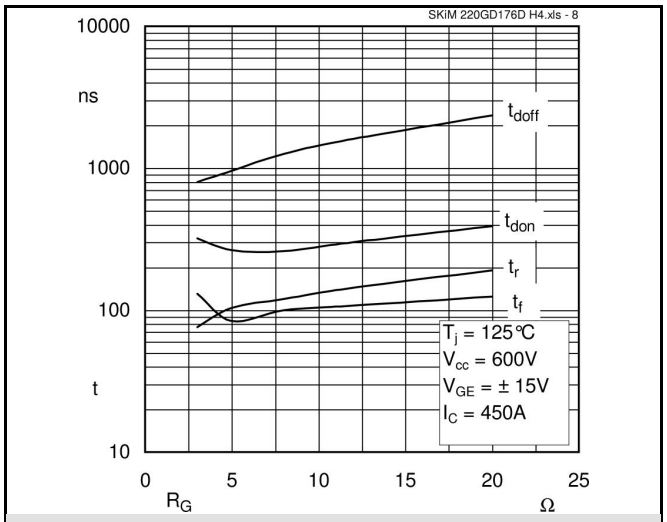


Fig. 8 Switching times vs. gate resistor R_G

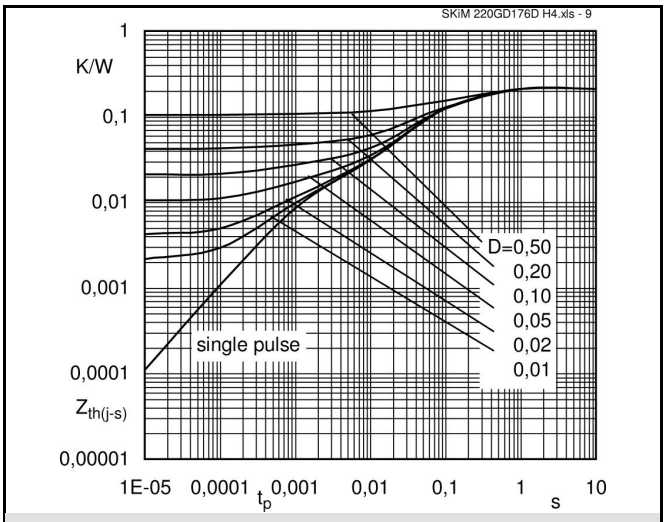


Fig. 9 Transient thermal impedance of
IGBT $Z_{thJC} = f(t_p)$; $D = t_p/t_c = t_p * f$

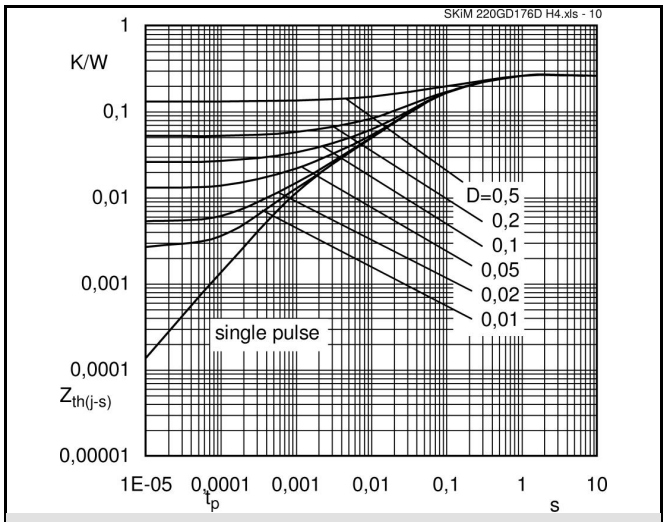


Fig. 10 Transient thermal impedance of inverse diodes
IGBT $Z_{thJC} = f(t_p)$; $D = t_p/t_c = t_p * f$

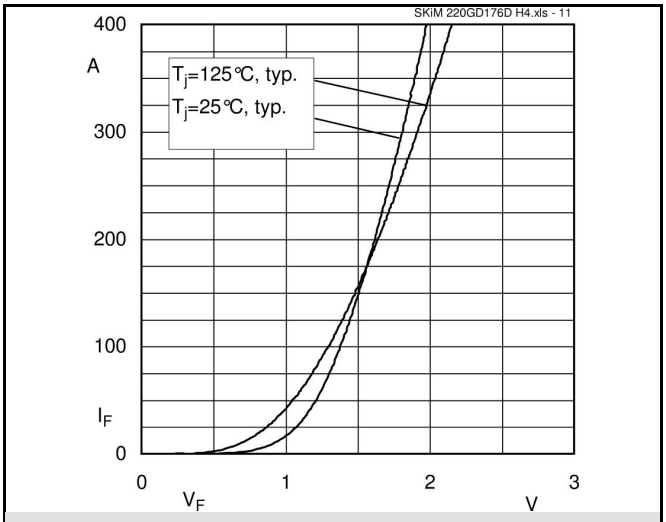
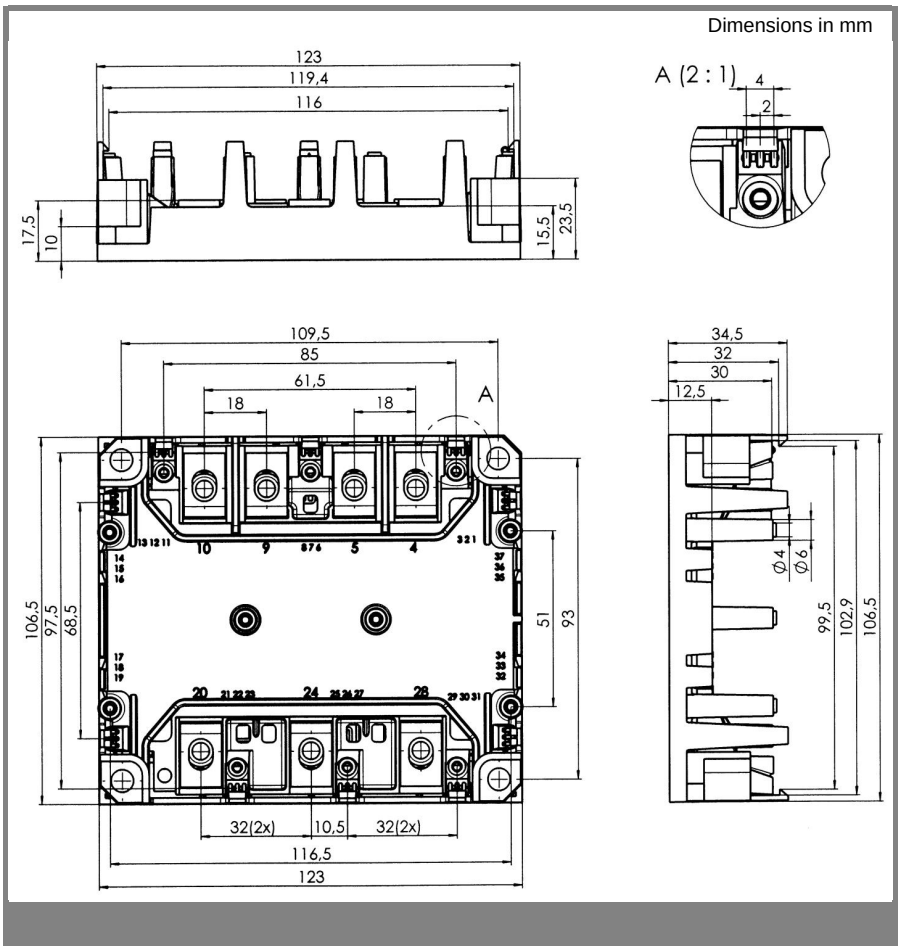
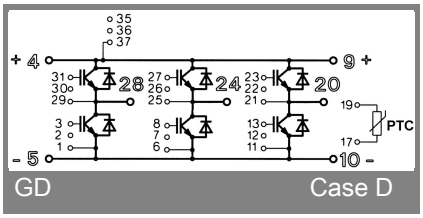


Fig. 11 CAL diode forward characteristic, incl. $R_{CC'+EE'}$





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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.

