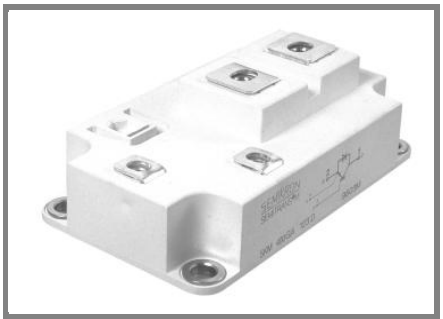
SKM 400GA128D



SEMITRANS™ 4

SPT IGBT Modules

SKM 400GA128D

Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20 kHz

Remarks

- $I_{DC} \leq 500$ A for $T_{Terminal} = 100$ °C

GA

Absolute Maximum Ratings	$T_c = 25$°C, unless otherwise specified		
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		1200	V
I_C	$T_c = 25$ (80) °C	565 (400)	A
I_{CRM}	$T_c = 25$ (80) °C, $t_p = 1$ ms	1130 (800)	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	390 (260)	A
I_{FRM}	$T_c = 25$ (80) °C, $t_p = 1$ ms	1130 (800)	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					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12$ mA	4,5	5,5	6,45	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25$ () °C		0,2	0,6	mA
$V_{CE(TO)}$	$T_j = 25$ () °C		1 (0,9)	1,15 (1,05)	V
r_{CE}	$V_{GE} = 15$ V, $T_j = 25$ (125) °C		3 (4)	4 (5)	mΩ
$V_{CE(sat)}$	$I_C = 300$ A, $V_{GE} = 15$ V, chip level		1,9 (2,1)	2,35 (2,55)	V
C_{ies}	under following conditions		26		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25$ V, f = 1 MHz		3		nF
C_{res}			3		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25$ (125) °C		0,18 (0,22)		mΩ
$t_{d(on)}$	$V_{CC} = 600$ V, $I_C = 300$ A		120		ns
t_r	$R_{Gon} = R_{Goff} = 5\ \Omega$, $T_j = 125$ °C		70		ns
$t_{d(off)}$	$V_{GE} = \pm 15$ V		800		ns
t_f			75		ns
E_{on} (E_{off})			31 (33)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_F = 300$ A; $V_{GE} = 0$ V; $T_j = 25$ (125) °C		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 25$ (125) °C		1,1	1,2	V
r_T	$T_j = 25$ (125) °C		3	4,3	mΩ
I_{RRM}	$I_F = 300$ A; $T_j = 125$ ( ) °C		345		A
Q_{rr}	di/dt = 5200 A/µs		48		µC
E_{rr}	$V_{GE} = 0$ V		19		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,055	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,125	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		5	Nm
w				330	g

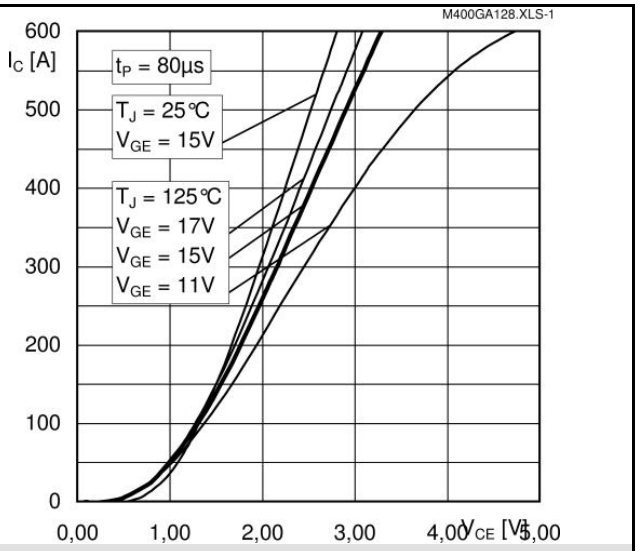


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

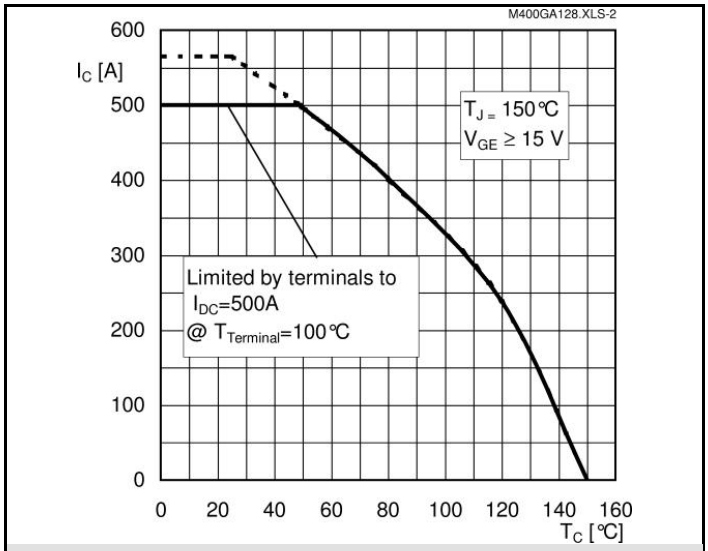


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

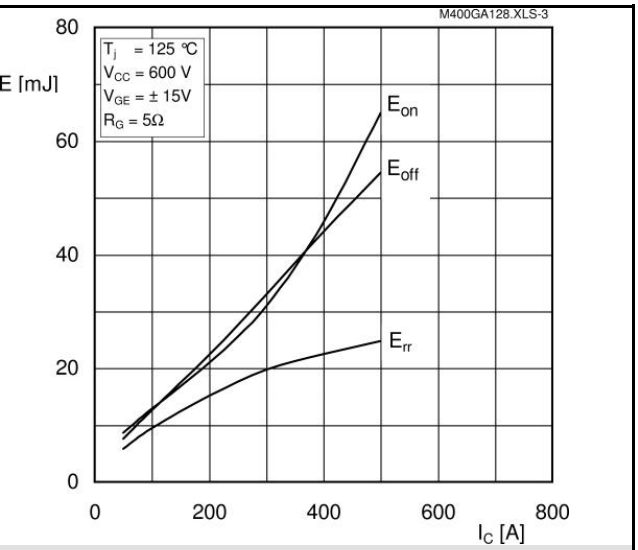


Fig. 3 Typ. turn-on /-off energy = f (I_C)

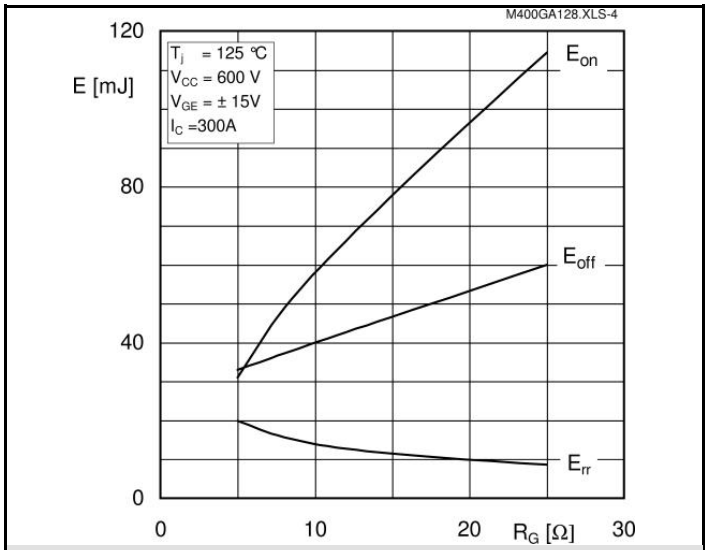


Fig. 4 Typ. turn-on /-off energy = f (R_G)

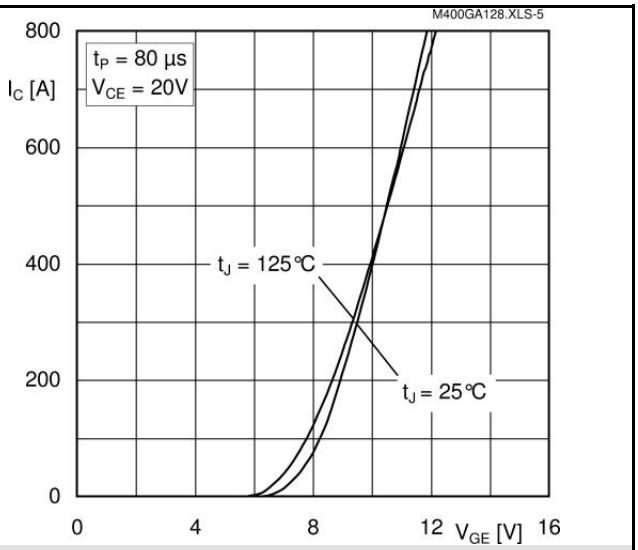


Fig. 5 Typ. transfer characteristic

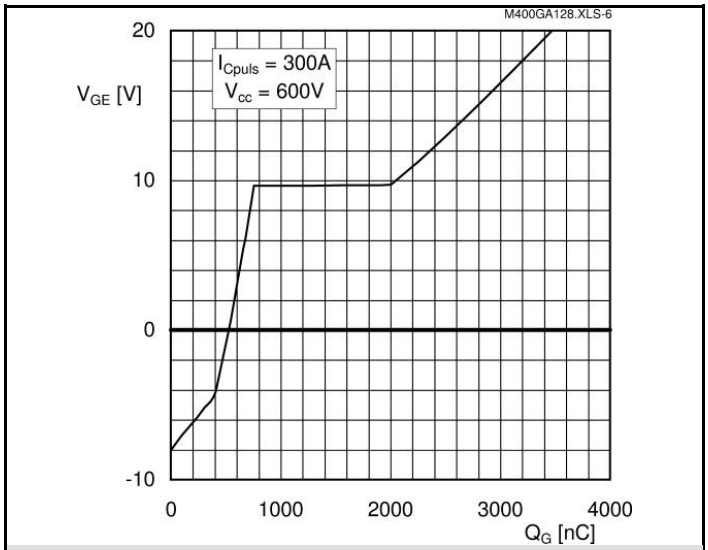


Fig. 6 Typ. gate charge characteristic

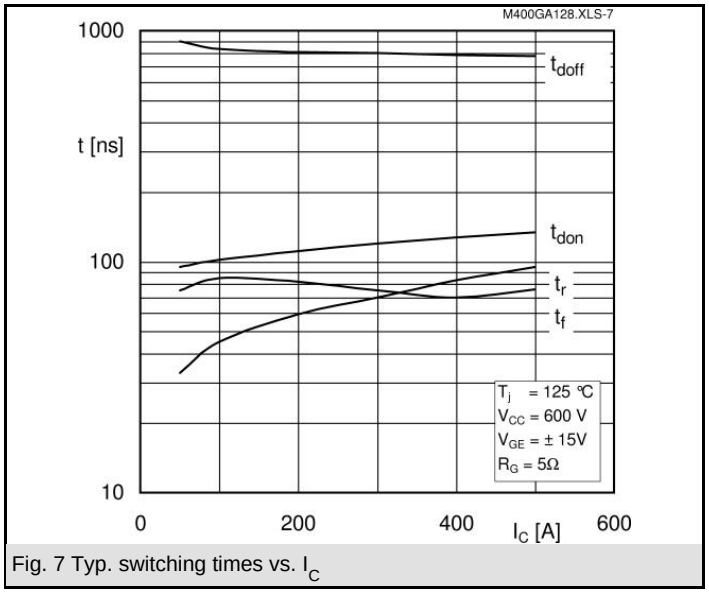


Fig. 7 Typ. switching times vs. I_C

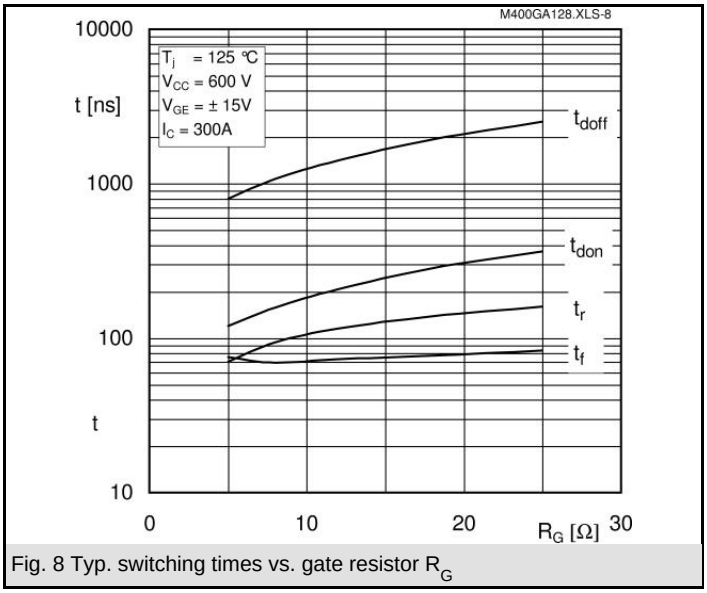


Fig. 8 Typ. switching times vs. gate resistor R_G

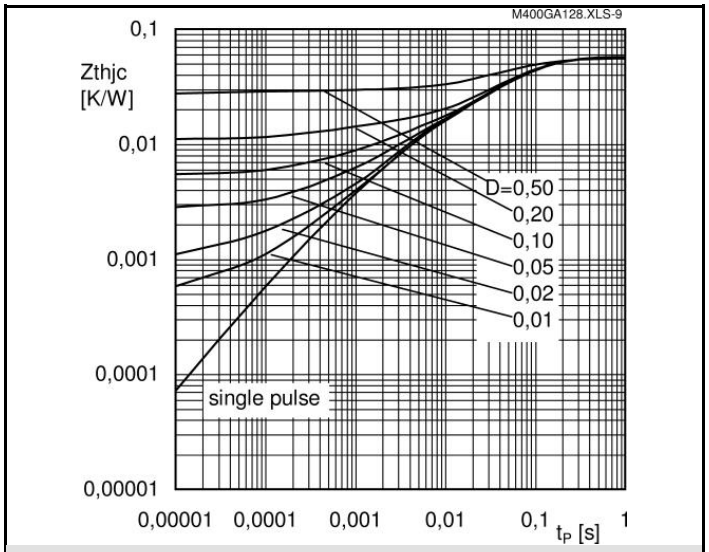


Fig. 9 Transient thermal impedance of IGBT

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

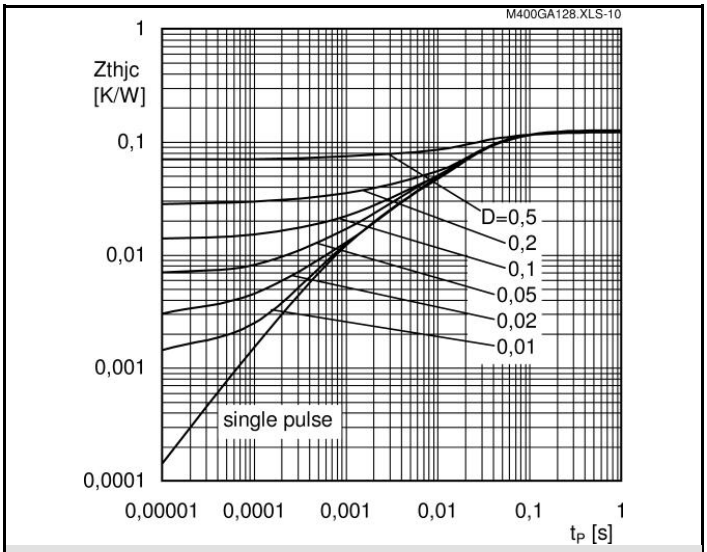


Fig. 10 Transient thermal impedance of FWD

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

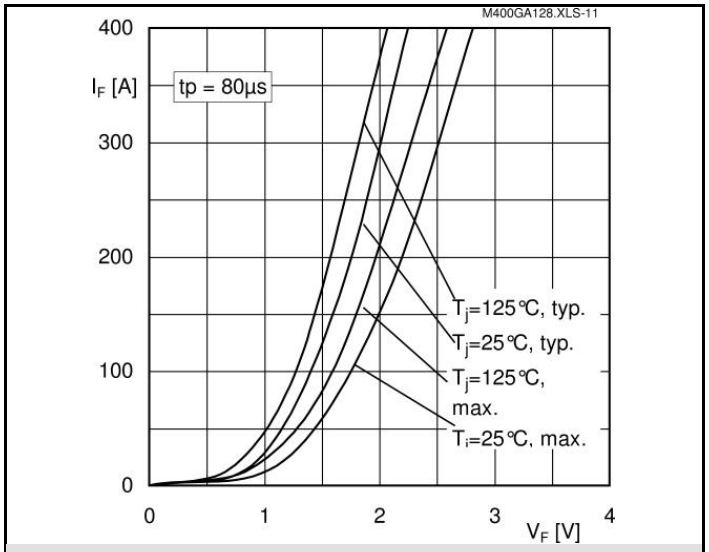


Fig. 11 CAL diode forward characteristic

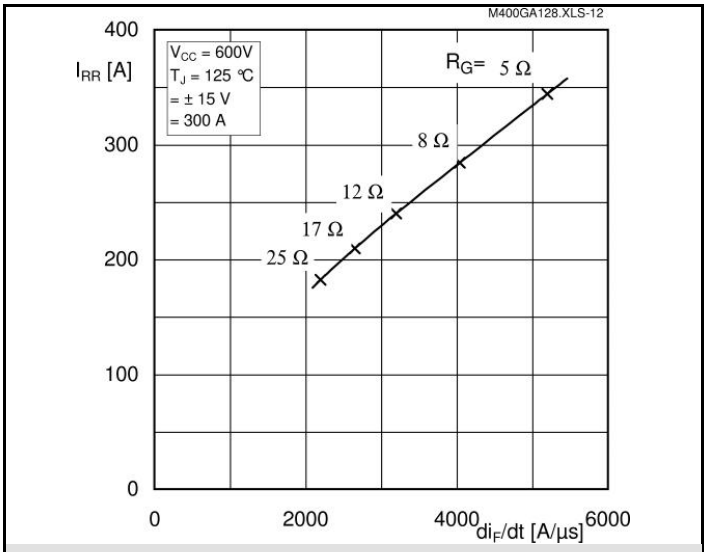


Fig. 12 Typ. CAL diode peak reverse recovery current

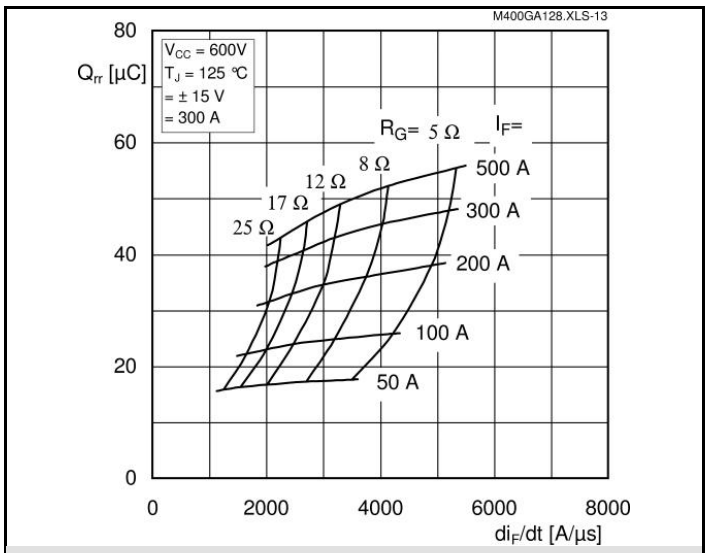
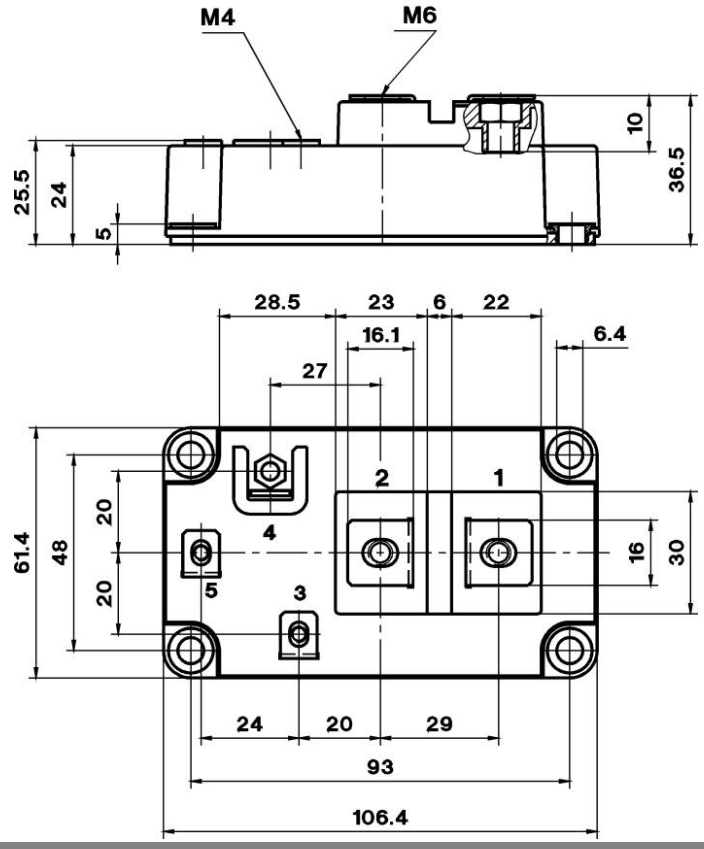


Fig. 13 Typ. CAL diode recovered charge

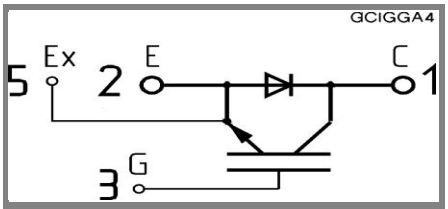
UL Recognized
File no. E 63 532

Dimensions in mm

CASED59



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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