SKM 300GB125D

SEMITRANS® 3

Ultra Fast IGBT Module

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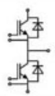
Features

- NPT - Non punch-through IGBT
- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (10 mm) and creepage distances (20 mm)

Typical Applications*

- Switched mode power supplies at f_{sw} > 20 kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- UPS Uninterruptable power supplies at f_{sw} > 20 kHz
- Electronic welders at f_{sw} > 20 kHz



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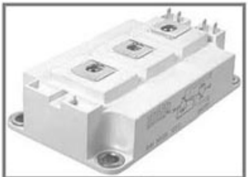
Absolute Maximum Ratings — T_c = 25 °C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	300	A
		T_{case} = 80 °C	210	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		400	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	260	A
		T_{case} = 80 °C	180	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		400	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	1800	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			- 40...+ 150	°C
T_{stg}			- 40...+ 125	°C
V_{isol}	AC, 1 min.		4000	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 = 8 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		1,5	1,75	V
		T_j = 125 °C		1,7		V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		9	10,5	mΩ
		T_j = 125°C		11,5		mΩ
$V_{CE(sat)}$	I_{Cnom} = 200 A, V_{GE} = 15 V	T_j = °$C_{chiplev.}$		3,3	3,85	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		18	24	nF
C_{oes}				2,5	3,2	nF
C_{res}				1	1,3	nF
Q_G	V_{GE} = 0V - +20V			2000		nC
R_{Gint}	T_j = °C			2,5		Ω
$t_{d(on)}$	R_{Gon} = 3 Ω	V_{CC} = 600V		130		ns
t_r		I_C= 200A		40		ns
E_{on}		T_j = 125 °C		16		mJ
$t_{d(off)}$	R_{Goff} = 3 Ω	V_{GE} = ± 15V		460		ns
t_f				30		ns
E_{off}						mJ
$R_{th(j-c)}$	per IGBT				0,075	K/W



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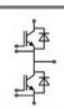

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Characteristics						
Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 200 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
		T_j = 125 °C				V
r_F		T_j = 25 °C		4,5	6,5	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_F = 200 A	T_j = 125 °C		340		A
Q_{rr}	di/dt = 8000 A/µs			46		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
$R_{th(j-c)D}$	per diode				0,18	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,35		mΩ
		T_{case}= 125 °C		0,5		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		2,5		5	Nm
w					325	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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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	53	mK/W
R_i	i = 2	18,5	mK/W
R_i	i = 3	3,1	mK/W
R_i	i = 4	0,4	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	0,003	s
$Z_{th(j-c)D}$			
R_i	i = 1	115	mK/W
R_i	i = 2	52	mK/W
R_i	i = 3	11	mK/W
R_i	i = 4	2	mK/W
tau_i	i = 1	0,0366	s
tau_i	i = 2	0,0113	s
tau_i	i = 3	0,003	s
tau_i	i = 4	0,0002	s

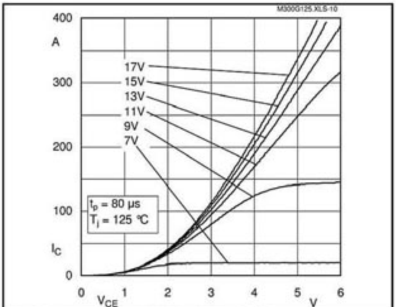

Fig. 1 Typ. output characteristic, t_p = 80 µs; 125 °C

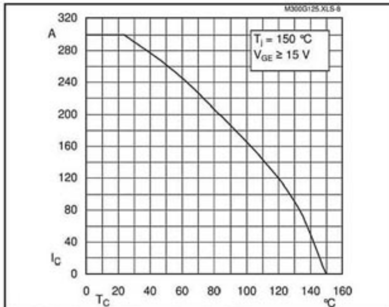

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

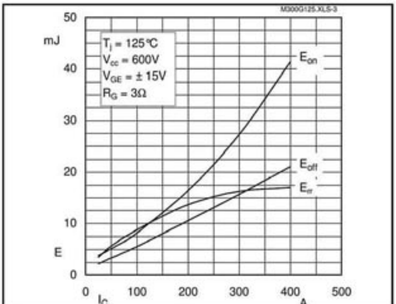

Fig. 3 Typ. turn-on /-off energy = f (I_C)

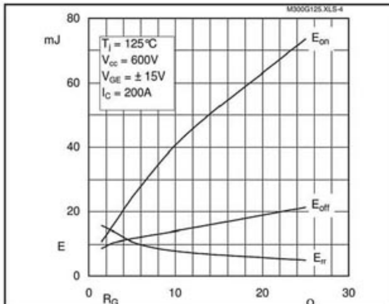

Fig. 4 Typ. turn-on /-off energy = f (R_G)

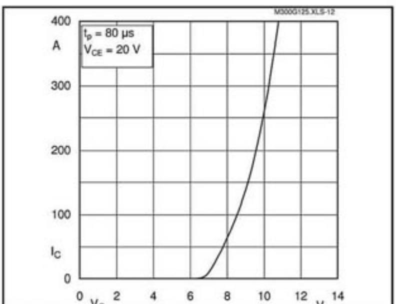

Fig. 5 Typ. transfer characteristic, t_p = 80 µs; V_{CE} = 20 V

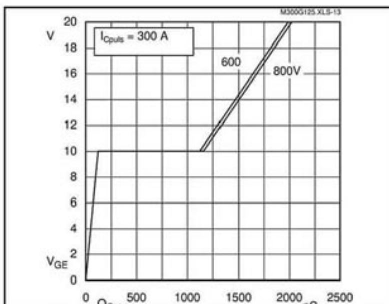

Fig. 6 Typ. gate charge characteristic

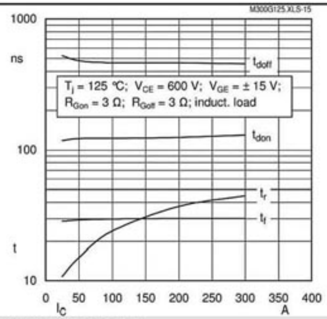

Fig. 7 Typ. switching times vs. I_C

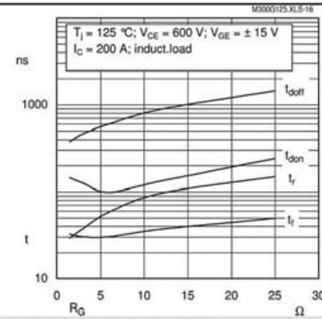

Fig. 8 Typ. switching times vs. gate resistor R_G

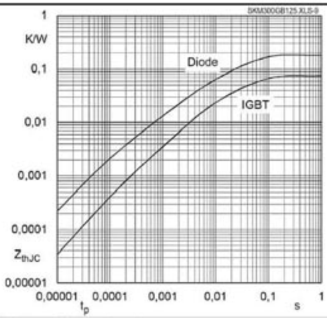

Fig. 9 Transient thermal impedance

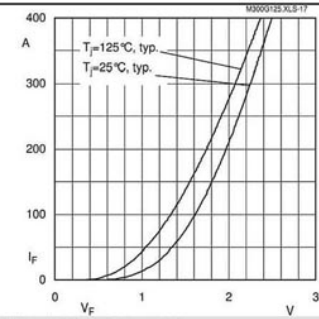

Fig. 10 CAL diode forward characteristic

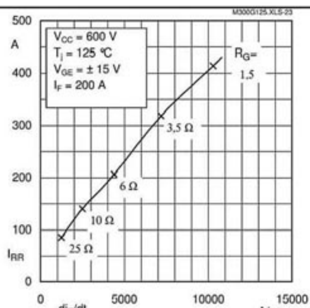

Fig. 11 Typ. CAL diode peak reverse recovery current

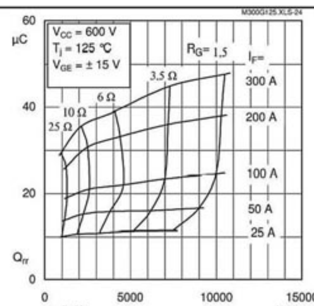

Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Recognized

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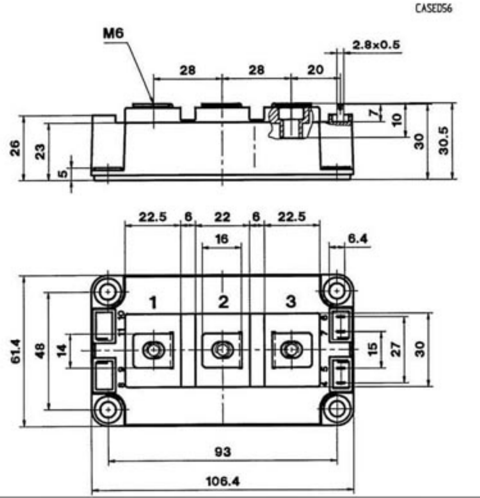
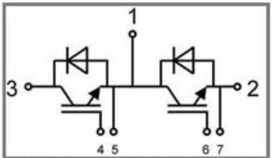


Case D 56



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Case D 56