SKM 400GA173D

SEMITRANS™ 4

IGBT Modules

SKM 400GA173D

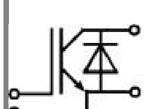
SKM 400GA173D1S

Features

- MOS input (voltage controlled)
- N channel, Homgeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{cnom}
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications

- AC inverter drives on mains 575-750 V_{AC}
- DC bus voltage 750-1200 V_{DC}
- Public transport
- Switching (not for linear use)



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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_c = 25 (80) °C	440 (300)	A
I_{CRM}	t_p = 1 ms	600	A
V_{GES}		± 20	V
T_{vj}, (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	°C
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	T_c = 25 (80) °C	300 (200)	A
I_{FRM}	t_p = 1 ms	600	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	2900	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 = 20 mA	4,8	5,5	6,2	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 (125) °C		0,1	0,3	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1,65 (1,9)	1,9 (2,15)	V
r_{CE}	V_{GE} = 15 V, T_j = 25 (125) °C		9 (16)	6,6666 (9,5)	mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V, chip level		3 (4,3)	3,9 (5)	V
C_{ies}	under following conditions		44		nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		3,5		nF
C_{res}			1		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip T_c= 25 (125) °C		0,18 (0,22)		mΩ
$t_{d(on)}$	V_{CC} = 1200 V, I_{Cnom} = 300 A		550		ns
t_r	$R_{Gon} = R_{Goff}$ = 2 Ω, T_j = 125 °C		120		ns
$t_{d(off)}$	V_{GE} = ± 15 V		850		ns
t_f			50		ns
E_{on} (E_{off})			180 (10)		mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V; T_j = 25 (125) °C		2,2 (1,9)	2,7 (2,4)	V
$V_{(TO)}$	T_j = 125 () °C		1,3	1,5	V
r_T	T_j = 125 () °C		2,9	3,2	mΩ
I_{RRM}	I_{Fnom} = 300 A; T_j = 25 (125) °C		120 (170)		A
Q_{rr}	di/dt = 1500 A/µs		30 (72)		µC
E_{rr}	V_{GE} = V				mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,05	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,17	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6 (M4)	2,5 (1,1)		5 (2)	Nm
w				330	g

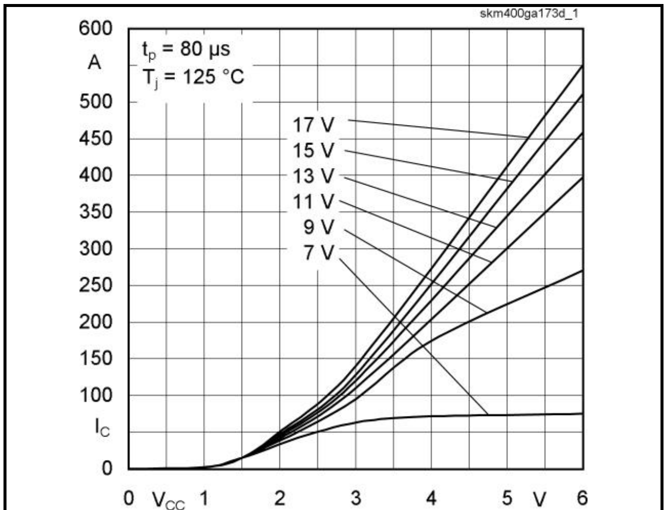


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

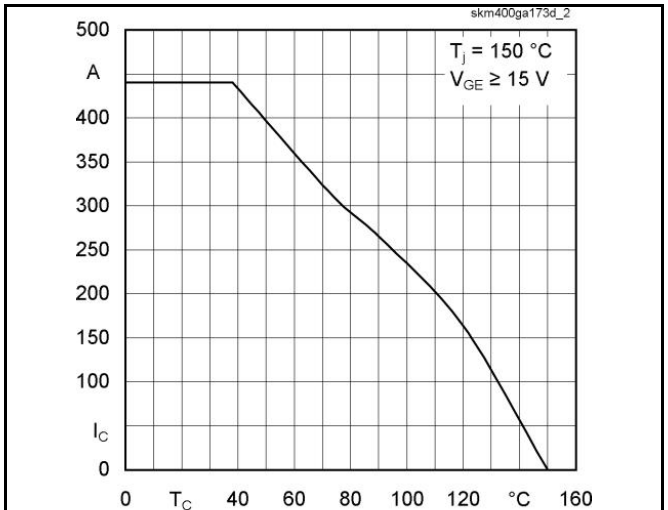


Fig. 2 Rated current vs. temperature I_C = f (T_C)

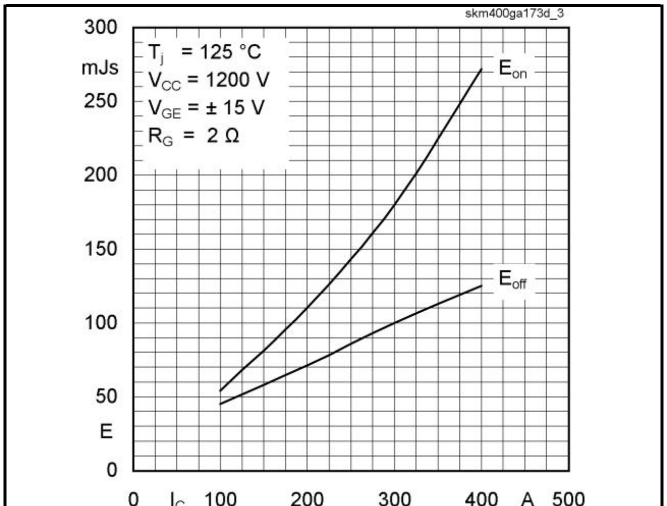


Fig. 3 Typ. turn-on /-off energy = f (I_C)

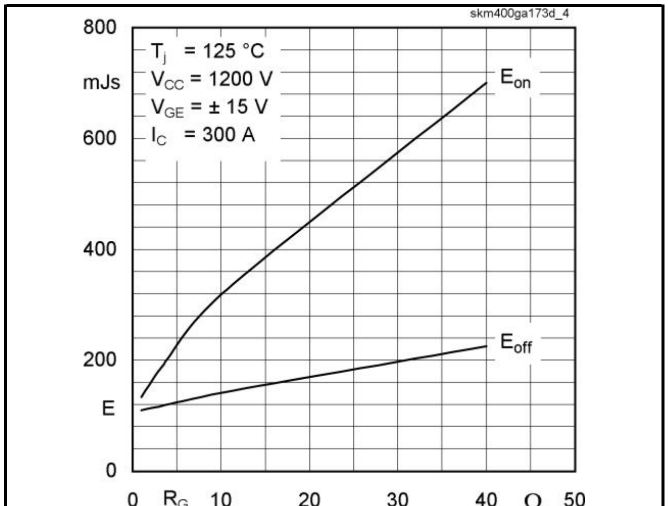


Fig. 4 Typ. turn-on /-off energy = f (R_G)

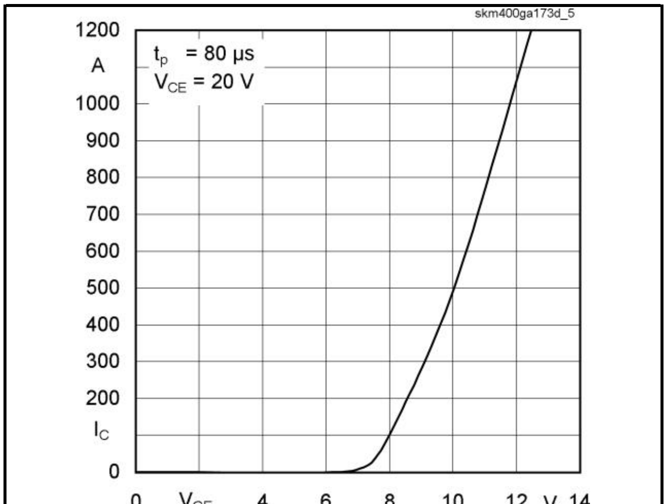


Fig. 5 Typ. transfer characteristic

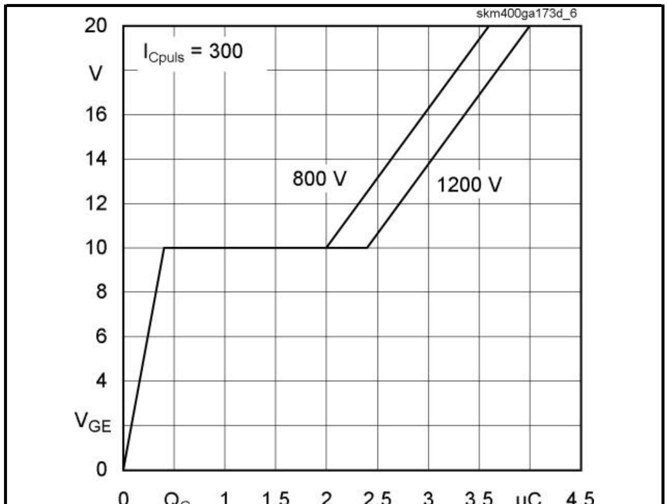


Fig. 6 Typ. gate charge characteristic

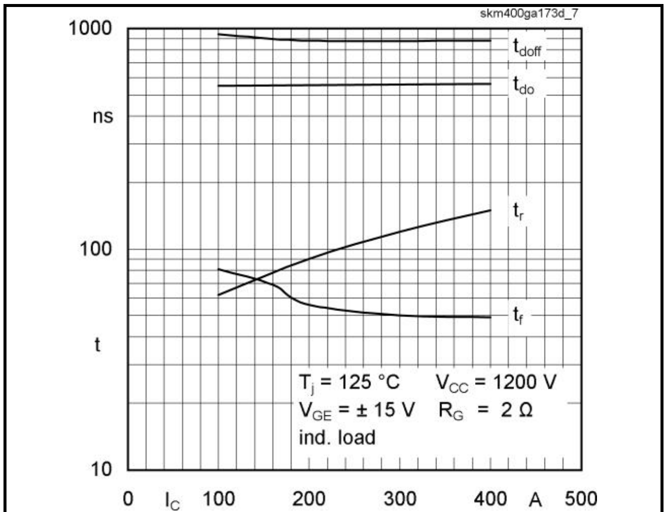


Fig. 7 Typ. switching times vs. I_C

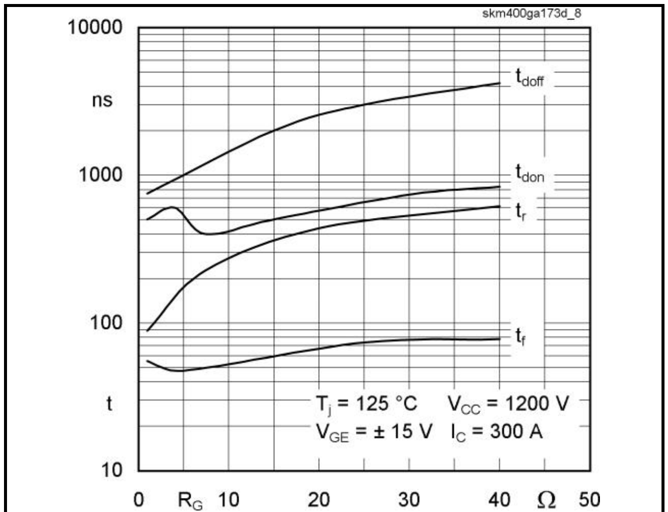


Fig. 8 Typ. switching times vs. gate resistor R_G

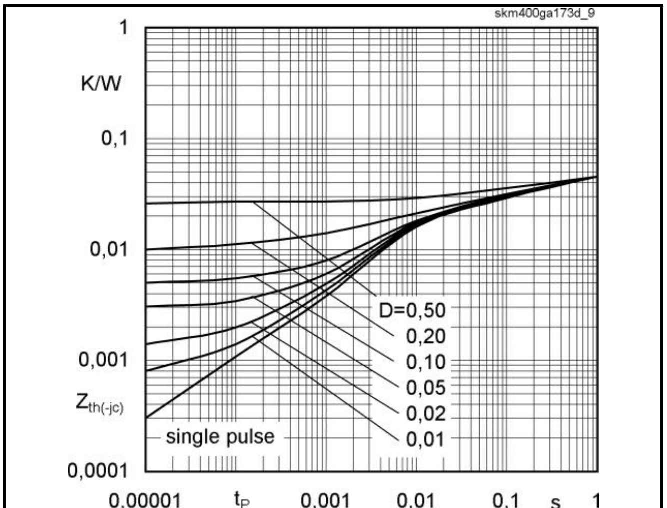


Fig. 9 Transient thermal impedance of IGBT

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

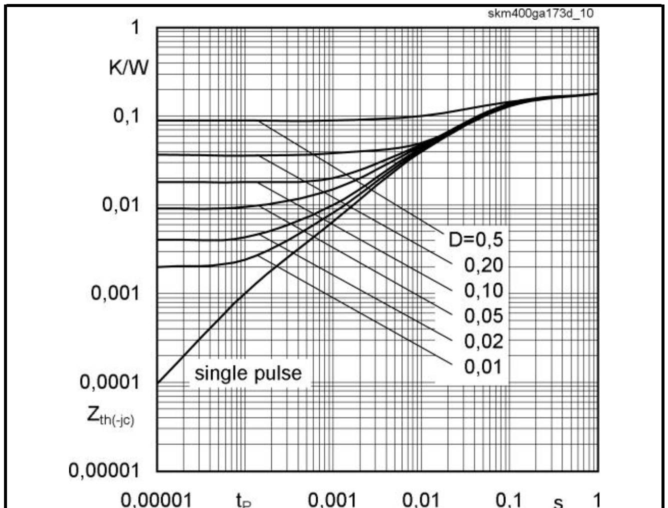


Fig. 10 Transient thermal impedance of FWD

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

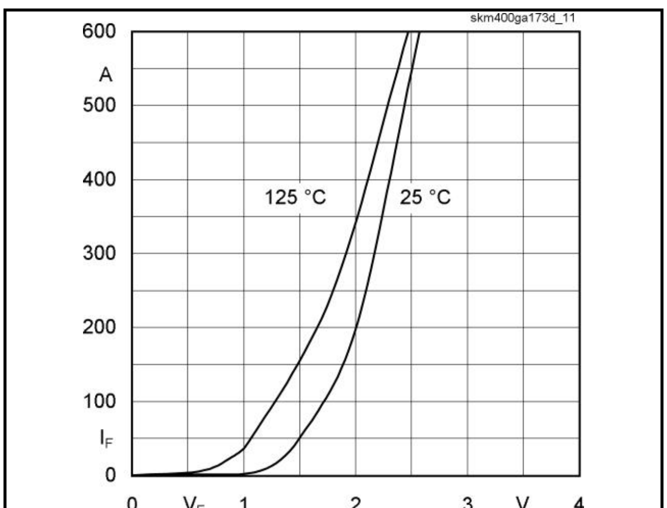


Fig. 11 CAL diode forward characteristic

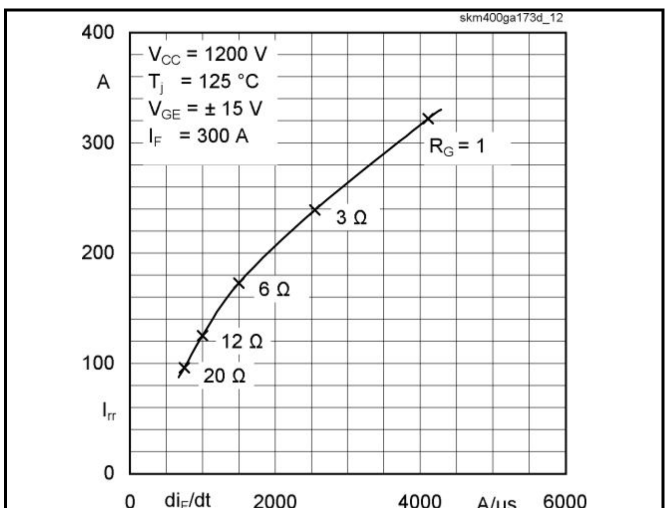


Fig. 12 Typ. CAL diode peak reverse recovery current

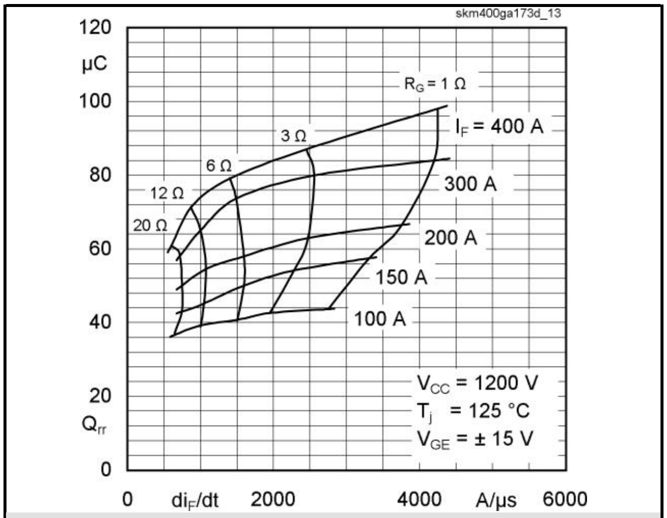
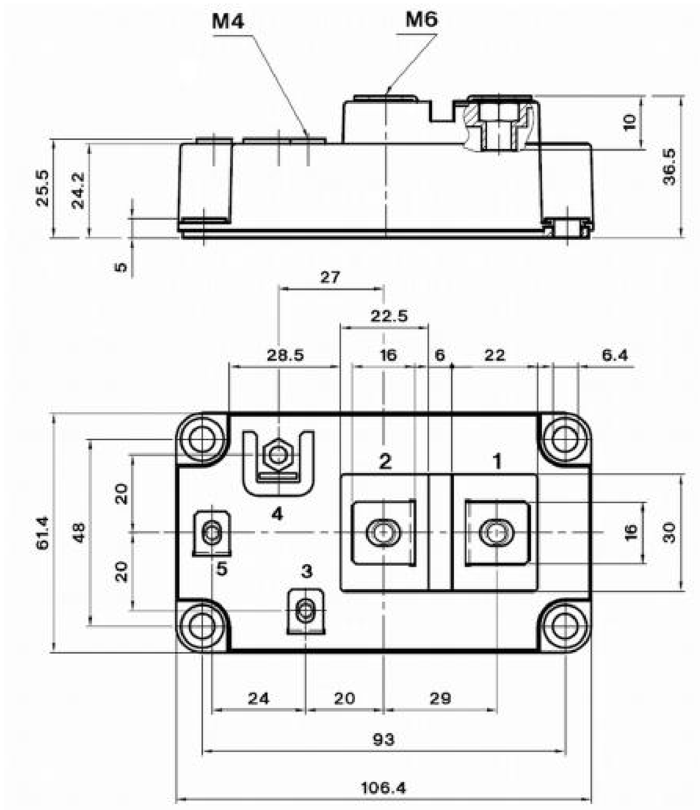


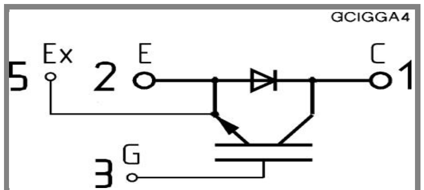
Fig. 13 Typ. CAL diode recovered charge

UL Recognized
File no. E 63 532

Dimensions in mm



Case D 59



GA Case D 59

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

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