



SKiM[®] 5

IGBT Modules

SKiM 400GD128D

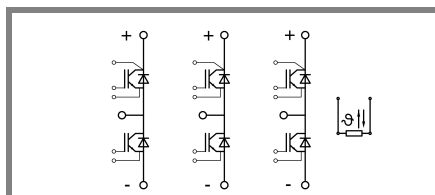
Preliminary Data

Features

- Homogeneous Si
- SPT = Soft Punch Through Technology
- V_{CEsat} with positive temperature coefficient
- High Short circuit capability, self limiting to $6 \times I_C$
- Isolated by Al_2O_3 DCB (Direct Copper Bonded) ceramic plate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- Integrated temperature sensore

Typical Applications

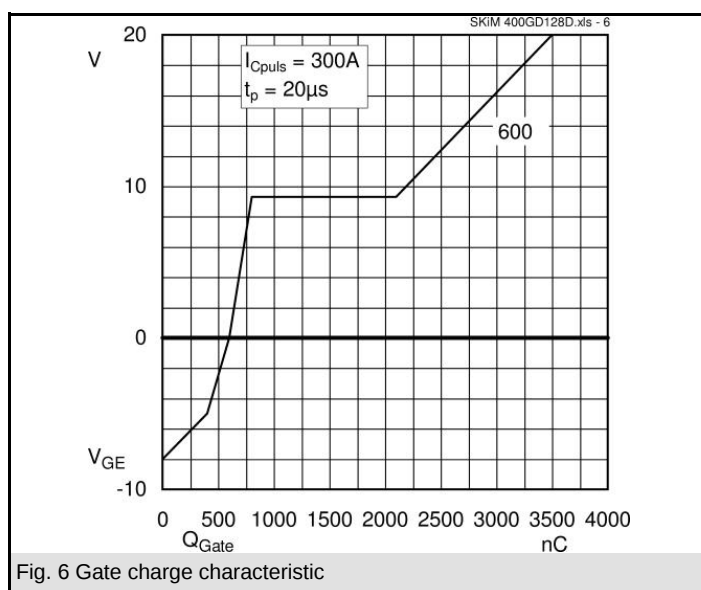
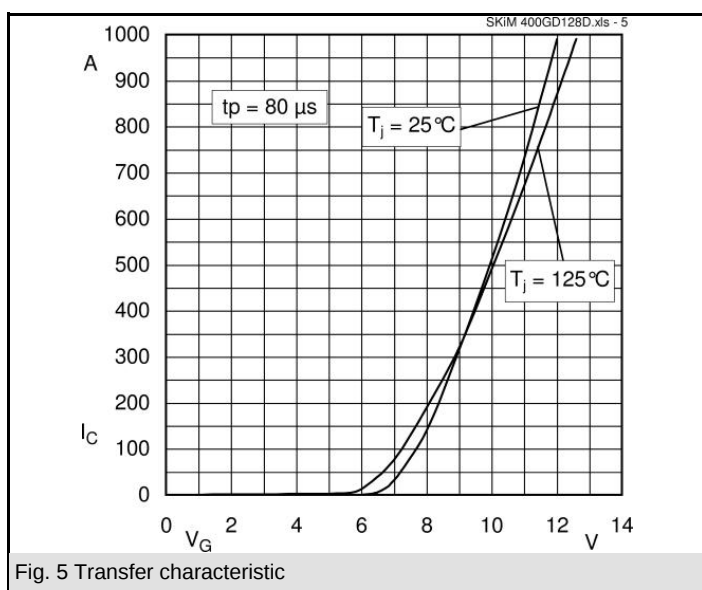
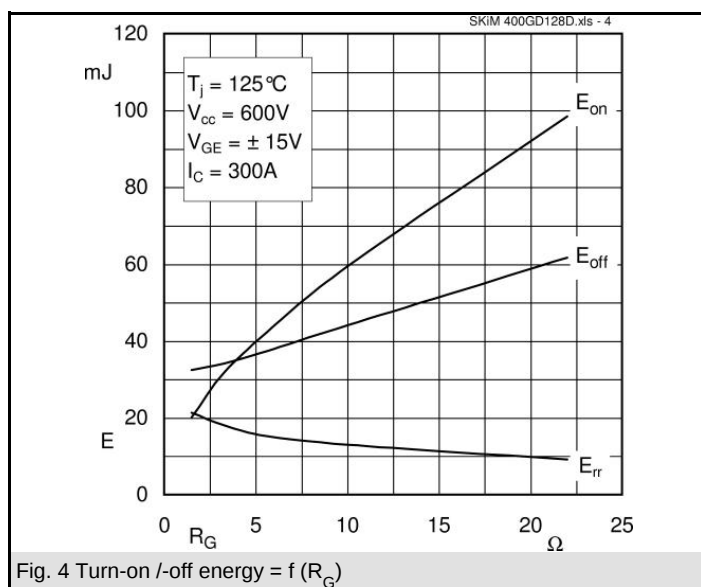
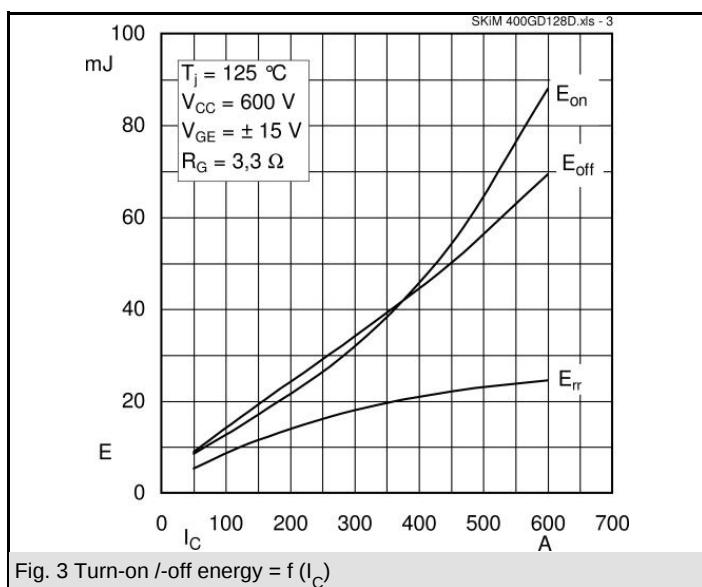
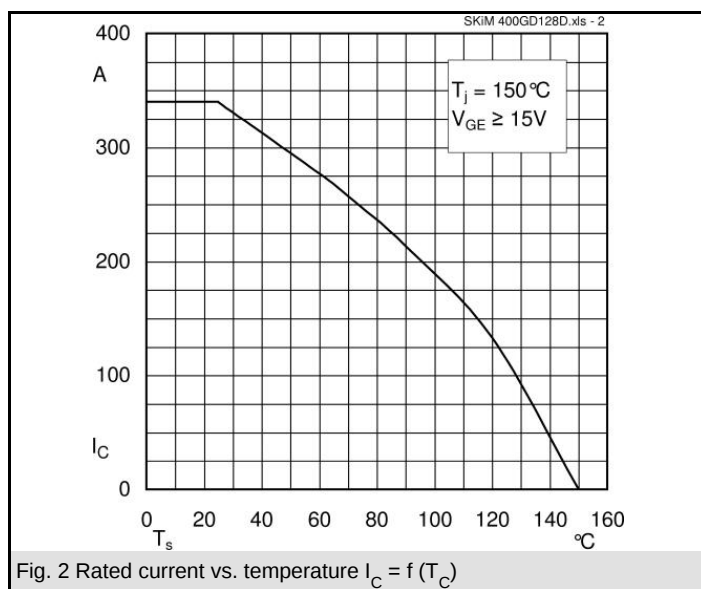
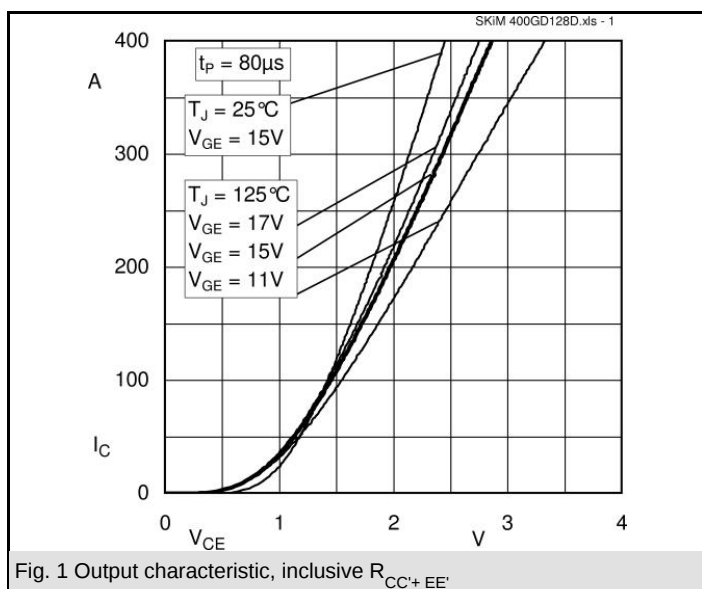
- AC inverter drives
- Uninterruptable Power supplies



GD

Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_s = 25 (70)^\circ\text{C}$	340 (260)	A
I_{CM}	$T_s = 25 (70)^\circ\text{C}$, $t_p = 1 \text{ ms}$	680 (520)	A
V_{GES}		± 20	V
$T_j (T_{stg})$		- 40 ... + 150 (125)	$^\circ\text{C}$
T_{cop}	max. case operating temperature	125	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V
Inverse diode			
I_F	$T_s = 25 (70)^\circ\text{C}$	350 (300)	A
$I_{FM} = -I_{CM}$	$T_s = 25 (70)^\circ\text{C}$, $t_p = 1 \text{ ms}$	680 (520)	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 150^\circ\text{C}$	3300	A

Characteristics		$T_{case} = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$; $I_C = 9 \text{ mA}$	4,45	5,5	6,55	V
I_{CES}	$V_{GE} = 0$; $V_{CE} = V_{CES}$; $T_j = 25^\circ\text{C}$			0,3	mA
V_{CEO}	$T_j = 25 (125)^\circ\text{C}$		1 (0,9)	1,15 (1,05)	V
r_{CE}	$T_j = 25 (125)^\circ\text{C}$		3,3 (4,7)	4 (5)	$\text{m}\Omega$
V_{CEsat}	$I_C = 300 \text{ A}$; $V_{GE} = 15 \text{ V}$; $T_j = 25 (125)^\circ\text{C}$ on chip level		2 (2,3)	2,35 (2,55)	V
C_{ies}	$V_{GE} = 0$; $V_{CE} = 25 \text{ V}$; $f = 1 \text{ MHz}$		27		nF
C_{oes}	$V_{GE} = 0$; $V_{CE} = 25 \text{ V}$; $f = 1 \text{ MHz}$		6,5		nF
C_{res}	$V_{GE} = 0$; $V_{CE} = 25 \text{ V}$; $f = 1 \text{ MHz}$		5,4		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	resistance, terminal-chip $T_c = 25 (125)^\circ\text{C}$		0,9		$\text{m}\Omega$
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$		190		ns
t_r	$I_C = 300 \text{ A}$		75		ns
$t_{d(off)}$	$R_{Gon} = R_{Goff} = 3,3 \Omega$		650		ns
t_f	$T_j = 125^\circ\text{C}$		70		ns
$E_{on} (E_{off})$	$V_{GE} \pm 15 \text{ V}$		32 (34)		mJ
$E_{on} (E_{off})$	with SKHI 65; $T_j = 125^\circ\text{C}$; $V_{CC} = 600 \text{ V}$; $I_C = 300 \text{ A}$		35 (44)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_F = 300 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)^\circ\text{C}$		2,3 (2,1)	2,65	V
V_{TO}	$T_j = 125^\circ\text{C}$		1,1		V
r_T	$T_j = 125^\circ\text{C}$		3,3		$\text{m}\Omega$
I_{RRM}	$I_F = 300 \text{ A}$; $T_j = 125^\circ\text{C}$		360		A
Q_{rr}	$V_{GE} = 0 \text{ V}$ di/dt = 6450 A/ μs		44		μC
E_{rr}	$R_{Gon} = R_{Goff} = 3,3 \Omega$		18		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}	$T = 25 (100)^\circ\text{C}$		1 (1,67)		$\text{k}\Omega$
tolerance	$T = 25 (100)^\circ\text{C}$		3 (2)		%
Mechanical data					
M_1	to heatsink (M5)	2		3	Nm
M_2	for terminals (M6)	4		5	Nm
w				460	g



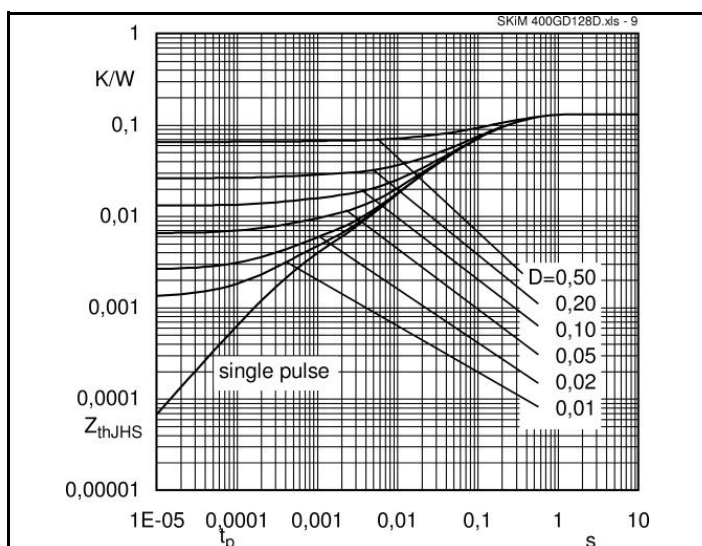
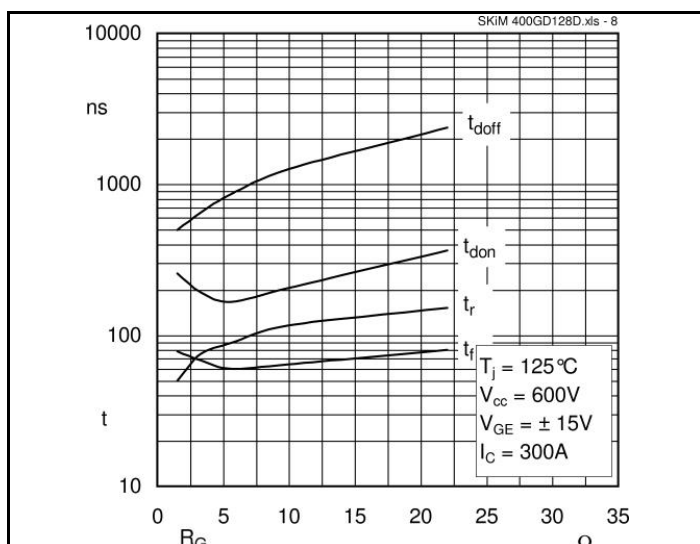
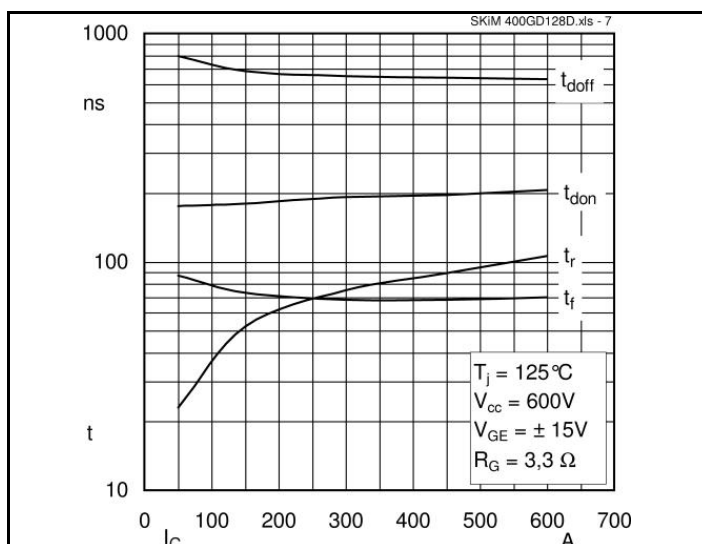


Fig. 9 Transient thermal impedance of IGBT

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

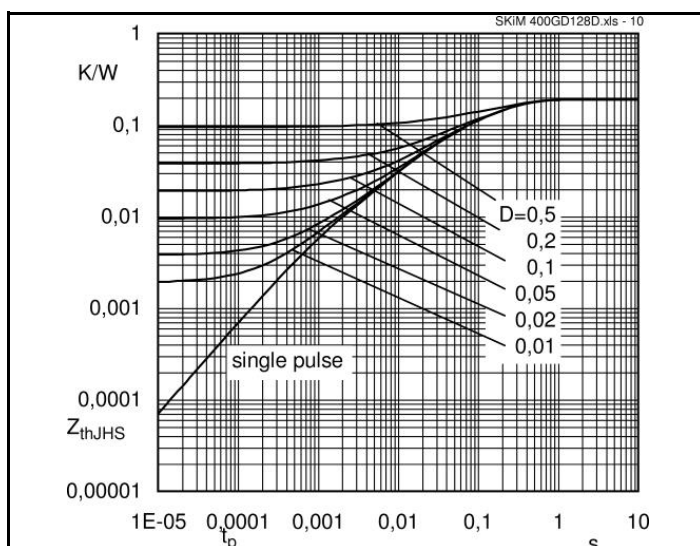


Fig. 10 Transient thermal impedance of FWD

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

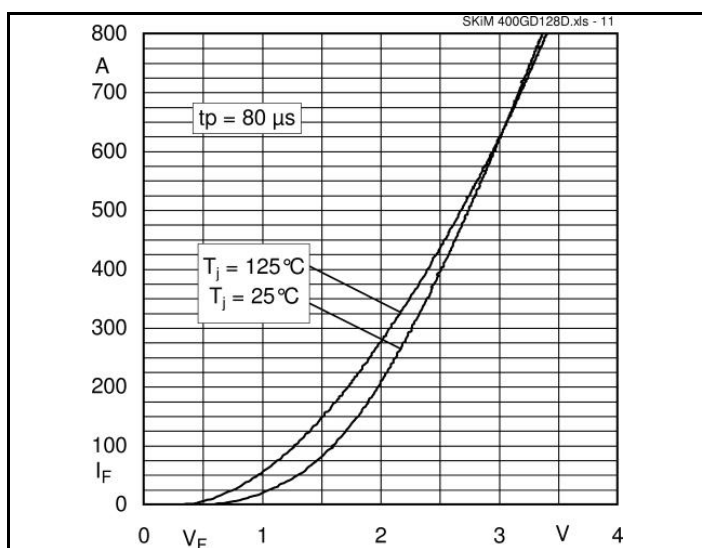
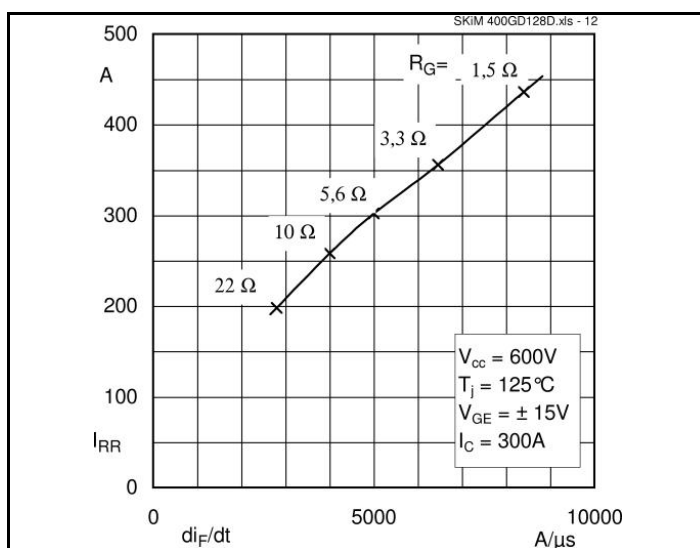
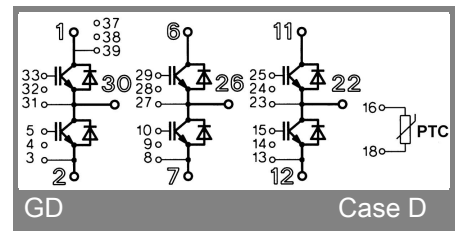
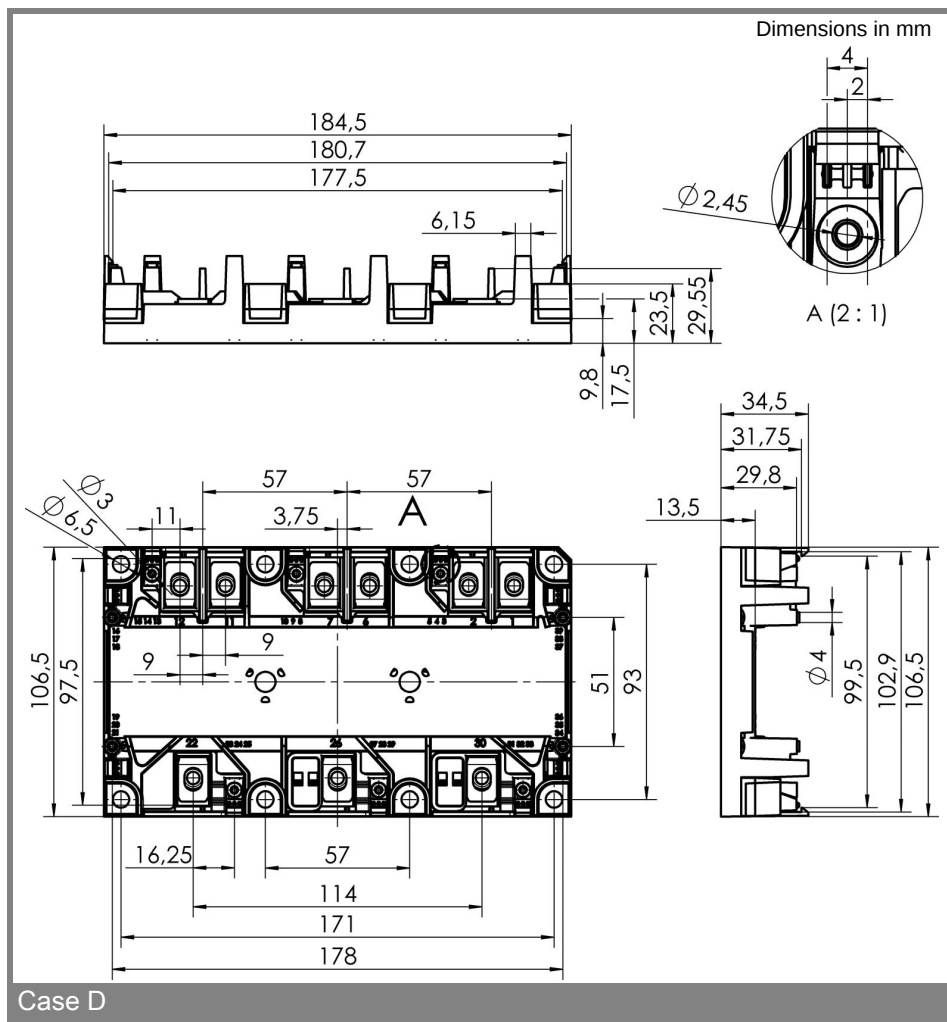
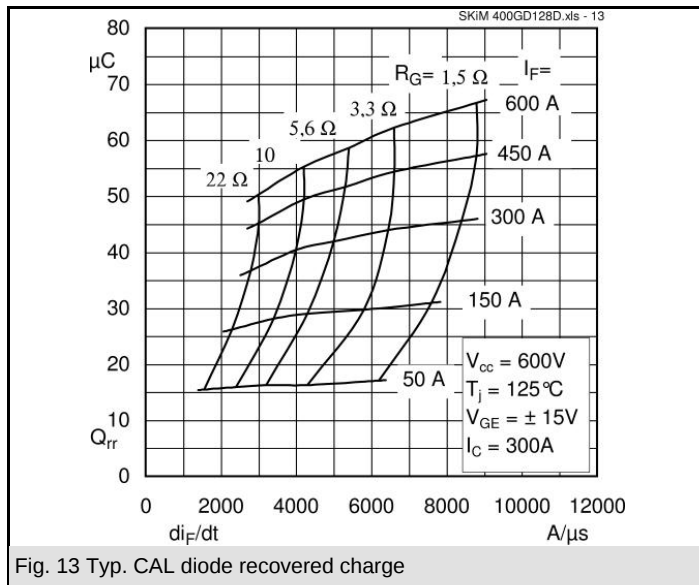

 Fig. 11 CAL diode forward characteristic, incl. $R_{CC'+EE'}$


Fig. 12 CAL diode peak reverse recovery current



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

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