SKM 500GA123D

SEMITRANS® 4

IGBT Modules

SKM 500GA123D

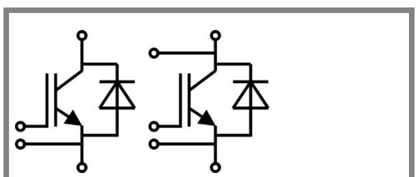
SKM 500GA123DS

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 CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (12 mm) and creepage distances (20 mm)

Typical Applications*

- AC inverter drives
- UPS



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Absolute Maximum Ratings — T_c = 25 °C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	500	A
		T_{case} = 80 °C	420	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		800	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; V_{CES} < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	500	A
		T_{case} = 80 °C	350	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		800	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	3600	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			- 40 ...+ 150	°C
T_{stg}			- 40 ...+ 125	°C
V_{isol}	AC, 1 min.		2500	V

Characteristics — T_c = 25 °C, unless otherwise specified

Symbol	Conditions		min.	typ.	max.	Units
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 16 mA		4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,1	0,3	mA
V_{CE0}		T_j = 25 °C		1,4	1,6	V
		T_j = 125 °C		1,6	1,8	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		2,75	3,5	mΩ
		T_j = 125°C		3,75	4,75	mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V	T_j = °$C_{chiplev.}$		2,5	3	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		26	40	nF
C_{oes}				4	5,2	nF
C_{res}				2	2,6	nF
R_{Gint}	T_j = °C			1,25		Ω
$t_{d(on)}$	R_{Gon} = 3,3 Ω	V_{CC} = 600V		250	600	ns
t_r		I_C= 400A		170	340	ns
E_{on}		T_j = 125 °C		45		mJ
$t_{d(off)}$	R_{Goff} = 3,3 Ω	V_{GE} = ± 15V		900	1100	ns
t_f				100	125	ns
E_{off}						mJ
$R_{th(j-c)}$	per IGBT				0,041	K/W

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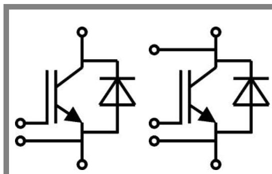

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 400 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
		T_j = 125 °C				V
r_F		T_j = 25 °C		2,3	3,3	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_F = 400 A	T_j = 25 °C		90		A
Q_{rr}	di/dt = 2000 A/µs			15		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
$R_{th(j-c)D}$	per diode				0,09	K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_{Fnom} = A; V_{GE} = V	T_j = °$C_{chiplev.}$				V
V_{F0}		T_j = 25 °C				V
		T_j = 125 °C				V
r_F		T_j = 25 °C				V
		T_j = 125 °C				V
I_{RRM}	I_F = A	T_j = °C				A
Q_{rr}						µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
	per diode					K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,18		mΩ
		T_{case}= 125 °C		0,22		mΩ
$R_{th(c-s)}$	per module				0,038	K/W
M_s	to heat sink M6		3		5	Nm
M_t	to terminals M6 (M4)		2,5 (1,1)		5 (2)	Nm
w					330	g

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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.

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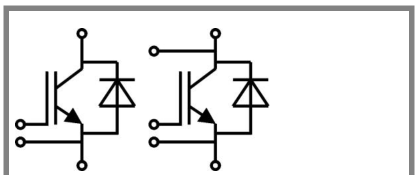

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	29	mk/W
R_i	i = 2	10	mk/W
R_i	i = 3	1,8	mk/W
R_i	i = 4	0,2	mk/W
tau_i	i = 1	0,04	s
tau_i	i = 2	0,0189	s
tau_i	i = 3	0,0017	s
tau_i	i = 4	0,001	s
$Z_{th(j-c)D}$			
R_i	i = 1	60	mk/W
R_i	i = 2	23	mk/W
R_i	i = 3	6,2	mk/W
R_i	i = 4	0,8	mk/W
tau_i	i = 1	0,0366	s
tau_i	i = 2	0,042	s
tau_i	i = 3	0,0009	s
tau_i	i = 4	0,002	s

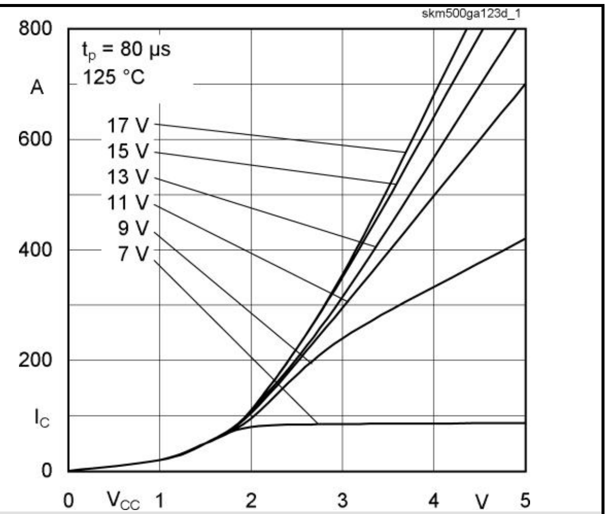

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

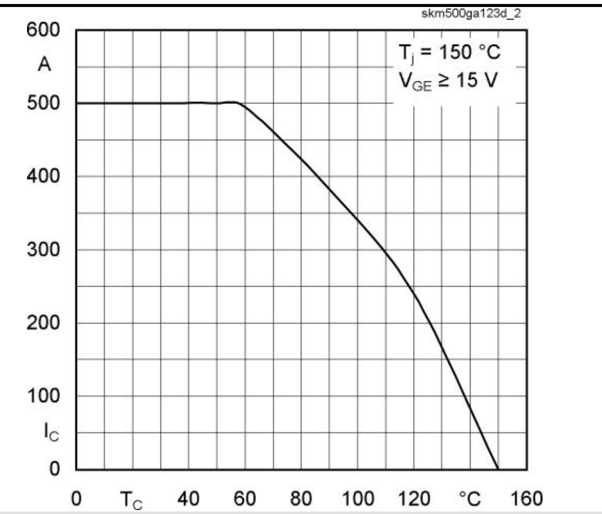

Fig. 2 Rated current vs. temperature $I_C = f (T_C)$

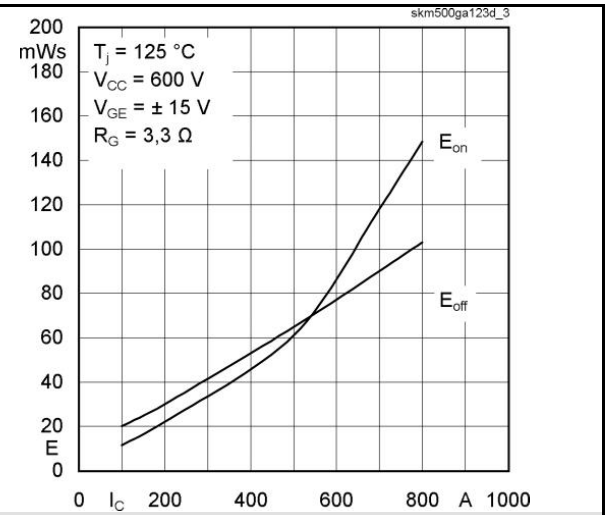

Fig. 3 Typ. turn-on /-off energy = f (I_C)

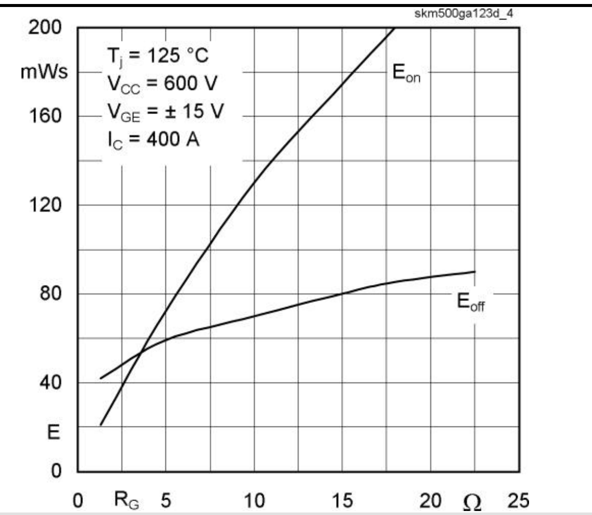

Fig. 4 Typ. turn-on /-off energy = f (R_G)

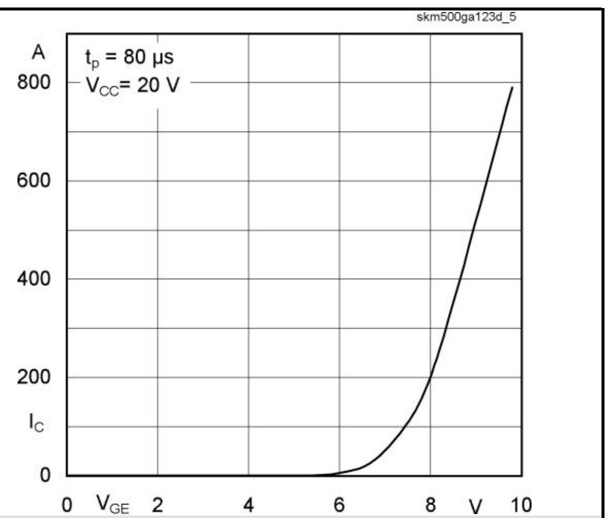

Fig. 5 Typ. transfer characteristic

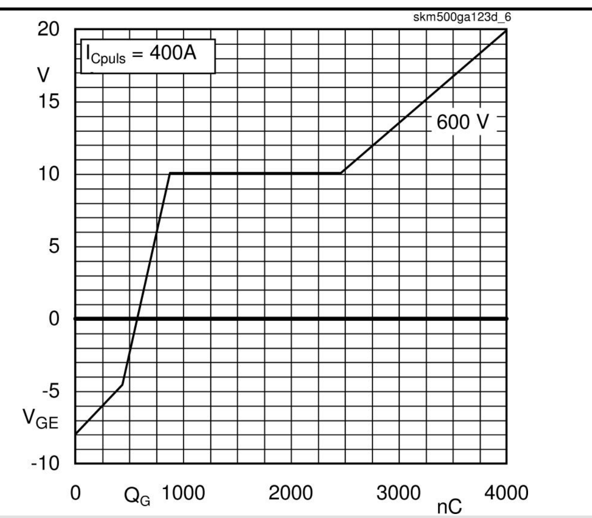

Fig. 6 Typ. gate charge characteristic

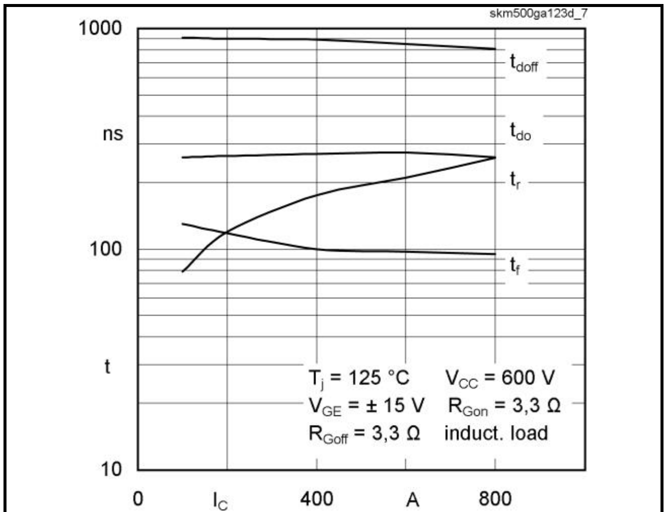

Fig. 7 Typ. switching times vs. I_C

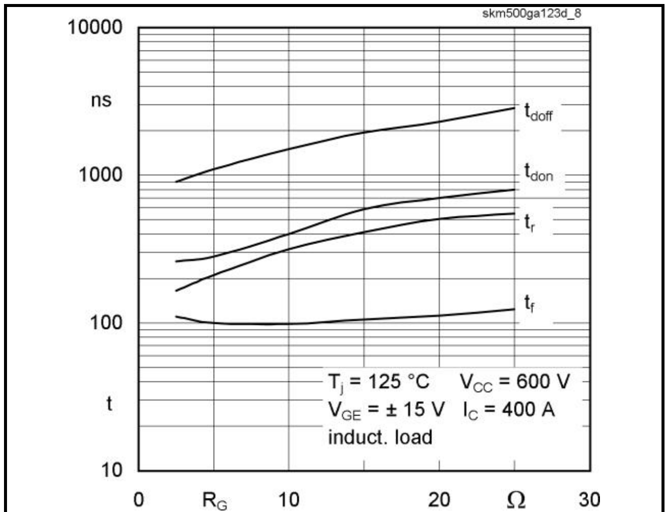

Fig. 8 Typ. switching times vs. gate resistor R_G

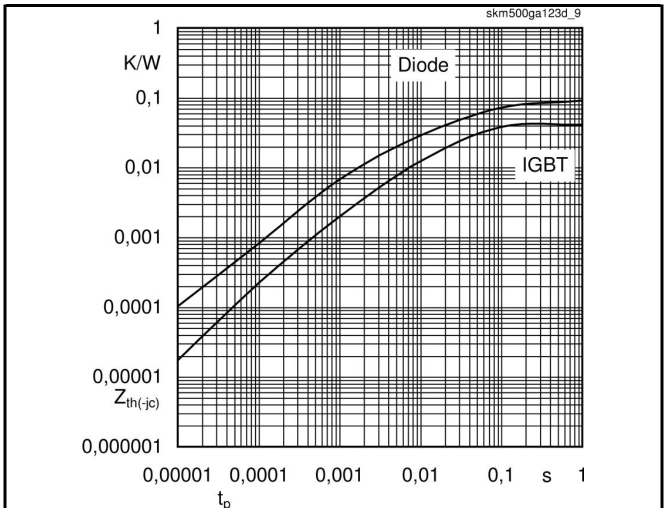

Fig. 9 Transient thermal impedance

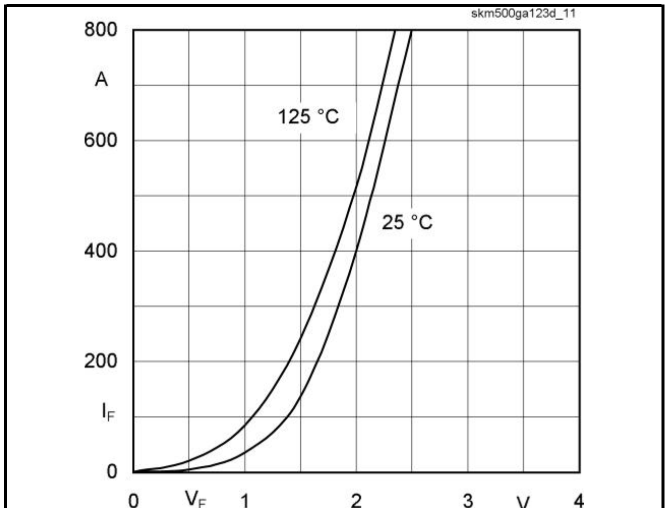

Fig. 10 CAL diode forward characteristic

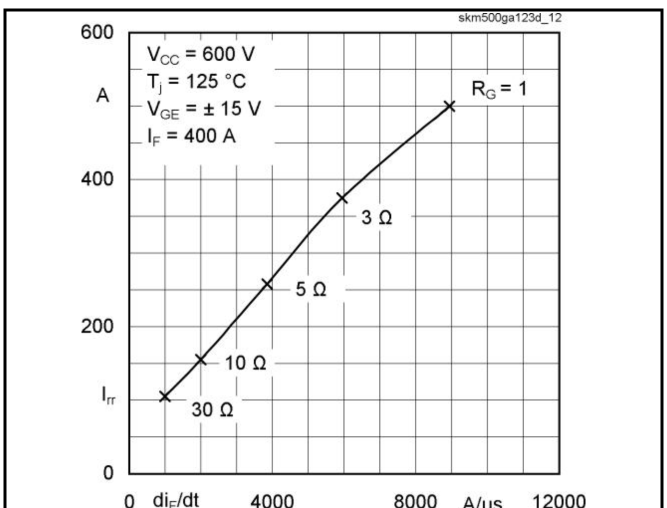

Fig. 11 Typ. CAL diode peak reverse recovery current

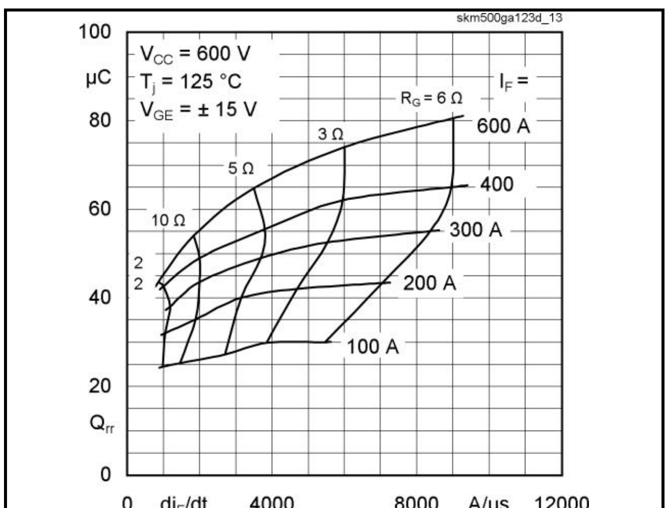

Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Recognized

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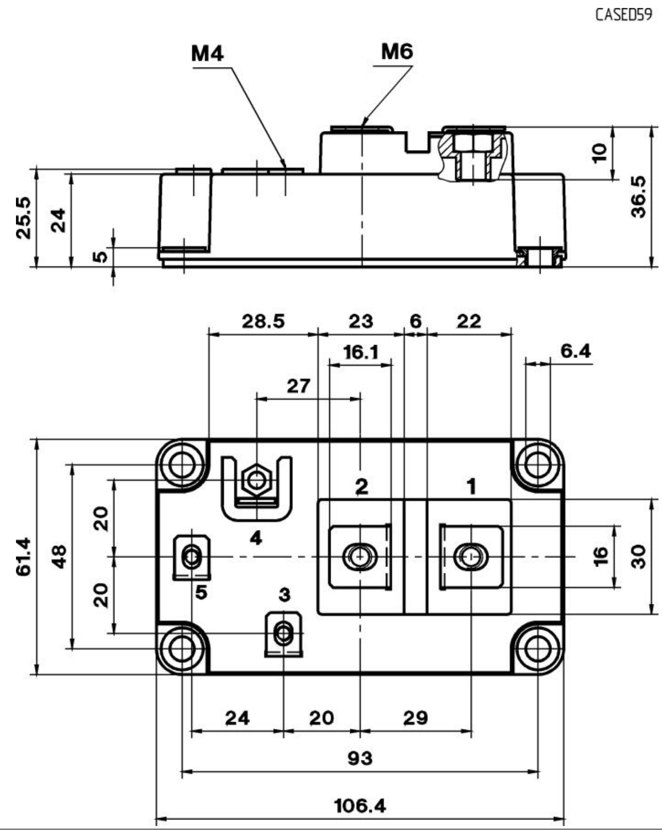
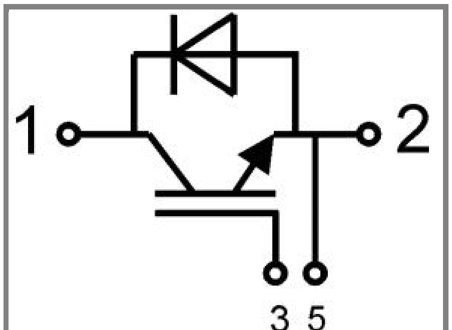


Case D 60



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Case D 60