SKM 400 GA 128 D

Absolute Maximum Ratings

T_{case} = 25 °C, unless otherwise specified

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

Characteristics

T_{case} = 25 °C, unless otherwise specified

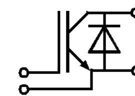
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(TO)}$	$V_{GE} = V_{CE}$, I_C = 12 mA	4,5	5,5	6,45	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 (125) °C			tbd	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1,0 (0,9)	1,15	V
r_{CE}	V_{GE} = 15 V, T_j = 25 (125) °C		3,3 (4,7)	4,2(tbd)	mΩ
$V_{CE(sat)}$	I_C = 300 A, V_{GE} = 15 V, chip level		2,0 (2,3)	2,4	V
C_{ies}			26		nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		3		nF
C_{res}			3		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	resistance, terminal-chip 25 (125) °C		0,18(0,22)		mΩ
	under following conditions:				
$t_{d(on)}$	V_{CC} = 600 V, I_C = 300 A,		120		ns
t_r	$R_{Gon} = R_{Goff}$ = 5 Ω, T_j = 125 °C,		70		ns
$t_{d(off)}$	V_{GE} ± 15 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 A; V_{GE} = 0 V; T_j = 25 (125) °C		2,0 (1,8)	2,5	V
$V_{T(TO)}$	T_j = 25 (125) °C		1,1 (tbd)	1,2	V
r_T	T_j = 25 (125) °C		3 (tbd)	4,3(tbd)	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
FWD	under following conditions:				
$V_F = V_{EC}$	I_F = A; V_{GE} = 0 V; T_j = 25 (125) °C				V
V_{TO}	T_j = 25 (125) °C				V
r_T	T_j = 25 (125) °C				mΩ
I_{RRM}	I_F = A; T_j = 125 °C				A
Q_{rr}	V_{GE} = 0 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 x I_C

Typical Applications

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

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

I:\Marketin\FRAMEDATA\datbl\B06-igbt\400ga128d.fm

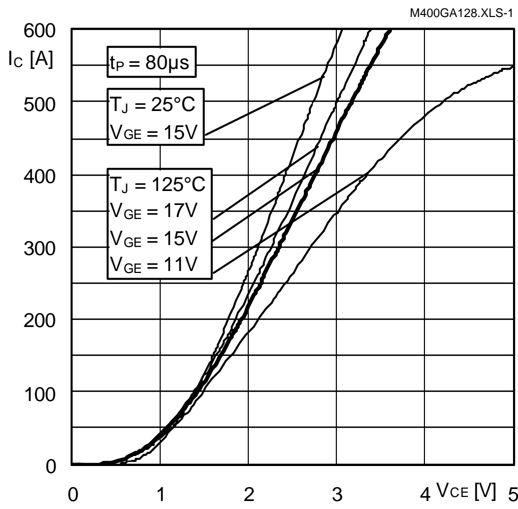


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

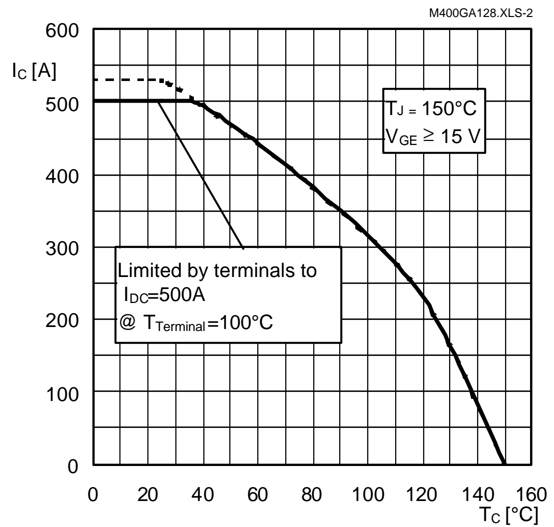


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

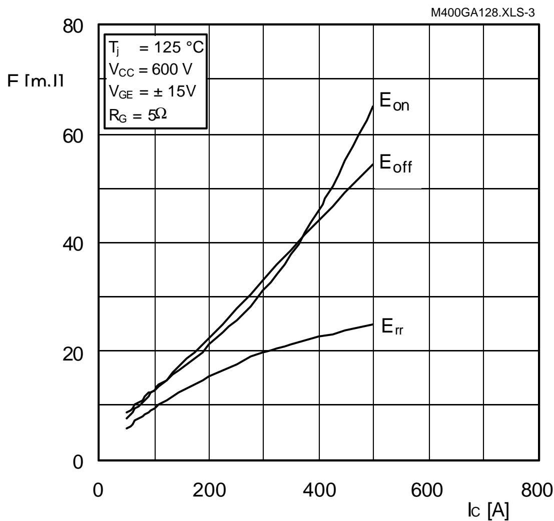


Fig. 3 Typ. turn-on /-off energy = f (I_C)

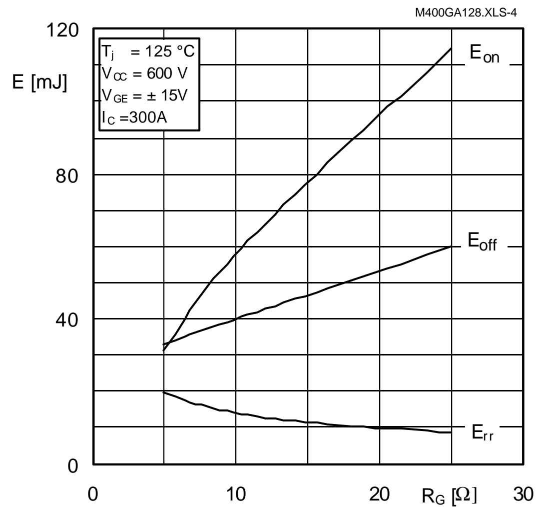


Fig. 4 Typ. turn-on /-off energy = f (R_G)

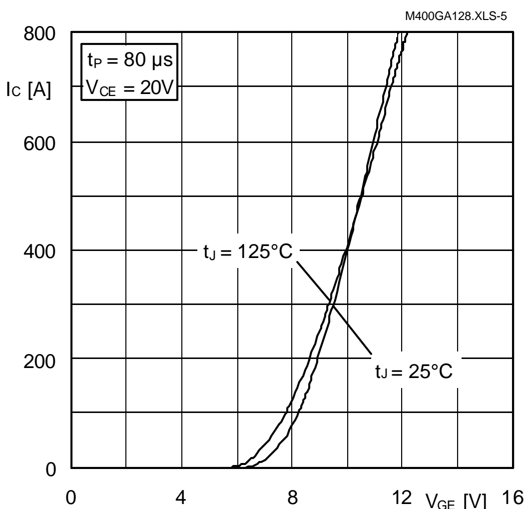


Fig. 5 Typ. transfer characteristic

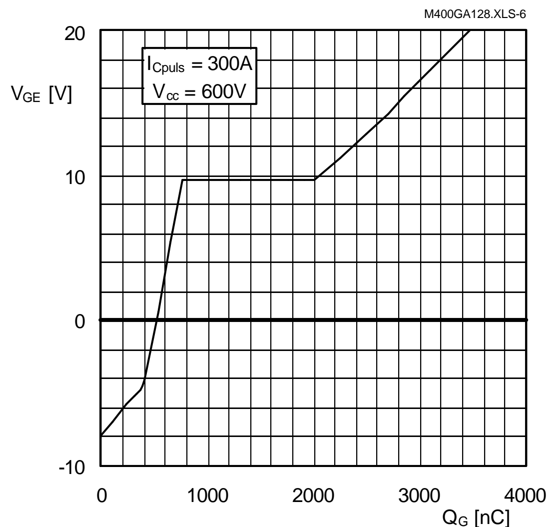


Fig. 6 Typ. gate charge characteristic

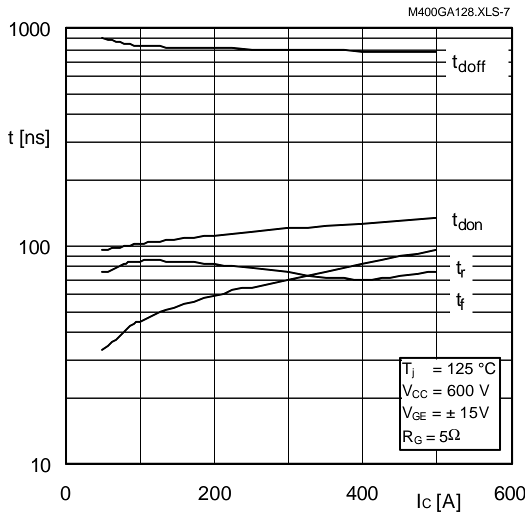


Fig. 7 Typ. switching times vs. I_C

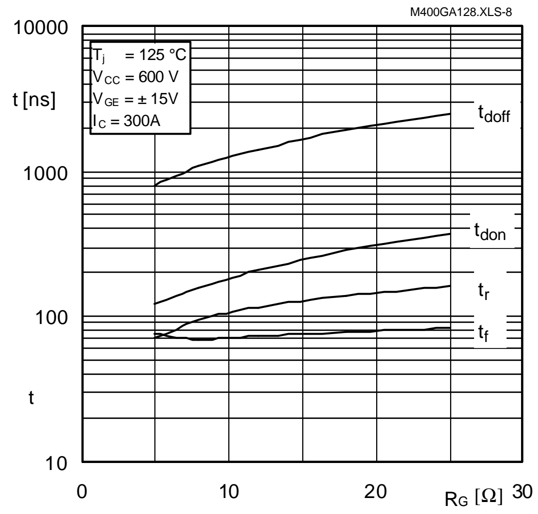


Fig. 8 Typ. switching times vs. gate resistor R_G

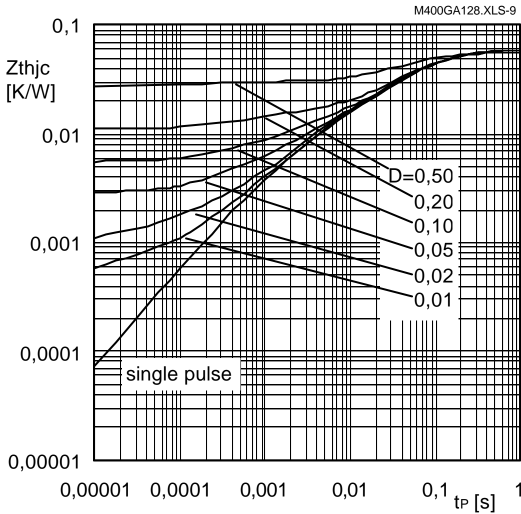


Fig. 9 Transient thermal impedance of IGBT $Z_{thp(j-c)} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

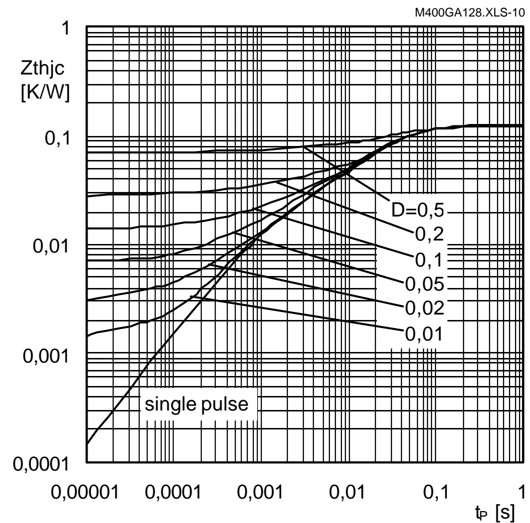


Fig. 10 Transient thermal impedance of FWD $Z_{thp(j-c)D} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

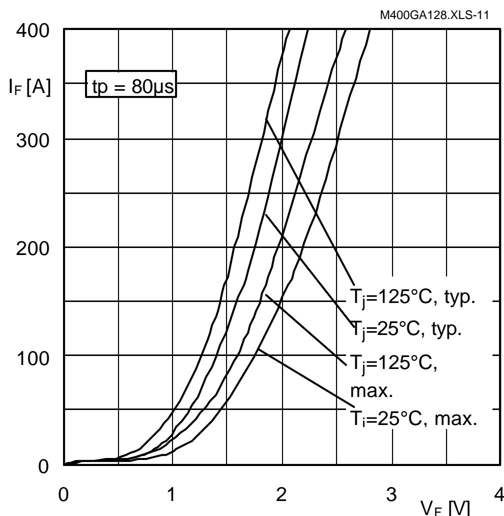


Fig. 11 CAL diode forward characteristic

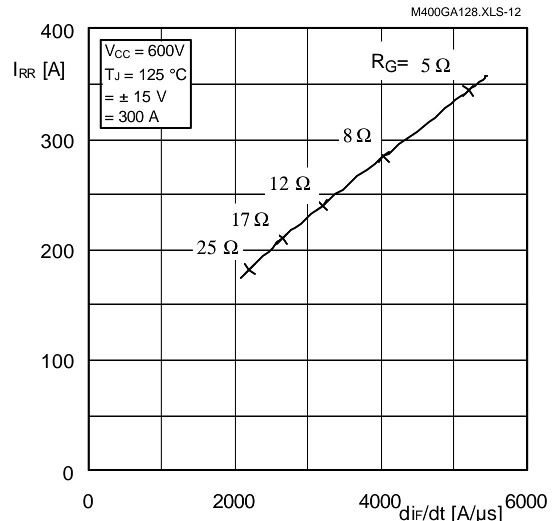


Fig. 12 Typ. CAL diode peak reverse recovery current

I:\Marketin\FRAMEDAT\datbl\B06-igbt\400ga128d.fm

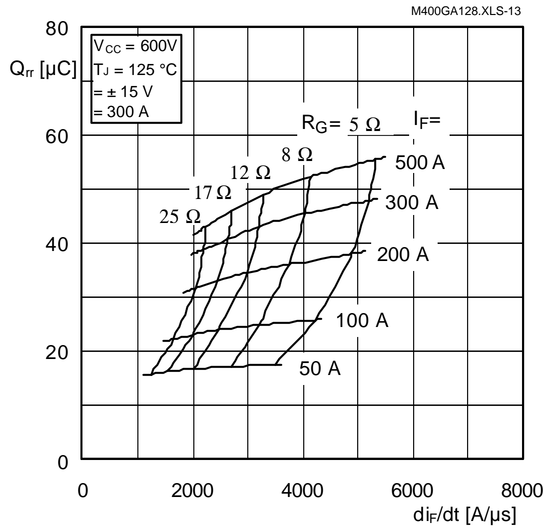


Fig. 13 Typ. CAL diode recovered charge

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

SEMITRANS 4

Case D 59
UL Recognized
File no. E 63 532

CASED59

SKM 400 GA 128 D

GCIGGA4

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.