SKiM® 4

IGBT Modules

SKiM 120GD176D

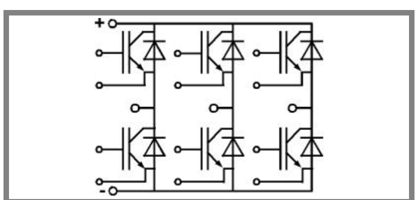
Preliminary Data

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.)



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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	110 (85)	A
I_{CRM}	t_p = 1 ms	250	A
V_{GES}		± 20	V
T_j (T_{stg})		- 40 ... 150	°C
T_{cop}	max. case operating temperature	125	°C
V_{isol}	AC, 1 min.	3300	V
Inverse diode			
I_F	T_s = 25 (70) °C	105 (80)	A
I_{FRM}	t_p = 1 ms	200	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	1200	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 = 5 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 = 25 (125) °C		1 (0,9)	1,2 (1,1)	V
r_{CE}	T_j = 25 (125) °C		8 (12)	10 (14,4)	mΩ
V_{CEsat}	I_{Cnom} = 125 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		11		nF
C_{oes}	V_{GE} = 0; V_{CE} = 25 V; f = 1 MHz		0,45		nF
C_{res}	V_{GE} = 0; V_{CE} = 25 V; f = 1 MHz		0,35		nF
L_{CE}			10	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		320		ns
t_r	I_{Cnom} = 125 A		40		ns
$t_{d(off)}$	$R_{Gon} = R_{Goff}$ = 12 Ω		850		ns
t_f	T_j = 125 °C		120		ns
E_{on} (E_{off})	V_{GE} = ± 15 V		72 (46)		mJ
E_{on} (E_{off})	with SKHI 6; T_j = °C V_{CC} = V; I_C = A				mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 100 A; V_{GE} = 15 V; T_j = 25 (125) °C		1,6 (1,6)	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		5 (7)	6 (8)	mΩ
I_{RRM}	I_F = 125 A; T_j = 125 °C		170		A
Q_{rr}	V_{GE} = V di/dt = 3100 A/μs		37		μC
E_{rr}	$R_{Gon} = R_{Goff}$ = 12 Ω		22		mJ
Thermal characteristics					
$R_{th(j-s)}$	per IGBT			0,4	K/W
$R_{th(j-s)}$	per FWD			0,56	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

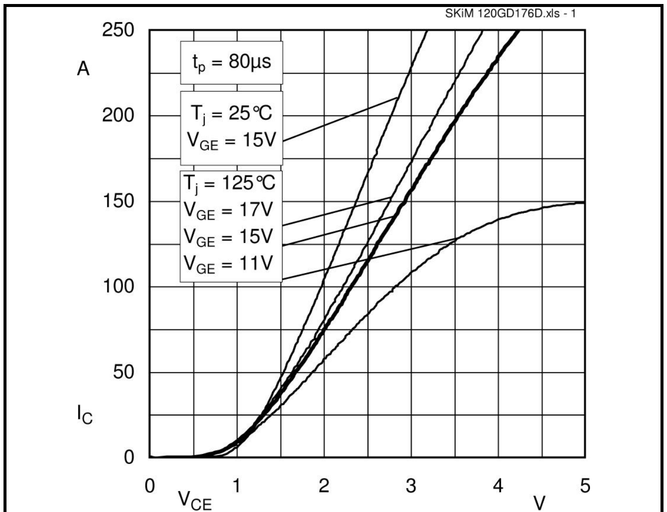


Fig. 1 Output characteristic, inclusive $R_{CC'+ EE'}$

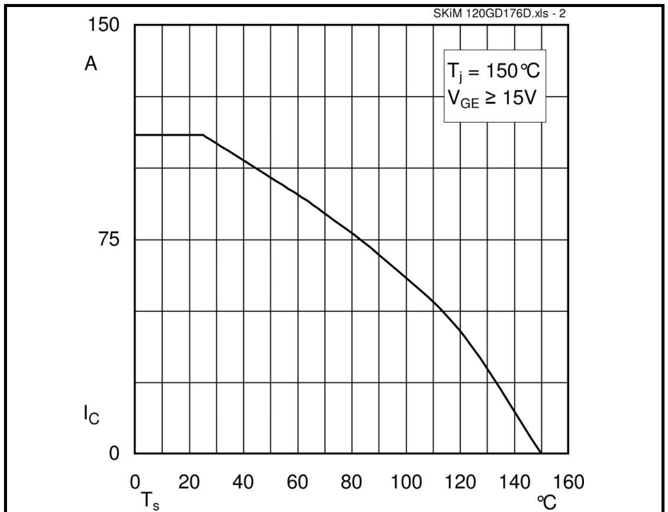


Fig. 2 Rated current vs. temperature I_C = f (T_C)

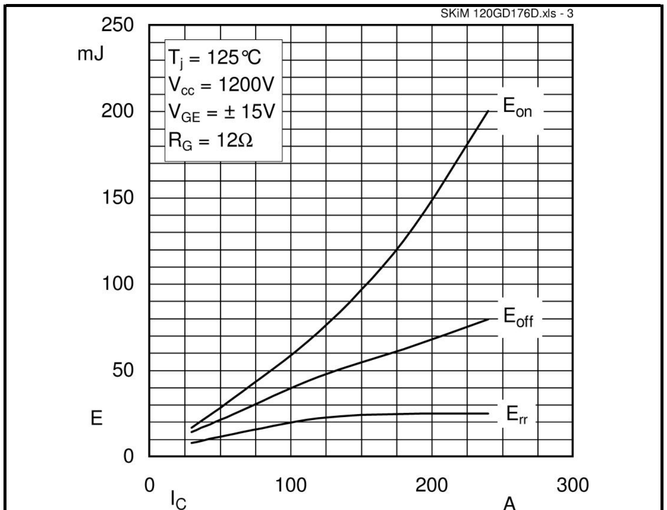


Fig. 3 Turn-on /-off energy = f (I_C)

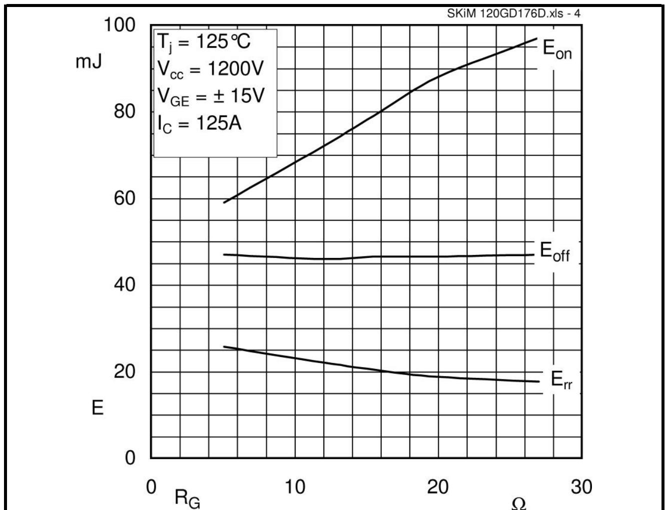


Fig. 4 Turn-on /-off energy = f (R_G)

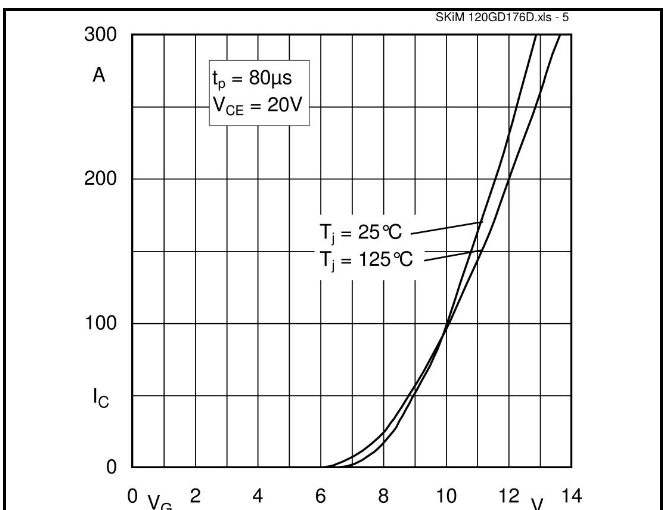


Fig. 5 Transfer characteristic

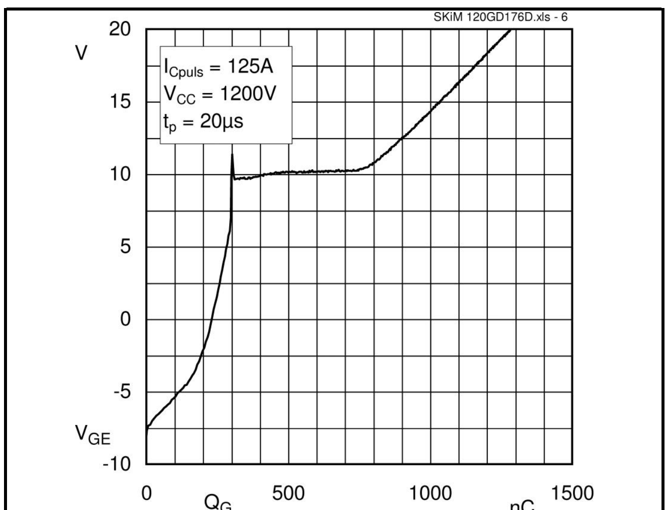


Fig. 6 Gate charge characteristic

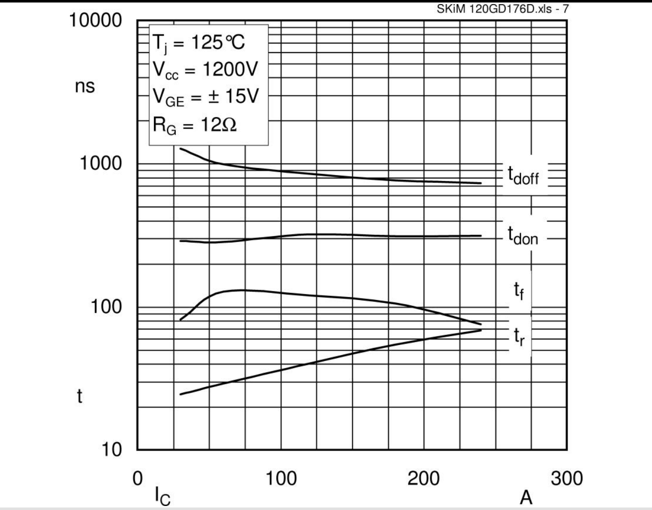


Fig. 7 Switching times vs. I_C

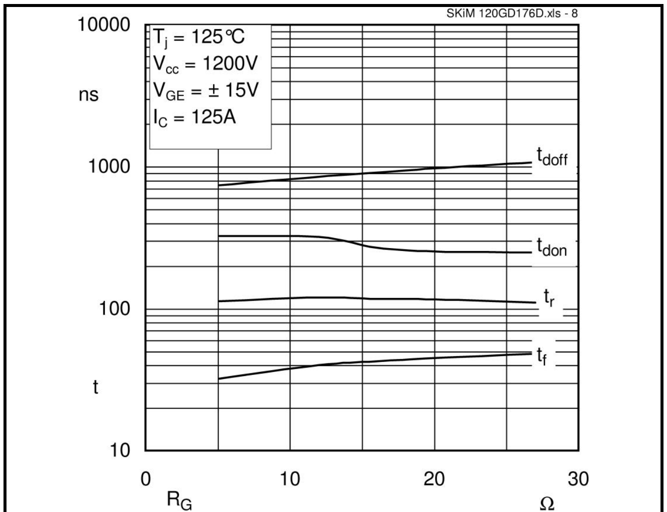


Fig. 8 Switching times vs. gate resistor R_G

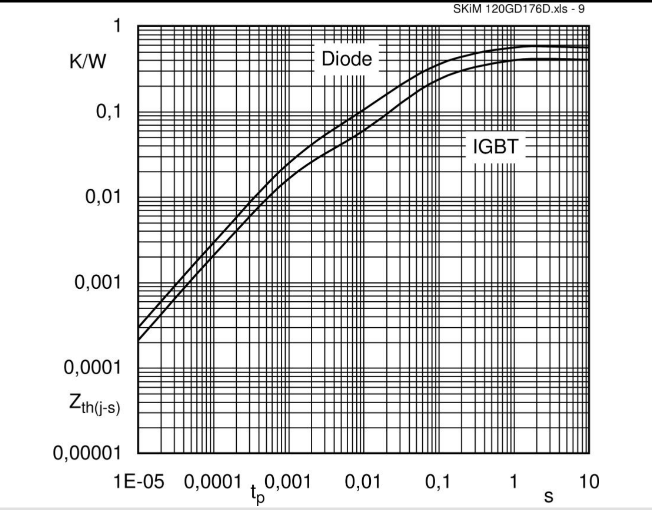


Fig. 9 Transient thermal impedance of

IGBT $Z_{thJC} = f(t_p)$; $D = t_p/t_c = t_p * f$

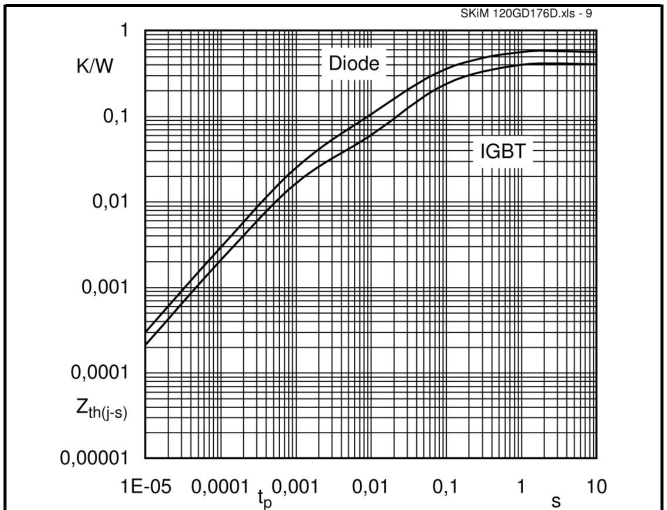


Fig. 10 Transient thermal impedance of inverse diodes

IGBT $Z_{thJC} = f(t_p)$; $D = t_p/t_c = t_p * f$

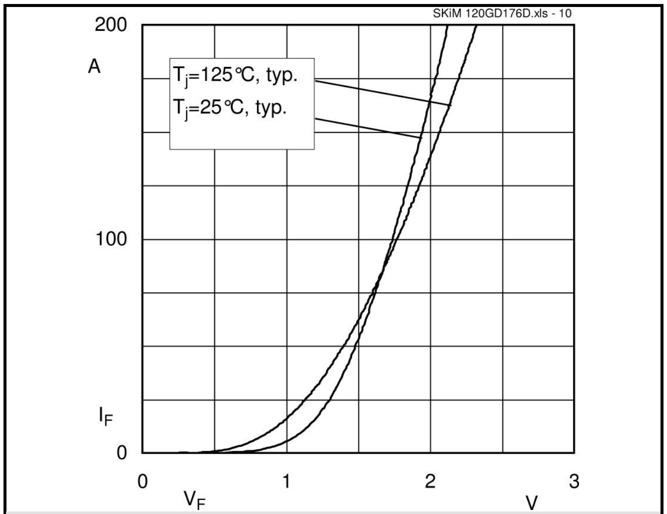


Fig. 11 CAL diode forward characteristic, incl. $R_{CC'+EE'}$

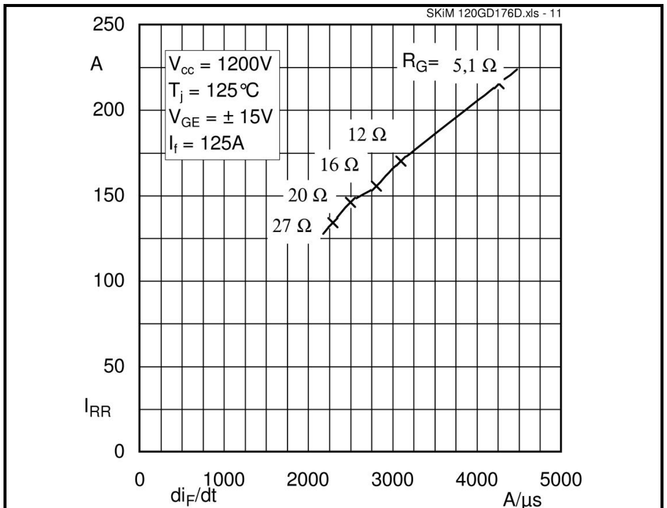


Fig. 12 CAL diode peak reverse recovery current

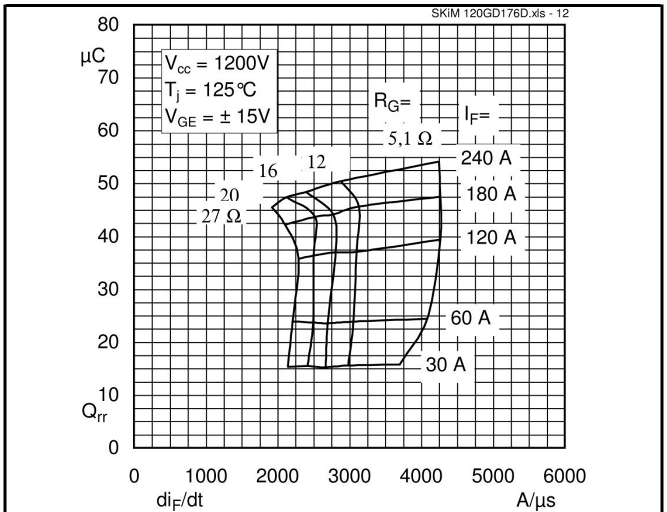
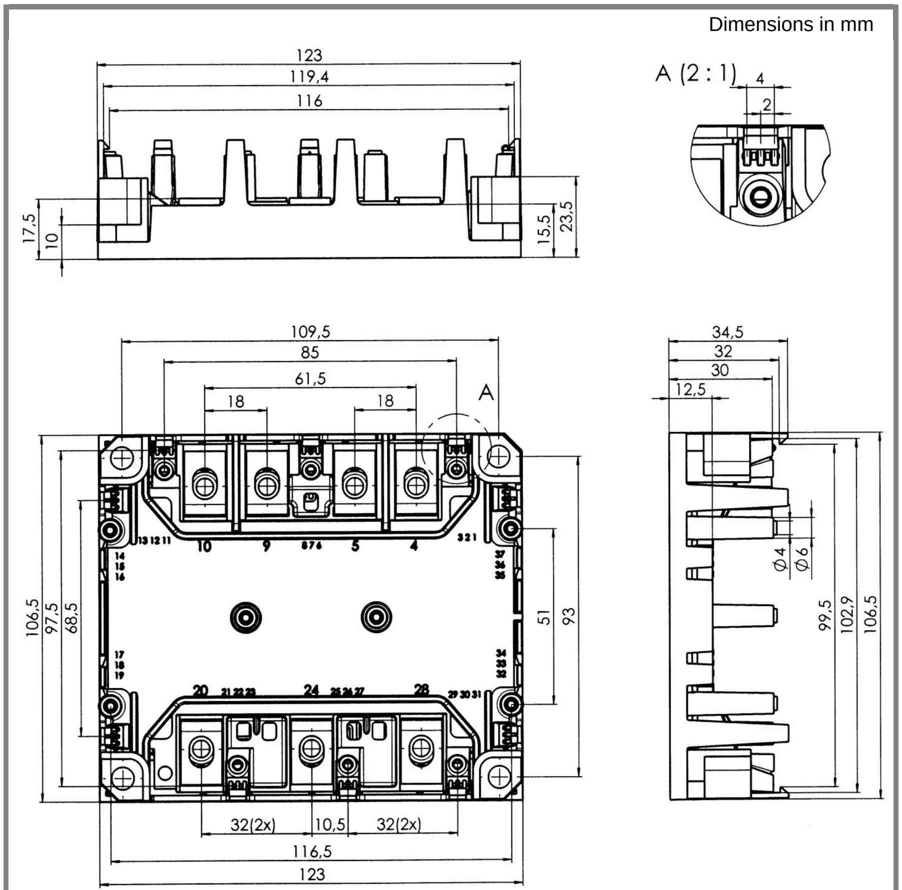
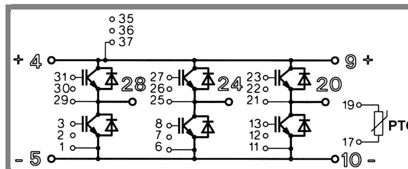


Fig. 13 Typ. CAL diode recovered charge





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

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