

SKM 400 GA 128 D

Absolute Maximum Ratings		$T_{case} = 25\text{ °C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_{case} = 25\text{ (80) °C}$	530 (380)	A
I_{CRM}	$T_{case} = 25\text{ (80) °C}$, $t_p = 1\text{ ms}$	1060 (760)	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			
$I_{FAV} = -I_C$	$T_{case} = 25\text{ (80) °C}$	390 (260)	A
I_{FRM}	$T_{case} = 25\text{ (80) °C}$, $t_p < 1\text{ ms}$	1060 (760)	A
I_{FSM}	$t_p = 10\text{ ms}$; sin.; $T_j = 150\text{ °C}$	2900	A
Freewheeling Diode			
$I_{FAV} = -I_C$	$T_{case} = 25\text{ (80) °C}$		A
I_{FRM}	$T_{case} = 25\text{ (80) °C}$, $t_p < 1\text{ ms}$		A
I_{FSM}	$t_p = 10\text{ ms}$; sin.; $T_j = 150\text{ °C}$		A

Characteristics		$T_{case} = 25\text{ °C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(TO)}$	$V_{GE} = V_{CE}$, $I_C = 12\text{ mA}$	4,5	5,5	6,45	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25\text{ (125) °C}$			tbd	mA
$V_{CE(TO)}$	$T_j = 25\text{ (125) °C}$		1,0 (0,9)	1,15	V
r_{CE}	$V_{GE} = 15\text{ V}$, $T_j = 25\text{ (125) °C}$		3,3 (4,7)	4,2(tbd)	mΩ
$V_{CE(sat)}$	$I_C = 300\text{ A}$, $V_{GE} = 15\text{ V}$, chip level		2,0 (2,3)	2,4	V
C_{ies}			26		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25\text{ V}$, $f = 1\text{ MHz}$		3		nF
C_{res}			3		nF
L_{CE}				20	nH
R_{CC+EE}	resistance, terminal-chip 25 (125) °C		0,18(0,22)		mΩ
$t_{d(on)}$	under following conditions: $V_{CC} = 600\text{ V}$, $I_C = 300\text{ A}$,		120		ns
t_r	$R_{Gon} = R_{Goff} = 5\text{ Ω}$, $T_j = 125\text{ °C}$,		70		ns
$t_{d(off)}$	$V_{GE} \pm 15\text{ V}$		800		ns
t_f			75		ns
$E_{on} (E_{off})$			31(33)		mJ
Inverse Diode under following conditions:					
$V_F = V_{EC}$	$I_F = 300\text{ A}$; $V_{GE} = 0\text{ V}$; $T_j = 25\text{ (125) °C}$		2,0 (1,8)	2,5	V
$V_{T(TO)}$	$T_j = 25\text{ (125) °C}$		1,1 (tbd)	1,2	V
r_T	$T_j = 25\text{ (125) °C}$		3 (tbd)	4,3(tbd)	mΩ
I_{RRM}	$I_F = 300\text{ A}$; $T_j = 125\text{ °C}$		345		A
Q_{rr}	$di/dt = 5200\text{ A/μs}$		48		μC
E_{rr}	$V_{GE} = 0\text{ V}$		19		mJ
FWD under following conditions:					
$V_F = V_{EC}$	$I_F = A$; $V_{GE} = 0\text{ V}$; $T_j = 25\text{ (125) °C}$				V
V_{TO}	$T_j = 25\text{ (125) °C}$				V
r_T	$T_j = 25\text{ (125) °C}$				mΩ
I_{RRM}	$I_F = A$; $T_j = 125\text{ °C}$				A
Q_{rr}	$V_{GE} = 0\text{ V}$				μC
E_{rr}					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
$R_{th(j-c)FD}$	per FWD				K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical Data					
M_s	to heatsink (M6)	3		5	Nm
M_t	for terminals (M5)	2,5		5	Nm
w				330	g

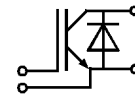
SEMITRANS™ M SPT IGBT Module

SKM 400 GA 128 D

Preliminary Data



SEMITRANS 4



GA

Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at $f_{sw} > 20\text{ kHz}$

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

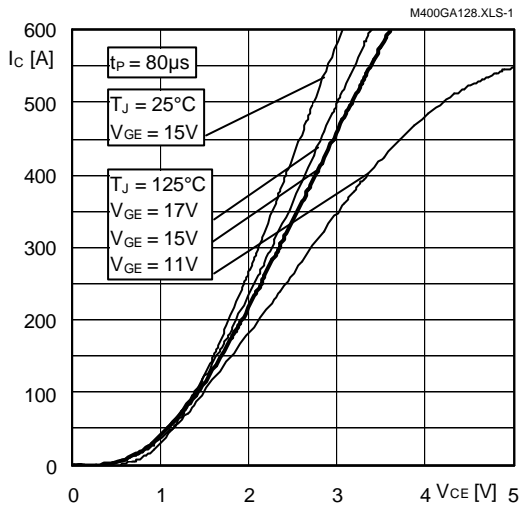


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

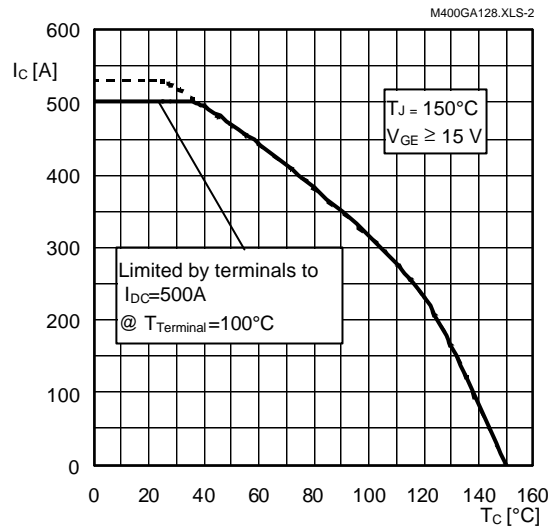


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

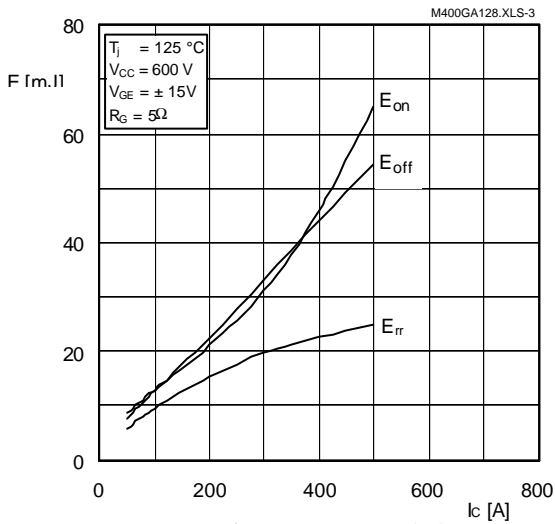


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

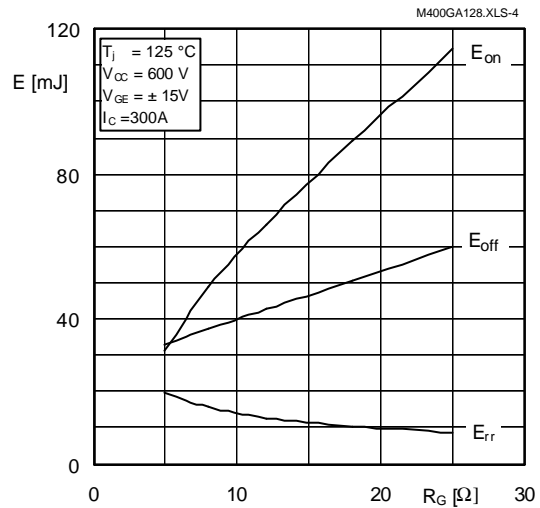


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

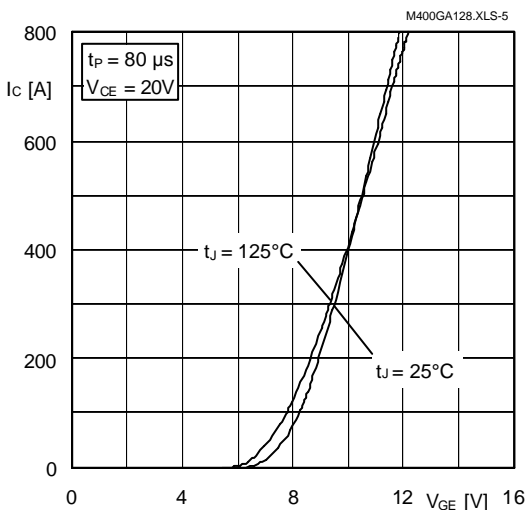


Fig. 5 Typ. transfer characteristic

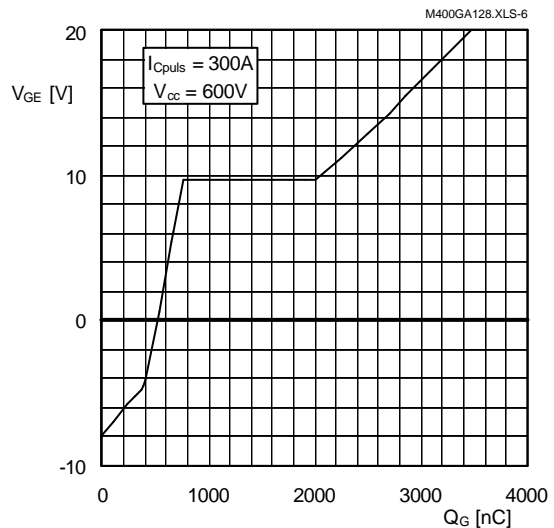


Fig. 6 Typ. gate charge characteristic

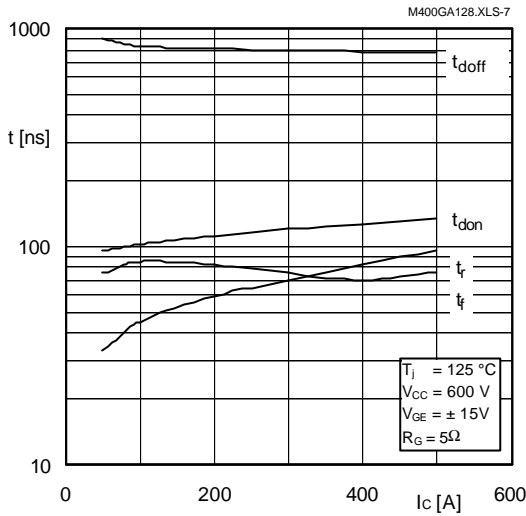


Fig. 7 Typ. switching times vs. I_C

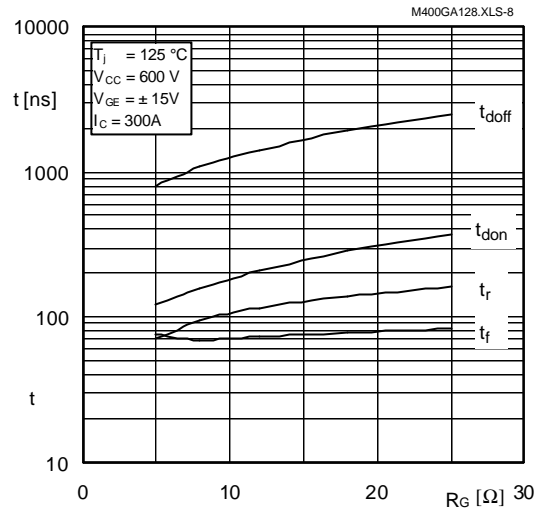


Fig. 8 Typ. switching times vs. gate resistor R_G

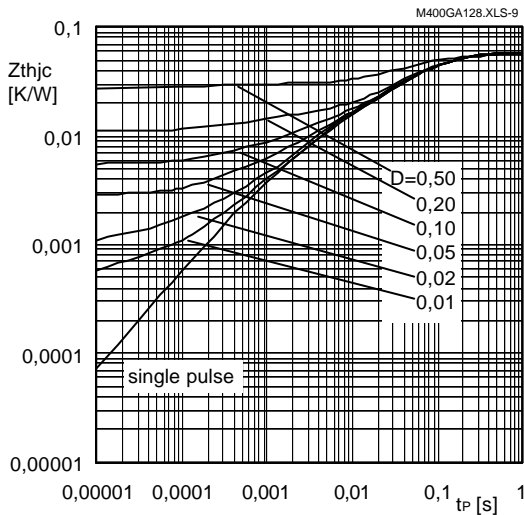


Fig. 9 Transient thermal impedance of IGBT $Z_{thp(j-c)} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

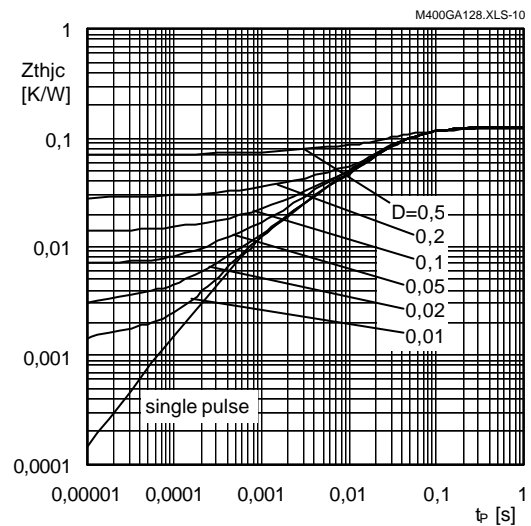


Fig. 10 Transient thermal impedance of FWD $Z_{thp(j-c)D} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

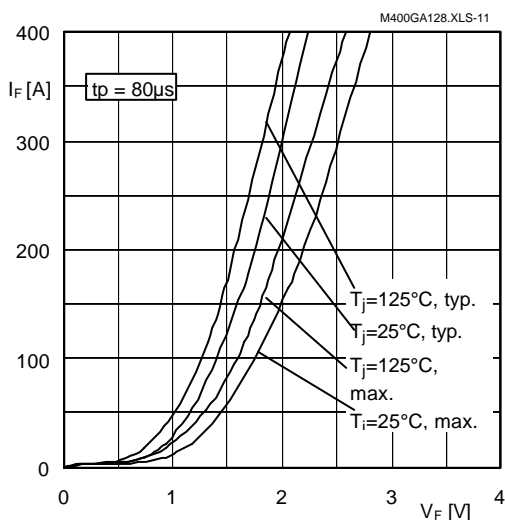


Fig. 11 CAL diode forward characteristic

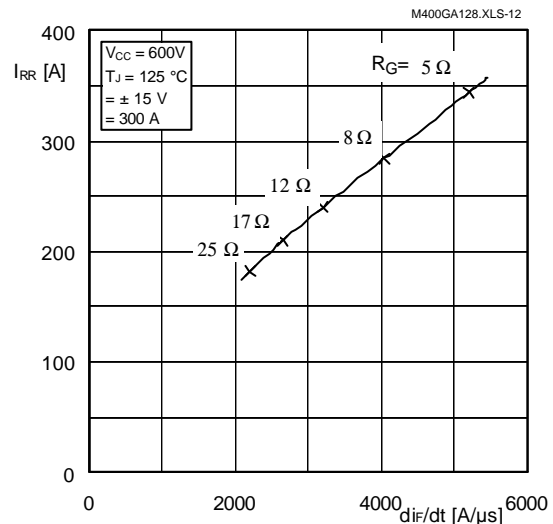
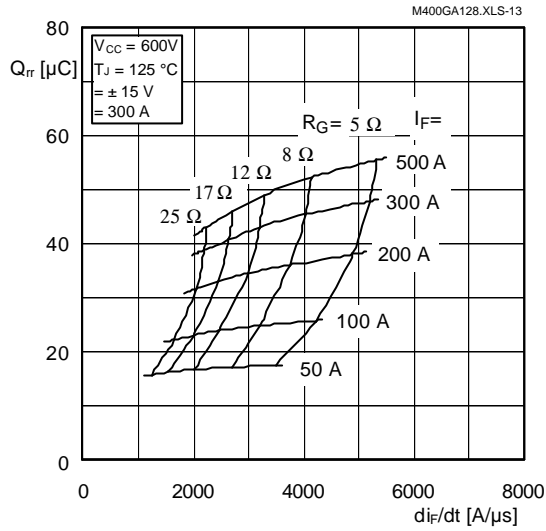


Fig. 12 Typ. CAL diode peak reverse recovery current

I:\Marketing\FRAME DATA\datbl\B06-igbt\400ga128d.frm



This is an electrostatic discharge sensitive device (ESDS).

Please observe the international standard IEC 60747-1, Chapter IX.

Packing Unit	3 pcs	SEMIBOX B
Mounting Kit	10 pcs	Ident-No. 33321100

Fig. 13 Typ. CAL diode recovered charge

SEMITRANS 4
 Case D 59
 UL Recognized
 File no. E 63 532

SKM 400 GA 128 D
 GCIGGA4

CASED59

Dimensions in mm
Case outline and circuit diagrams

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.