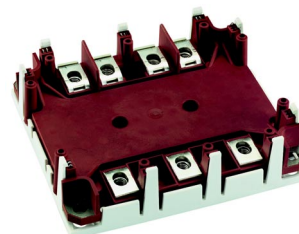


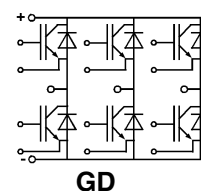
SKiM® 4 IGBT Module

SKiM 350 GD 063 DM

Preliminary Data



SKiM 4



GD

Features

- NPT-IGBT with positive temperature coefficient of V_{CEsat}
- Short circuit, self limiting to $6 \times I_C$
- Corresponds to standards IEC 60721-3-3 (humidity) class 3K7/IE32 and IEC 68T.1 (climate) 40/125/56

Typical Applications

- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at $f_{sw} > 20$ kHz

Absolute Maximum Ratings $T_h = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		600	V
I_C	$T_S = 25 (70)^\circ\text{C}$	300 (230)	A
I_{CRM}	$T_S = 25 (70)^\circ\text{C}$, $t_p = 1$ ms	600 (460)	A
V_{GES}		± 20	V
$T_j, (T_{stg})$	$T_{OPERATION} \leq T_{stg}$	$-40 \dots +150 (125)$	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V
Inverse Diode			
$I_{FAV} = -I_C$	$T_S = 25 (70)^\circ\text{C}$	315 (240)	A
$I_{FRM} = -I_{CM}$	$T_S = 25 (70)^\circ\text{C}$, $t_p < 1$ ms	630 (480)	A
I_{FSM}	$t_p = 10$ ms; sin.; $T_j = 150^\circ\text{C}$	2900	A

Characteristics $T_h = 25^\circ\text{C}$, unless otherwise specified					
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(To)}$	$V_{GE} = V_{CE}$, $I_C = 8$ mA	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25 (125)^\circ\text{C}$		0,4 (24)		mA
$V_{CE(To)}$			0,9 (0,8)		V
r_{CE}	$V_{GE} = 15$ V, $T_j = 25 (125)^\circ\text{C}$		2,9 (3,9)		m Ω
$V_{CE(sat)}$	$I_C = 200$ A, $V_{GE} = 15$ V, $T_j = 25 (125)^\circ\text{C}$ on chip level		1,5 (1,6)	1,7	V
C_{ies}			23		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25$ V, $f = 1$ MHz		2,5		nF
C_{res}			1,5		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	resistance, terminal-chip $25 (125)^\circ\text{C}$		1,35 (1,85)		m Ω
$t_{d(on)}$	$V_{CC} = 300$ V		130		ns
t_r	$I_C = 200$ A		75		ns
$t_{d(off)}$	$R_{Gon} = R_{Goff} = 8 \Omega$		700		ns
t_f	$T_j = 125^\circ\text{C}$		50		ns
E_{on}	$V_{GE} \pm 15$ V		10		mJ
E_{off}			9		mJ
Inverse Diode					
$V_F = V_{EC}$	$I_F = 200$ A; $V_{GE} = 0$ V; $T_j = 25 (125)^\circ\text{C}$ on chip level		1,25 (1,2)	1,4	V
V_{TO}	$T_j = 25 (125)^\circ\text{C}$		(0,85)	(0,9)	V
r_T	$T_j = 25 (125)^\circ\text{C}$		(1,6)	(2,75)	m Ω
I_{rrm}	$I_F = 300$ A; $T_j = 125^\circ\text{C}$		204		A
Q_{rr}	$V_{GE} = 0$ V		27		μC
E_{rr}	$R_{Gon} = R_{Goff} = 8 \Omega$		4,6		mJ
Thermal Characteristics					
R_{thjh}	per IGBT			0,135	K/W
R_{thjh}	per FWD			0,185	K/W
Temperature Sensor					
R_{TS}	$T = 25^\circ\text{C} / 100^\circ\text{C}$		1,0 / 1,67		k Ω
tolerance	$T = 25^\circ\text{C} / 100^\circ\text{C}$		3,0 / 2,0		%
Mechanical Data					
M_1	to heatsink (M5)	2		3	Nm
M_2	for terminals (M6)	4		5	Nm
w				310	g

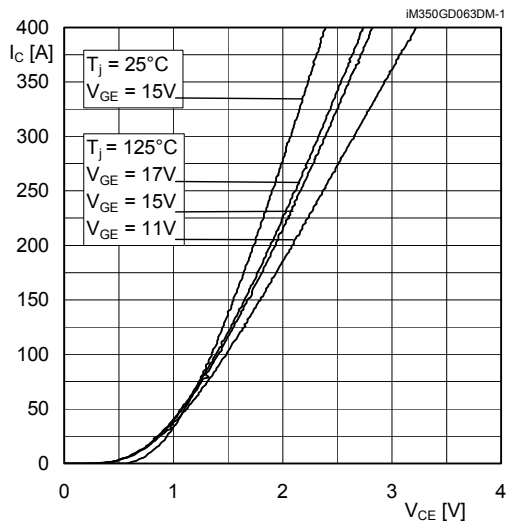


Fig. 1 Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

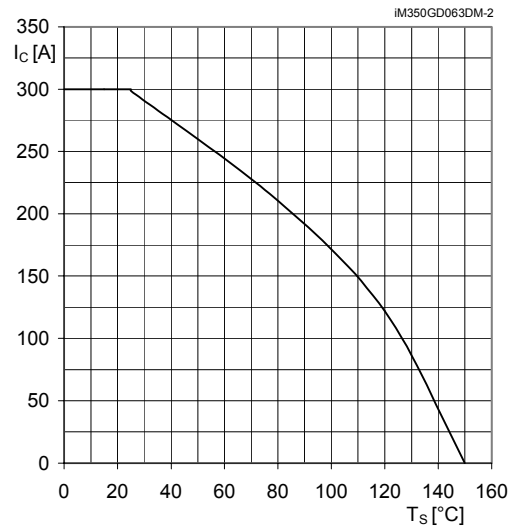


Fig. 2 Rated current vs. temperature $I_C = f(T_S)$

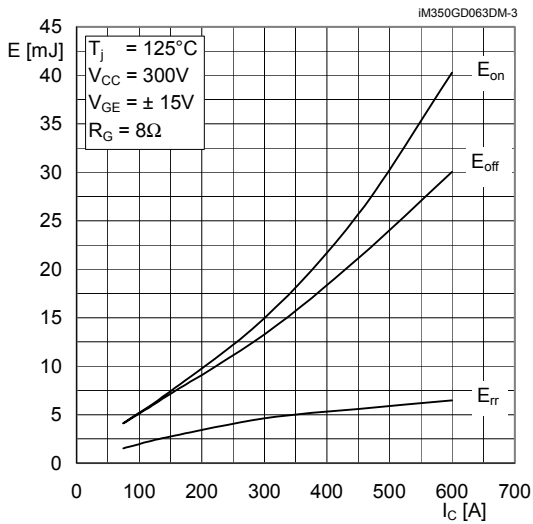


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

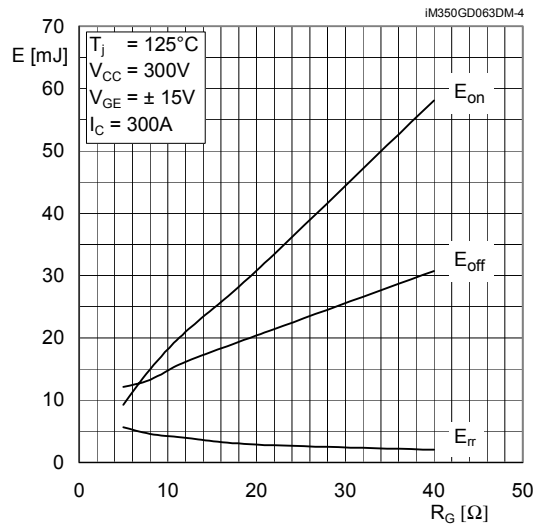


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

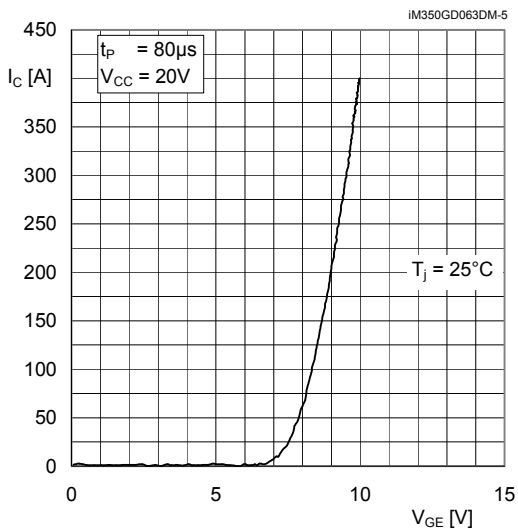


Fig. 5 Typ. transfer characteristic

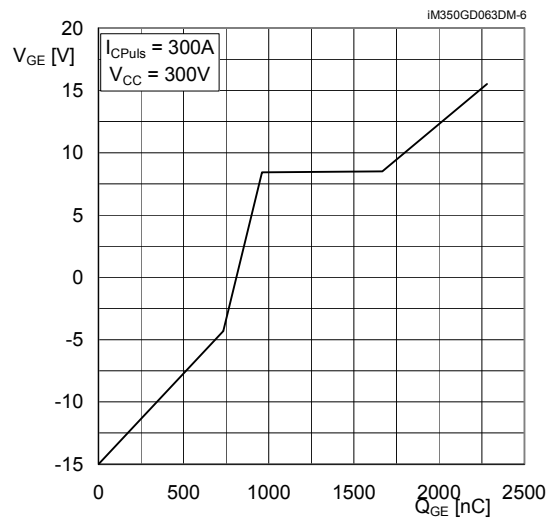


Fig. 6 Typ. gate charge characteristic

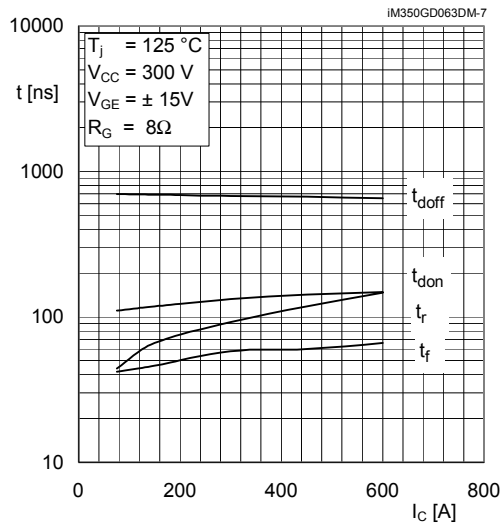


Fig. 7 Typ. switching times vs. I_C

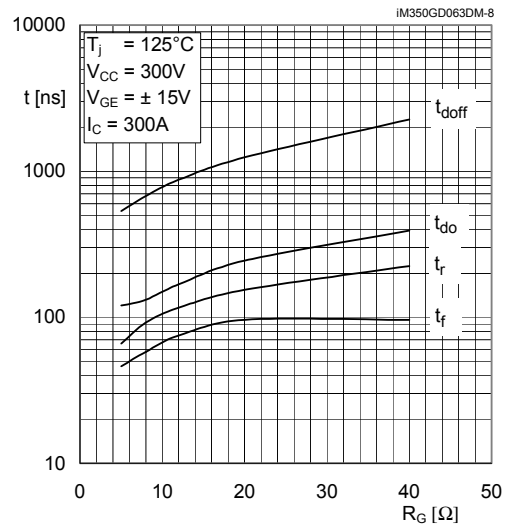


Fig. 8 Typ. switching times vs. gate resistor R_G

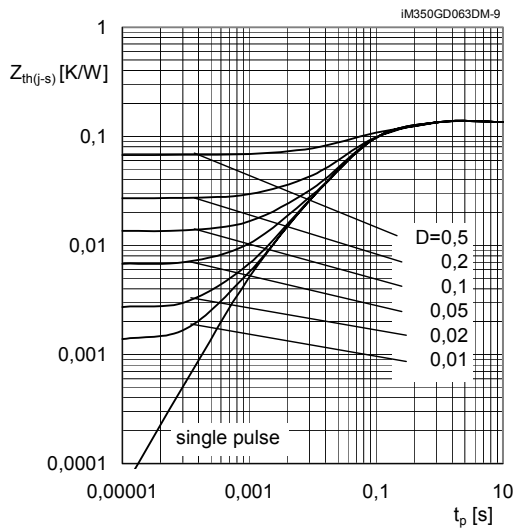


Fig. 9 Transient thermal impedance of IGBT
 $Z_{thp(j-s)} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

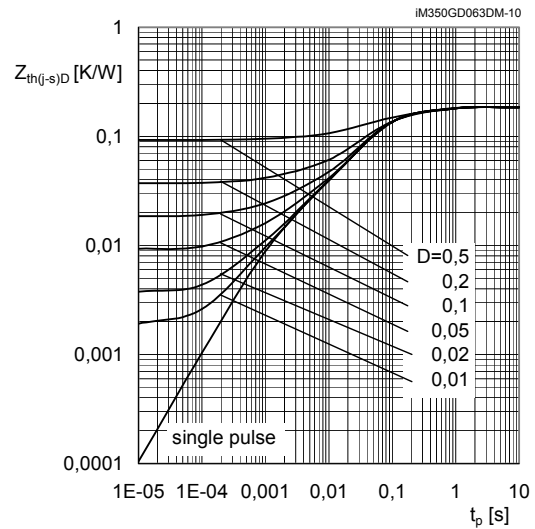


Fig. 10 Transient thermal impedance of FWD
 $Z_{thp(j-s)D} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

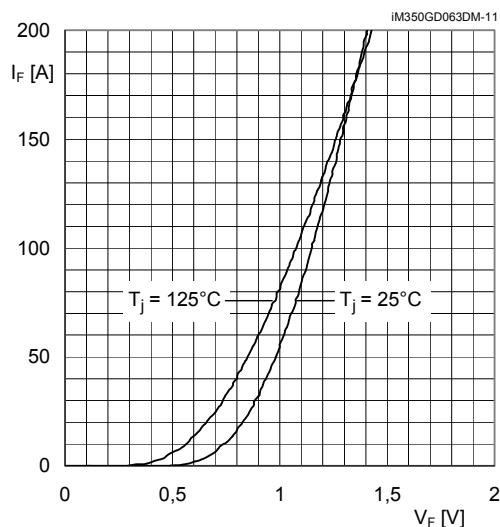


Fig. 11 CAL diode forward characteristic, inclusive $R_{CC'} + EE'$

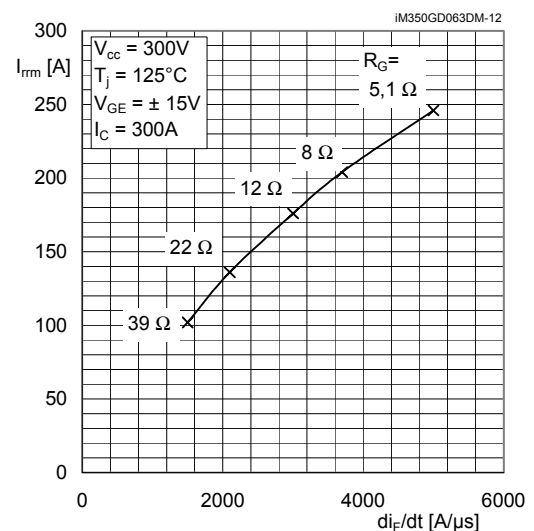
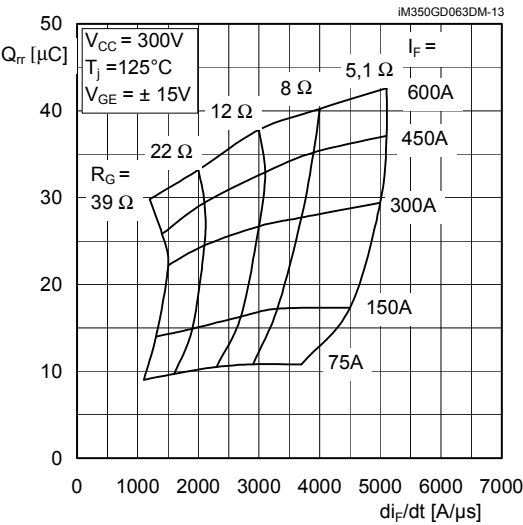
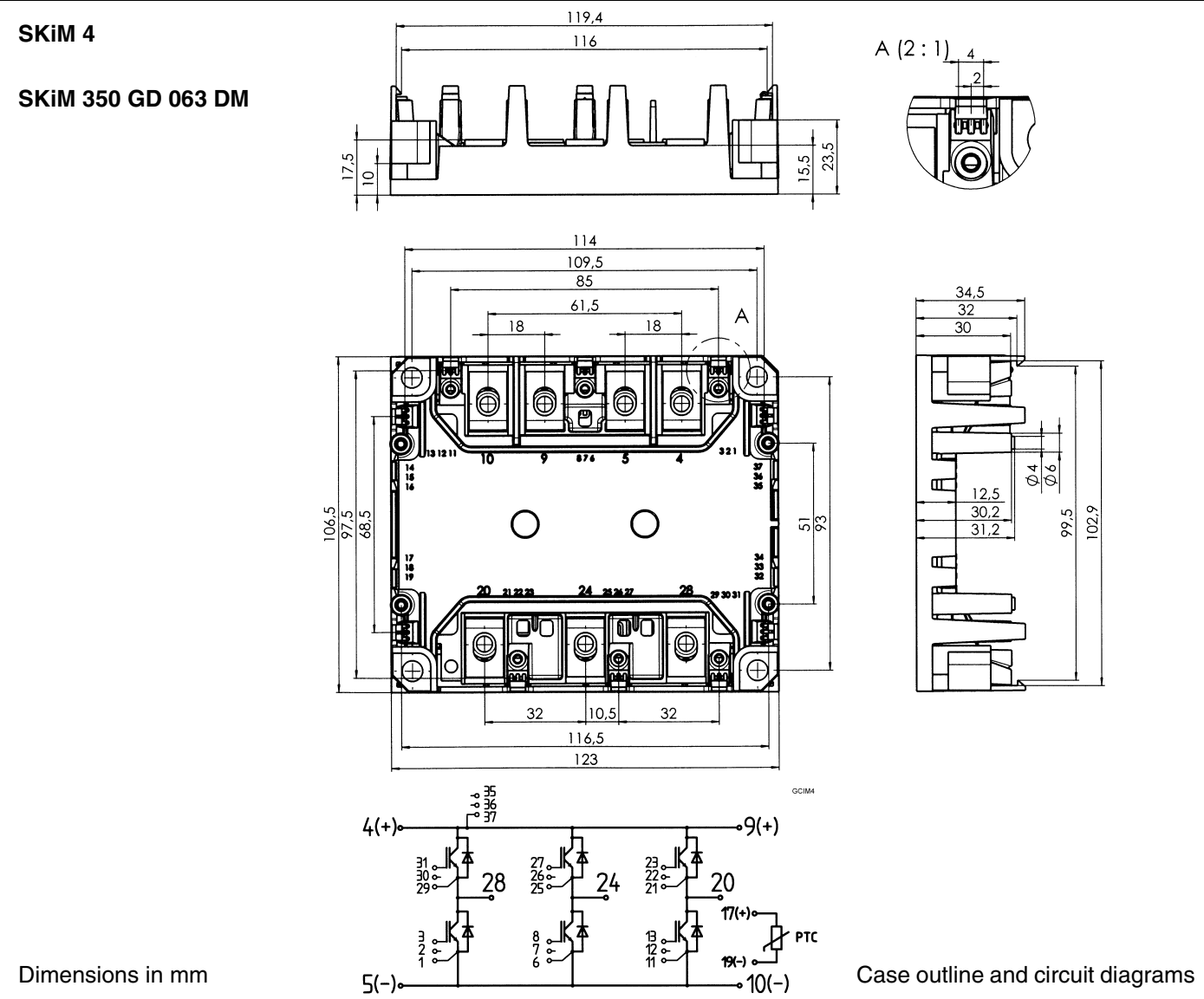


Fig. 12 CAL diode peak reverse recovery current



This is an electrostatic discharge sensitive device (ESDS).
Please observe the international standard IEC 747-1, Chapter IX.

Fig. 13 Typ. CAL diode recovered charge



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