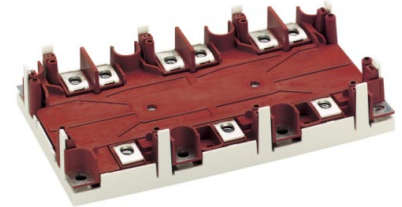


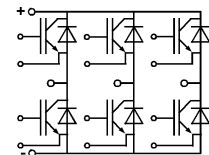
### SKiM® 5 IGBT Module

### SKiM 400 GD 063 D

Preliminary Data



### SKiM 5



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
<b>IGBT</b>			
$V_{CES}$		600	V
$I_C$	$T_S = 25 (70)^\circ\text{C}$	420 (316)	A
$I_{CRM}$	$T_S = 25 (70)^\circ\text{C}$ , $t_p = 1$ ms	840 (632)	A
$V_{GES}$		$\pm 20$	V
$T_j$ , ( $T_{stg}$ )	$T_{OPERATION} \leq T_{stg}$	- 40 ... +150 (125)	$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	2500	V
<b>Inverse Diode</b>			
$I_{FAV} = -I_C$	$T_S = 25 (70)^\circ\text{C}$	390 (260)	A
$I_{FRM} = -I_{CM}$	$T_S = 25 (70)^\circ\text{C}$ , $t_p < 1$ ms	780 (520)	A
$I_{FSM}$	$t_p = 10$ ms; sin.; $T_j = 150^\circ\text{C}$	54450	A

Characteristics		$T_h = 25^\circ\text{C}$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(To)}$	$V_{GE} = V_{CE}$ , $I_C = 12$ 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)	1,0	V
$r_{CE}$	$V_{GE} = 15$ V, $T_j = 25 (125)^\circ\text{C}$		2,0 (2,9)	2,7	m $\Omega$
$V_{CE(sat)}$	$I_C = 300$ A, $V_{GE} = 15$ V, $T_j = 25 (125)^\circ\text{C}$ on chip level		1,5 (1,7)	1,8	V
$C_{ies}$			35		nF
$C_{oes}$	$V_{GE} = 0$ , $V_{CE} = 25$ V, $f = 1$ MHz		3,75		nF
$C_{res}$			2,25		nF
$L_{CE}$				20	nH
$R_{CC'+EE'}$	resistance, terminal-chip $25 (125)^\circ\text{C}$		0,9 (1,1)		m $\Omega$
$t_{d(on)}$	$V_{CC} = 300$ V		140		ns
$t_r$	$I_C = 300$ A		110		ns
$t_{d(off)}$	$R_{Gon} = R_{Goff} = 6,2 \Omega$		750		ns
$t_f$	$T_j = 125^\circ\text{C}$		64		ns
$E_{on}$	$V_{GE} \pm 15$ V		16,5		mJ
$E_{off}$			11		mJ
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_F = 300$ A; $V_{GE} = 0$ V; $T_j = 25 (125)^\circ\text{C}$ on chip level		1,25 (1,2)	1,5	V
$V_{TO}$	$T_j = 25 (125)^\circ\text{C}$		(0,85)	(0,9)	V
$r_T$	$T_j = 25 (125)^\circ\text{C}$		(1,33)	(2,0)	m $\Omega$
$I_{rrm}$	$I_F = 300$ A; $T_j = 125^\circ\text{C}$		230		A
$Q_{rr}$	$V_{GE} = 0$ V		28		$\mu\text{C}$
$E_{rr}$	$R_{Gon} = R_{Goff} = 6,2 \Omega$		5,2		mJ
<b>Thermal Characteristics</b>					
$R_{thjh}$	per IGBT			0,13	K/W
$R_{thjh}$	per FWD			0,19	K/W
<b>Temperature Sensor</b>					
$R_{TS}$	$T = 25^\circ\text{C} / 100^\circ\text{C}$		1,0 / 1,67		k $\Omega$
tolerance	$T = 25^\circ\text{C} / 100^\circ\text{C}$		3,0 / 2,0		%
<b>Mechanical Data</b>					
$M_1$	to heatsink (M5)			3	Nm
$M_2$	for terminals (M6)			5	Nm
w		2 4		325	g

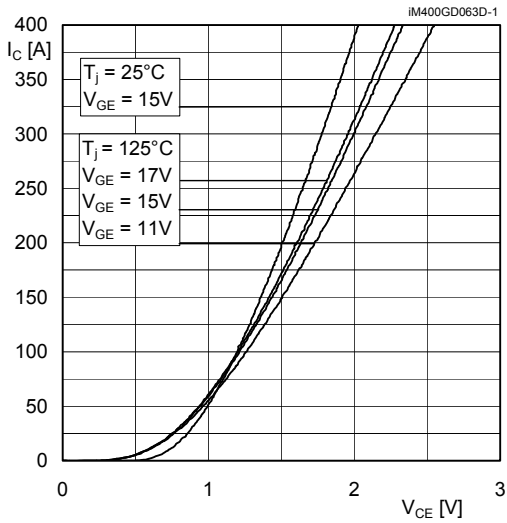


Fig. 1 Typ. output characteristic, inclusive  $R_{CC} + E_{E'}$

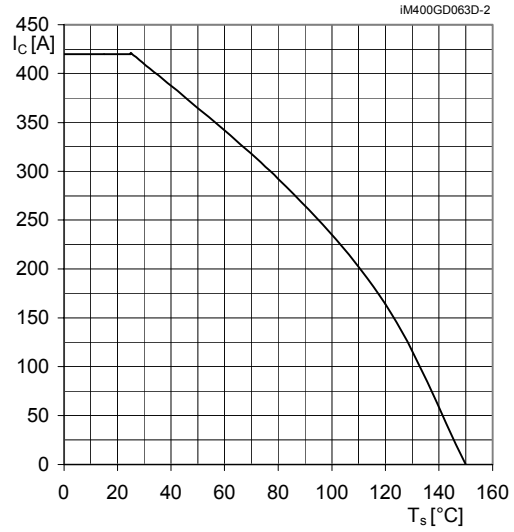


Fig. 2 Rated current vs. temperature  $I_C = f(T_S)$

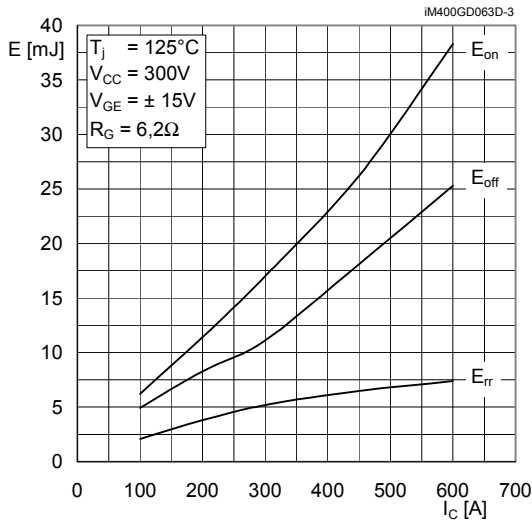


Fig. 3 Typ. turn-on /-off energy =  $f(I_C)$

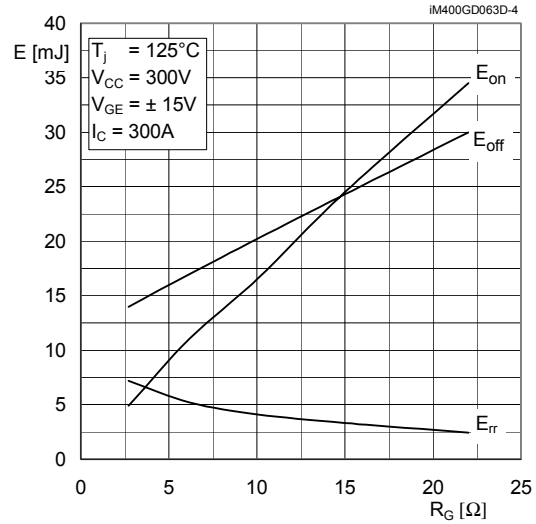


Fig. 4 Typ. turn-on /-off energy =  $f(R_G)$

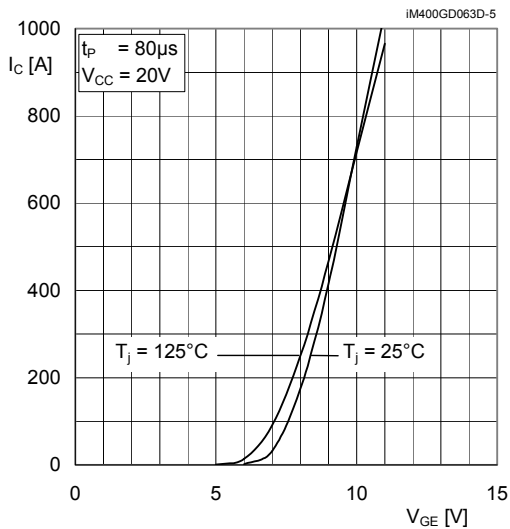


Fig. 5 Typ. transfer characteristic

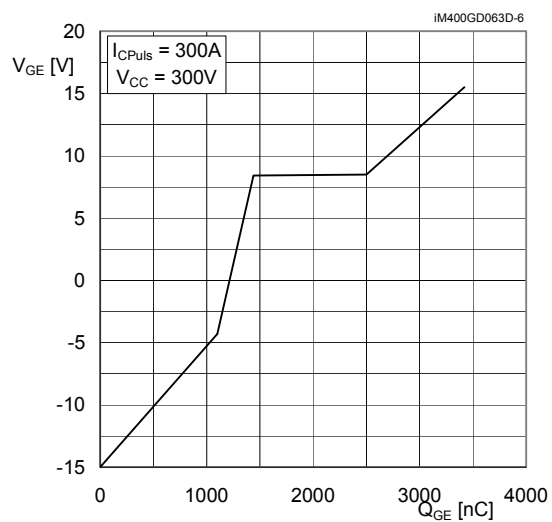


Fig. 6 Typ. gate charge characteristic

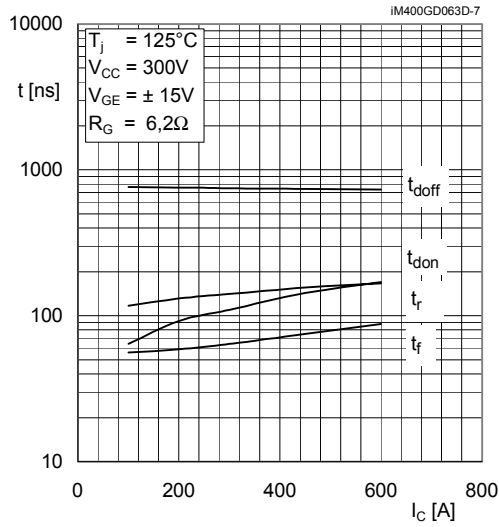


Fig. 7 Typ. switching times vs.  $I_C$

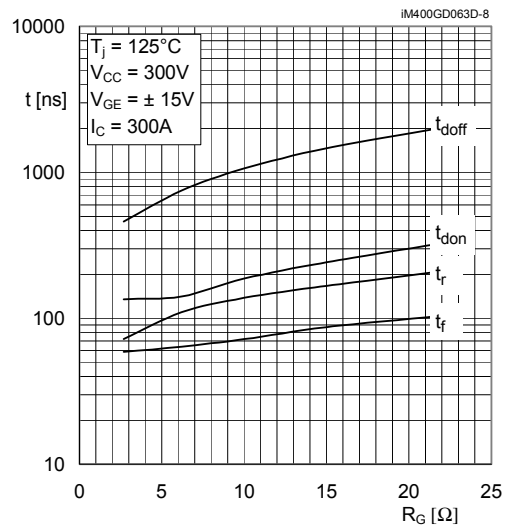


Fig. 8 Typ. switching times vs. gate resistor  $R_G$

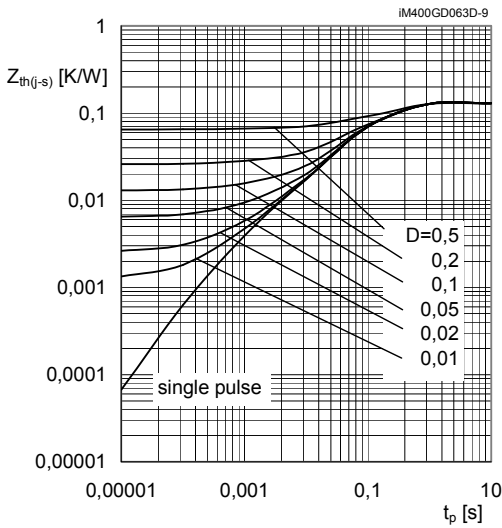


Fig. 9 Transient thermal impedance of IGBT  
 $Z_{thp(j-s)} = f(t_p)$ ;  $D = t_p / t_c = t_p \cdot f$

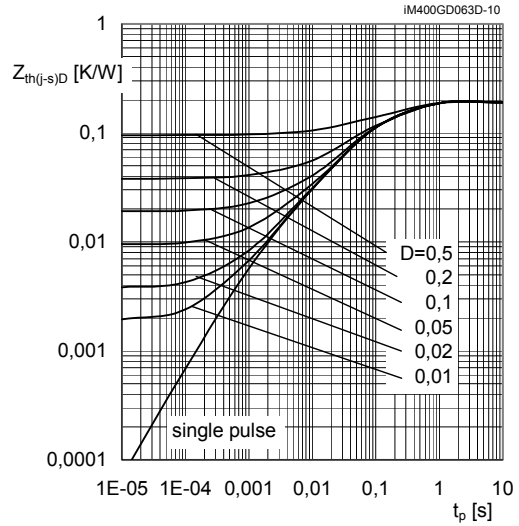


Fig. 10 Transient thermal impedance of FWD  
 $Z_{thp(j-s)D} = f(t_p)$ ;  $D = t_p / t_c = t_p \cdot f$

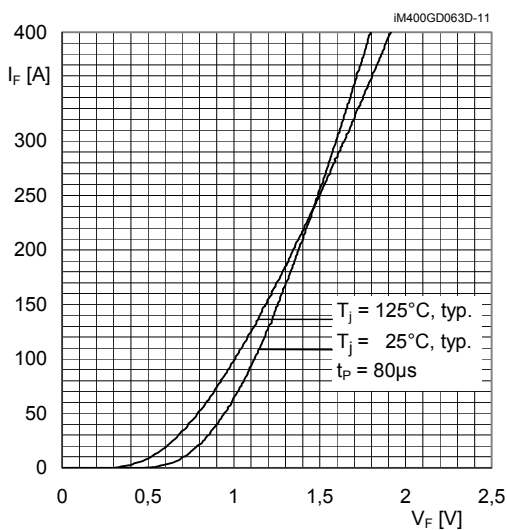


Fig. 11 CAL diode forward characteristic, inclusive  $R_{CC'+EE'}$

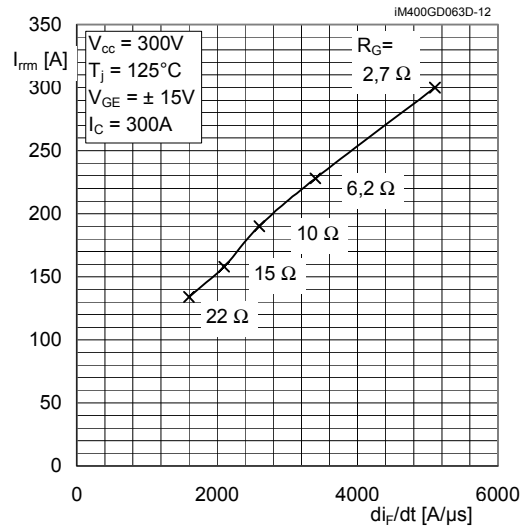
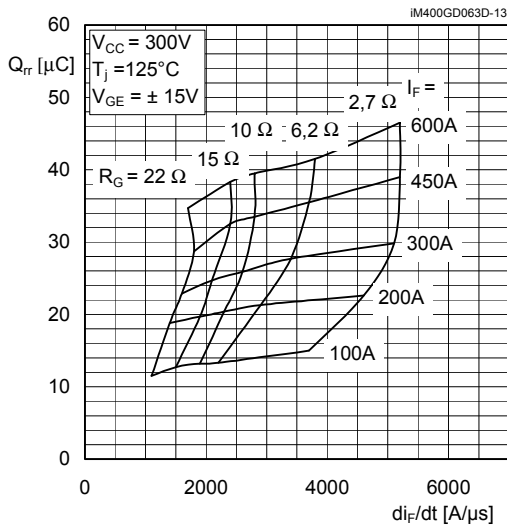


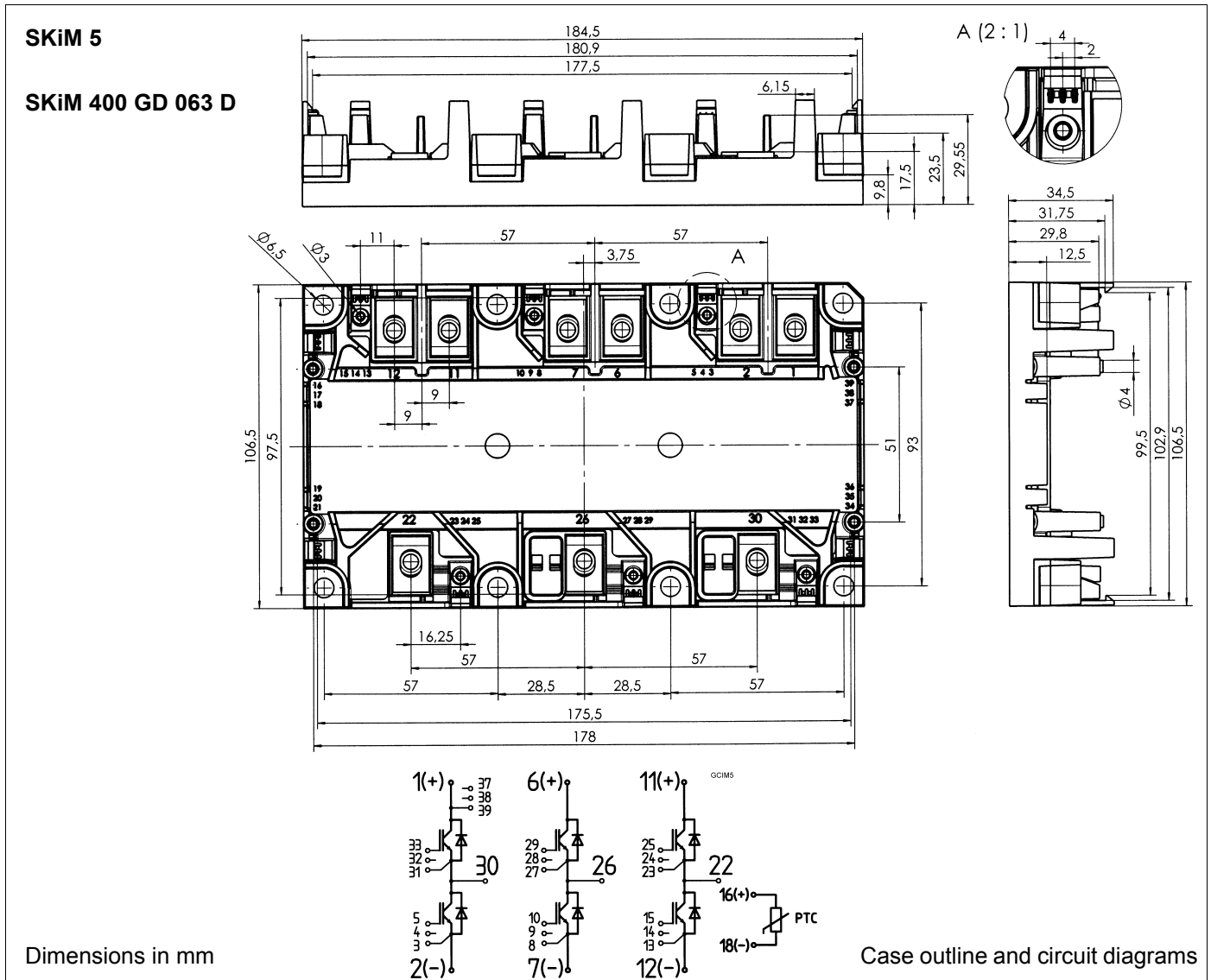
Fig. 12 CAL diode peak reverse recovery current



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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