



SKiM® 5

IGBT Modules

SKiM 400GD063D

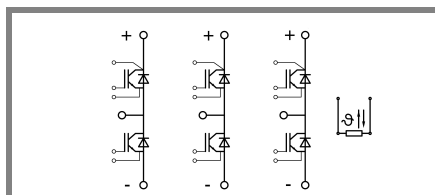
Preliminary Data

Features

- NPT-IGBT with positive temperature coefficient of V_{CEsat}
- Short circuit, self limiting to $6 \times I_C$
- DBC substrate : Al_2O_3
- Corresponds to standards IEC 60721-3-3 (humidity) class 3K7IE32 and IEC 68T.1 (climate) 40/125/56

Typical Applications

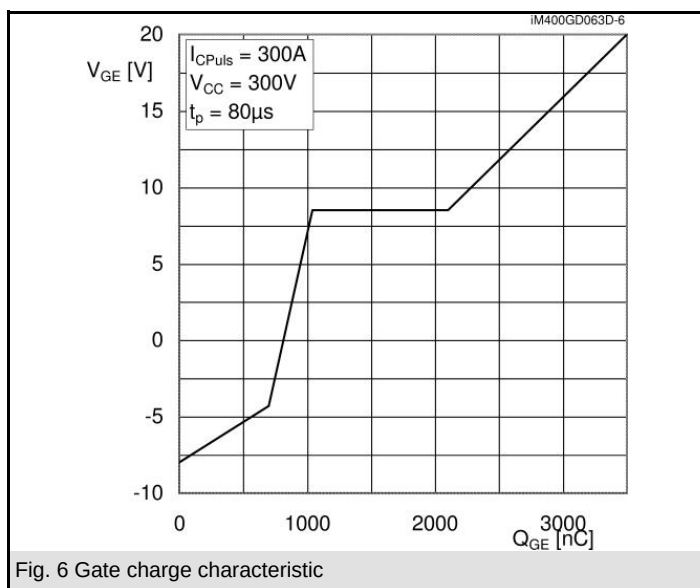
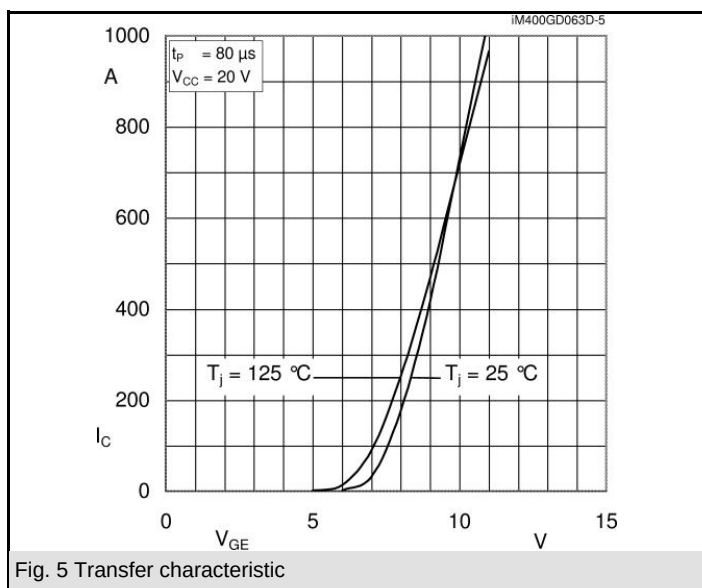
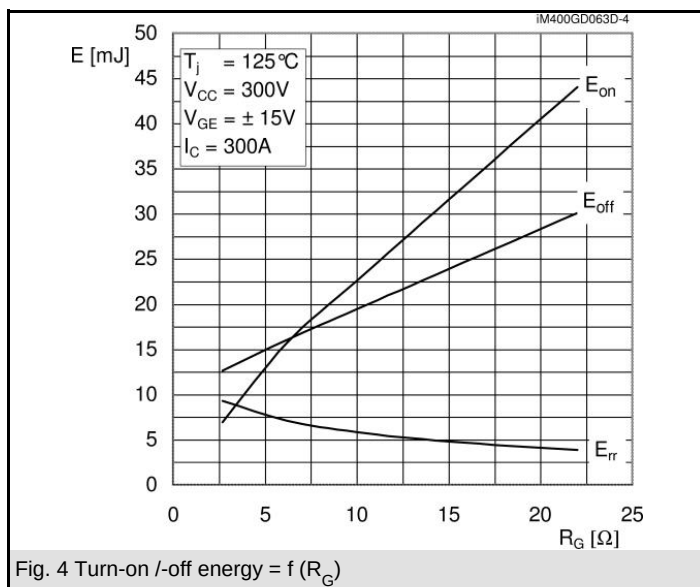
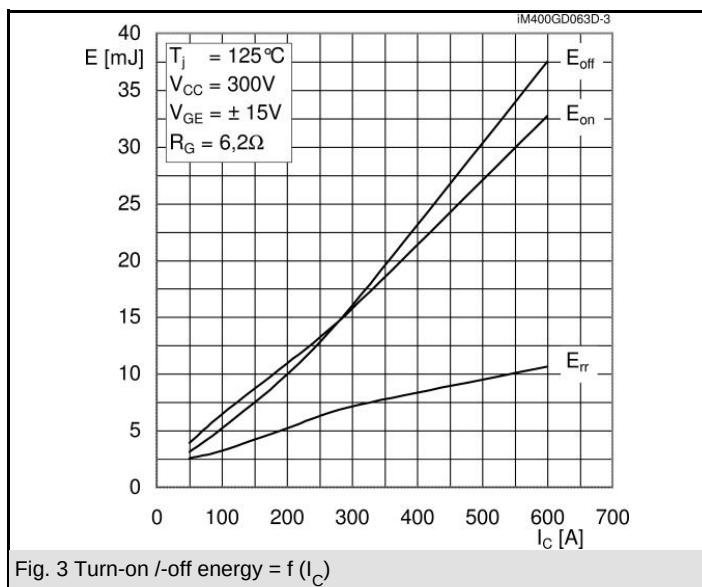
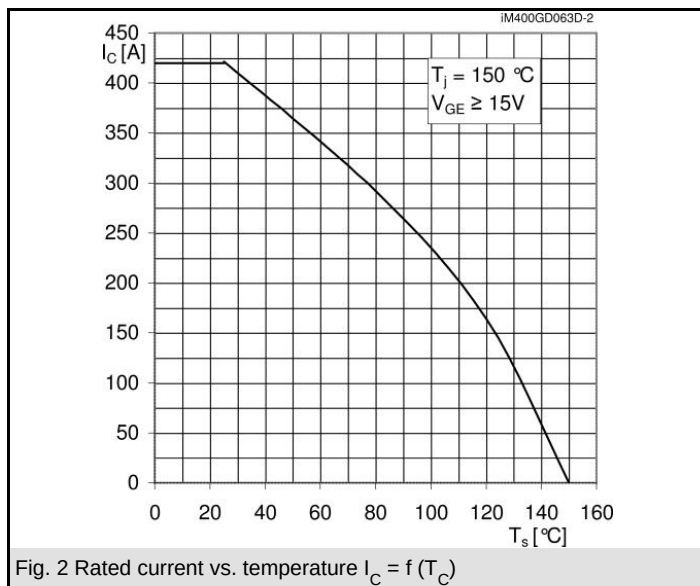
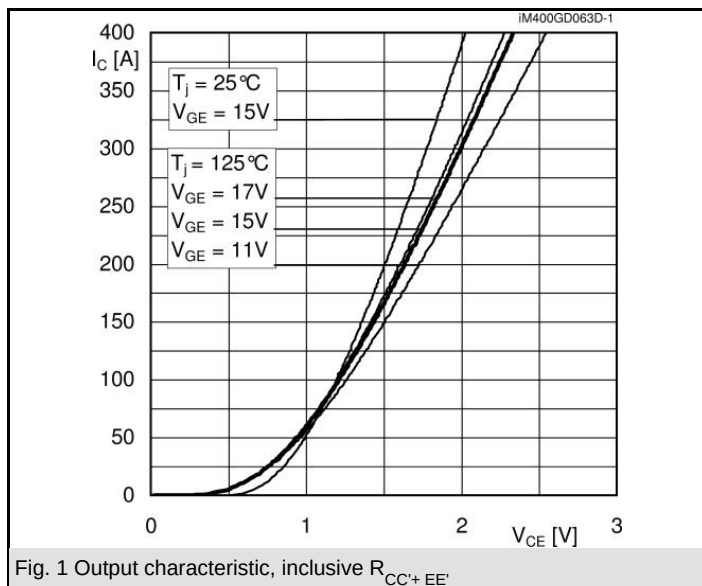
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welder at $f_{sw} > 20$ kHz



GD

Absolute Maximum Ratings		$T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		600	V
I_C	$T_s = 25\text{ (70) }^\circ\text{C}$	420 (320)	A
I_{CM}	$T_s = 25\text{ (70) }^\circ\text{C}$, $t_p = 1\text{ ms}$	840 (640)	A
V_{GES}		± 20	V
T_j (T_{stg})		- 40 ... + 150 (125)	$^\circ\text{C}$
T_{cop}	max. case operating temperature		$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V
Inverse diode			
I_F	$T_s = 25\text{ (70) }^\circ\text{C}$	390 (260)	A
$I_{FM} = -I_{CM}$	$T_s = 25\text{ (70) }^\circ\text{C}$, $t_p = 1\text{ ms}$	840 (640)	A
I_{FSM}	$t_p = 10\text{ ms}$; sin.; $T_j = 150\text{ }^\circ\text{C}$	4300	A

Characteristics		$T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$; $I_C = 12\text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0$; $V_{CE} = V_{CES}$; $T_j = 25\text{ (125) }^\circ\text{C}$			0,3	mA
V_{CEO}	$T_j = 25\text{ }^\circ\text{C}$		0,9 (0,8)	1	V
r_{CE}	$T_j = 25\text{ (125) }^\circ\text{C}$		2 (2,9)	2,7	m Ω
V_{CEsat}	$I_C = 300\text{ A}$; $V_{GE} = 15\text{ V}$, $T_j = 25\text{ (125) }^\circ\text{C}$ on chip level		1,5 (1,7)	1,8	V
C_{ies}	$V_{GE} = 0$; $V_{CE} = 25\text{ V}$; $f = 1\text{ MHz}$		26,2		nF
C_{oes}	$V_{GE} = 0$; $V_{CE} = 25\text{ V}$; $f = 1\text{ MHz}$		3,7		nF
C_{res}	$V_{GE} = 0$; $V_{CE} = 25\text{ V}$; $f = 1\text{ MHz}$		3,6		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	resistance, terminal-chip $T_c = 25\text{ (125) }^\circ\text{C}$		0,9 (1,1)		m Ω
$t_{d(on)}$	$V_{CC} = 300\text{ V}$		160		ns
t_r	$I_C = 300\text{ A}$		120		ns
$t_{d(off)}$	$R_{Gon} = R_{Goff} = 6,2\text{ }\Omega$		730		ns
t_f	$T_j = 125\text{ }^\circ\text{C}$		60		ns
$E_{on} (E_{off})$	$V_{GE} \pm 15\text{ V}$		16 (16)		mJ
$E_{on} (E_{off})$	with SKHI 6; $T_j = 125\text{ }^\circ\text{C}$ $V_{CC} = V$; $I_C = A$				mJ
Inverse diode					
$V_F = V_{EC}$	$I_F = 300\text{ A}$; $V_{GE} = 0\text{ V}$; $T_j = 25\text{ (125) }^\circ\text{C}$		1,25 (1,2)	1,5	V
V_{TO}	$T_j = 25\text{ (125) }^\circ\text{C}$		0,85	0,9	V
r_T	$T_j = 25\text{ (125) }^\circ\text{C}$		1,3	2	m Ω
I_{RRM}	$I_F = 300\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$		220		A
Q_{rr}	$V_{GE} = 0\text{ V}$ di/dt = 3000 A/ μ s		36,5		μ C
E_{rr}	$R_{Gon} = R_{Goff} = 6,2\text{ }\Omega$		7,3		mJ
Thermal characteristics					
$R_{th(j-s)}$	per IGBT			0,13	K/W
$R_{th(j-s)}$	per FWD			0,19	K/W
Temperature Sensor					
R_{TS}	$T = 25\text{ (100) }^\circ\text{C}$		1 (1,67)		k Ω
tolerance	$T = 25\text{ (100) }^\circ\text{C}$		3 (2)		%
Mechanical data					
M_1	to heatsink (M5)	2	3		Nm
M_2	for terminals (M6)	4	5		Nm
w			325		g



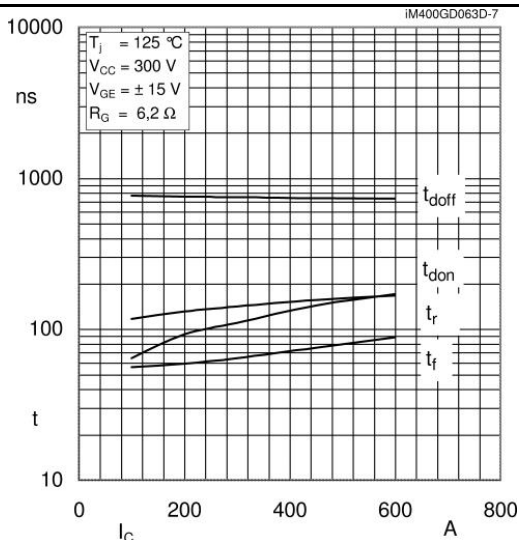


Fig. 7 Switching times vs. I_C

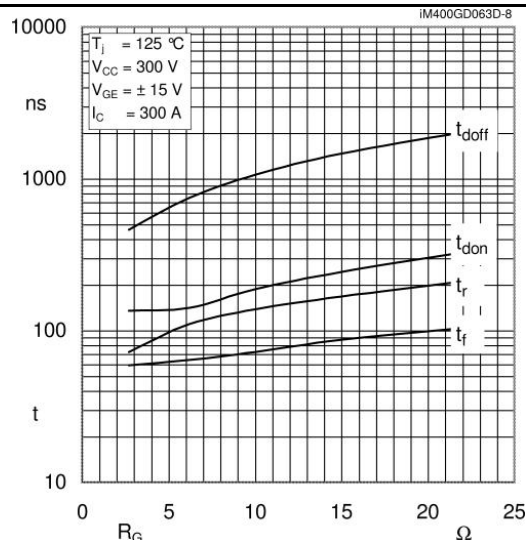


Fig. 8 Switching times vs. gate resistor R_G

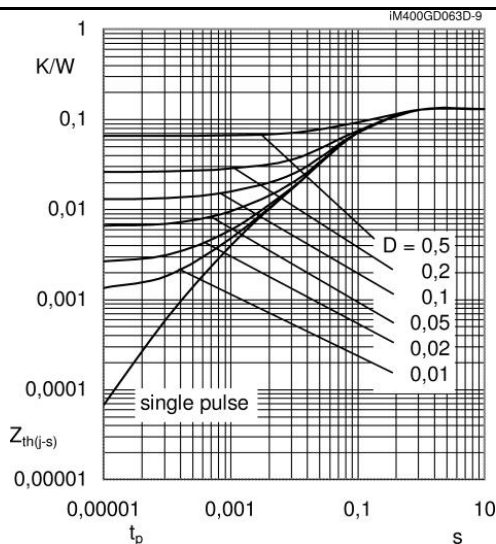


Fig. 9 Transient thermal impedance of IGBT

$$Z_{th(j-s)} = f(t_p); D = t_p/t_c = t_p * f$$

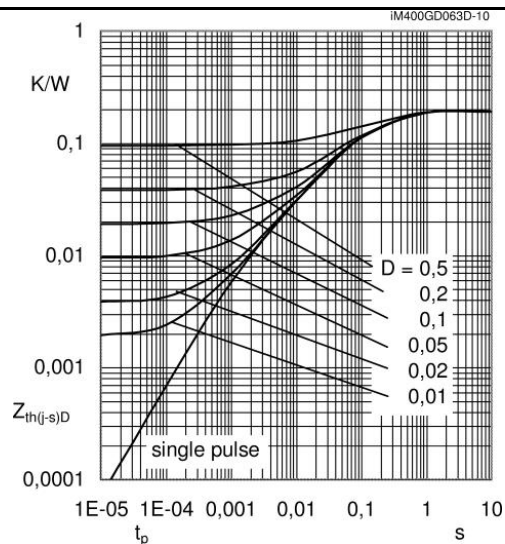


Fig. 10 Transient thermal impedance of FWD

$$Z_{th(j-s)} = f(t_p); D = t_p/t_c = t_p * f$$

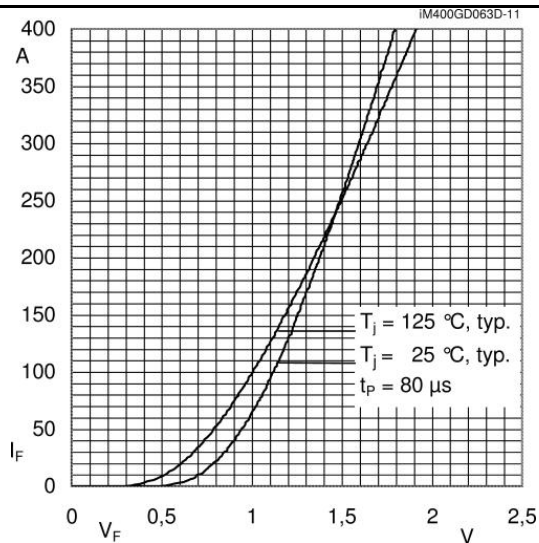


Fig. 11 CAL diode forward characteristic, incl. $R_{CC'+EE'}$

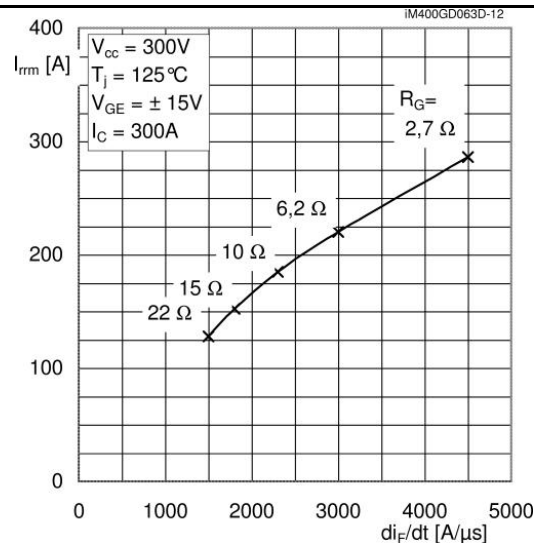
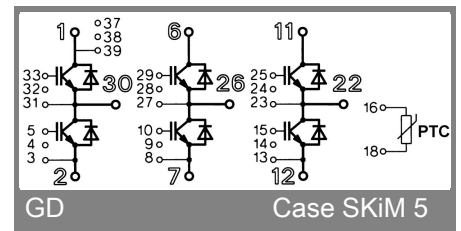
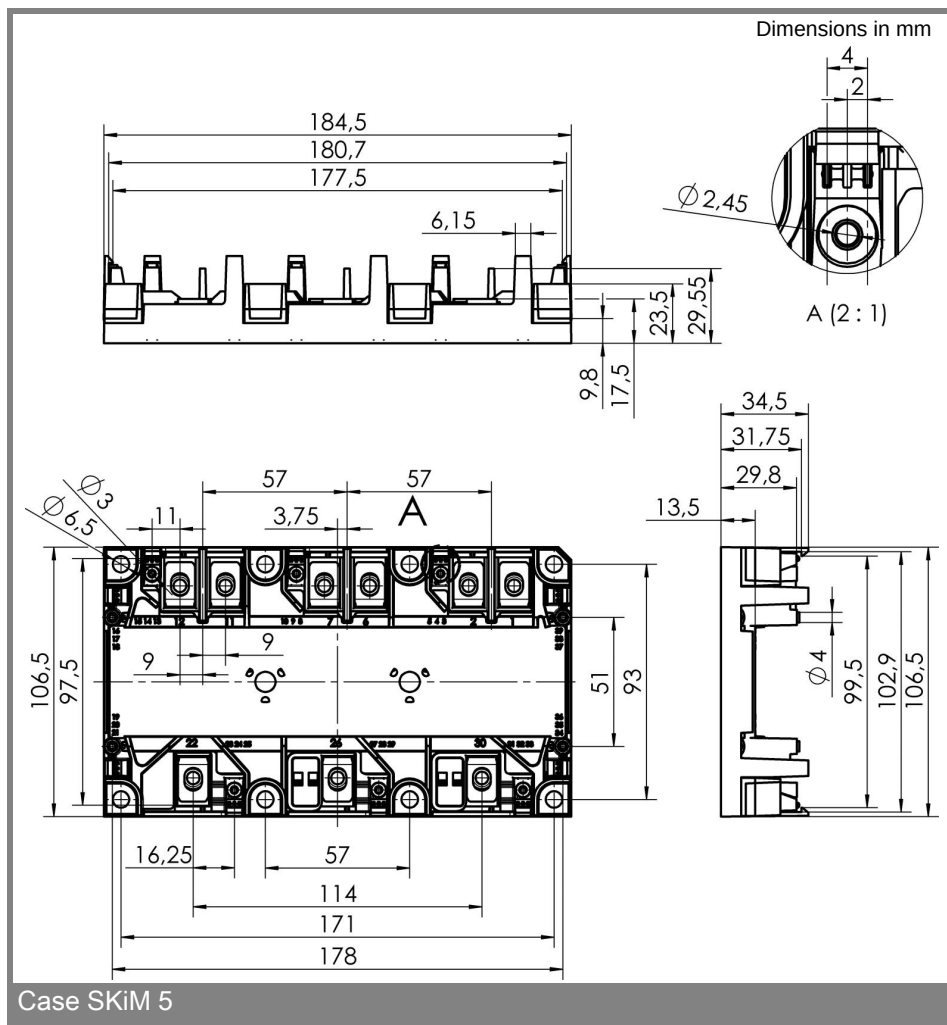
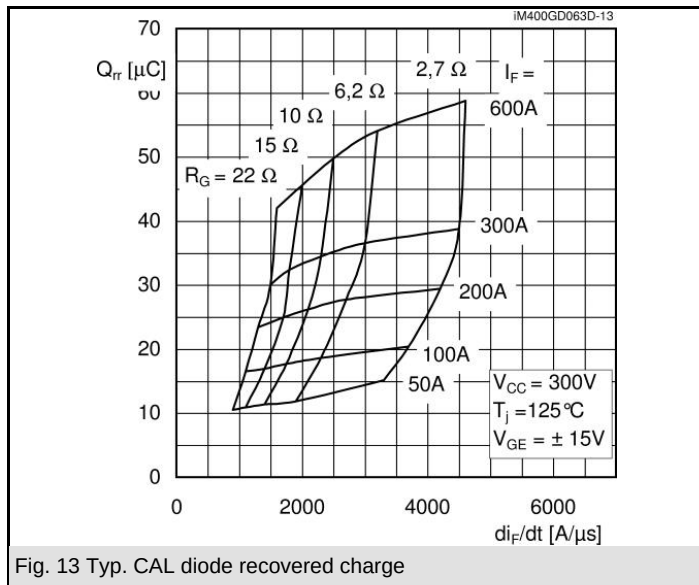


Fig. 12 CAL diode peak reverse recovery current



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.