SEMITRANS® 4

Trench IGBT Modules

SKM 600GA176D

Features

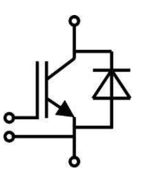
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C

Typical Applications*

- AC inverter drives mains 575 - 790 V AC
- Public transport (auxiliary systems)

Remarks

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



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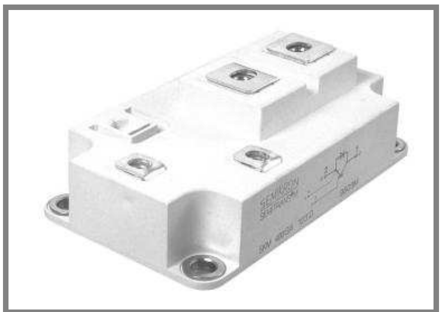
Absolute Maximum Ratings	T_{case} = 25°C, unless otherwise specified			
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 150 °C	T_c = 25 °C	660	A
		T_c = 80 °C	470	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		800	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 1200 V; $V_{GE} \leq$ 20 V; V_{CES} < 1700 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_c = 25 °C	600	A
		T_c = 80 °C	410	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		800	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	3800	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_{case} = 25°C, unless otherwise specified					
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 16 mA		5,2	5,8	6,4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C			4	mA
V_{CE0}		T_j = 25 °C		1	1,2	V
		T_j = 125 °C		0,9	1,1	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		2,5	3,1	mΩ
		T_j = 125°C		3,9	4,5	mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		2	2,45	V
		T_j = 125°$C_{chiplev.}$		2,45	2,9	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		28,4		nF
C_{oes}				1,46		nF
C_{res}				1,17		nF
$t_{d(on)}$	R_{Gon} = 3 Ω	V_{CC} = 1200V, I_C= 400A, T_j = 125 °C, V_{GE} = ±15V		290		ns
t_r				70		ns
E_{on}				255		mJ
$t_{d(off)}$	R_{Goff} = 3 Ω			890		ns
t_f				160		ns
E_{off}				155		mJ
$R_{th(j-c)}$	per IGBT				0,044	K/W



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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 °$C_{chiplev.}$		1,6	1,9	V
		T_j = 125 °$C_{chiplev.}$		1,6	1,9	V
V_{F0}		T_j = 25 °C		1,1	1,3	V
r_F		T_j = 25 °C		1,3	1,5	mΩ
I_{RRM}	I_F = 400 A	T_j = 125 °C		510		A
Q_{rr}	di/dt = 5700 A/µs			155		µC
E_{rr}	V_{GE} = -15V V; V_{CC} = 1200 V			102		mJ
$R_{th(j-c)D}$	per diode				0,09	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.

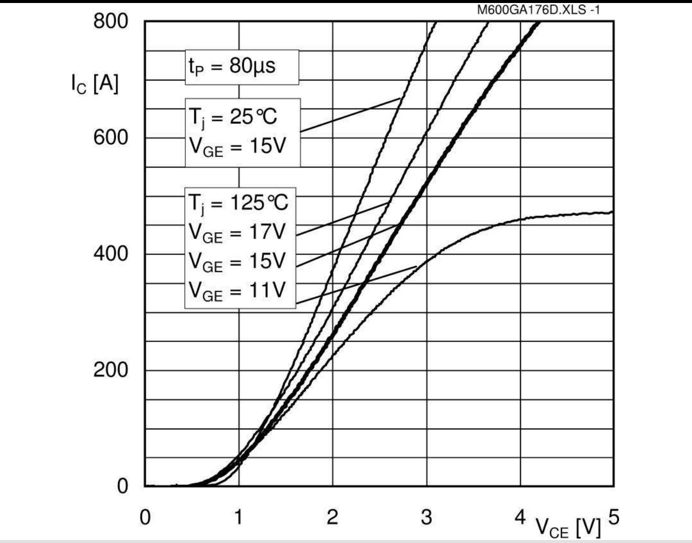

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

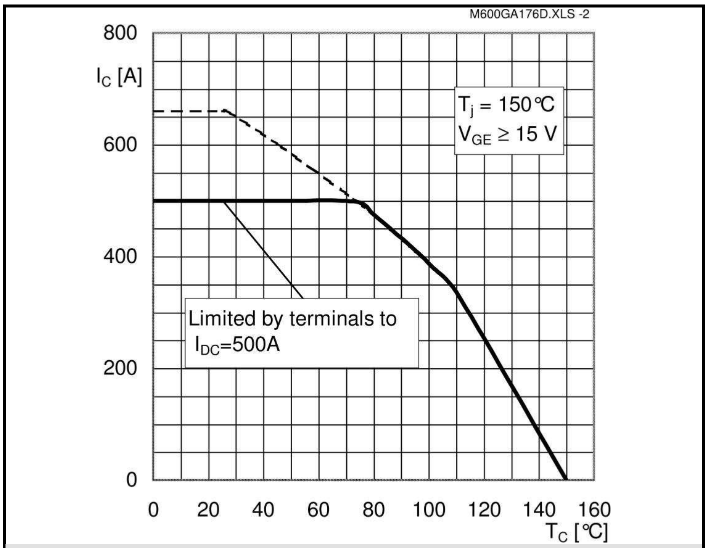

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

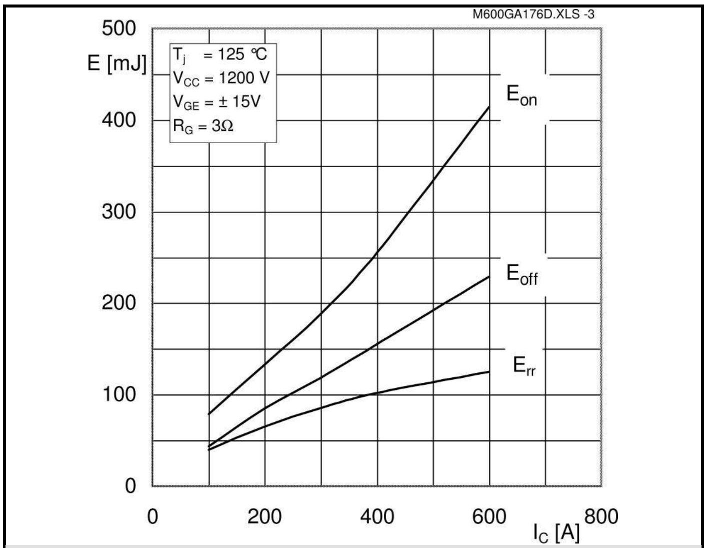

Fig. 3 Typ. turn-on /-off energy = f (I_C)

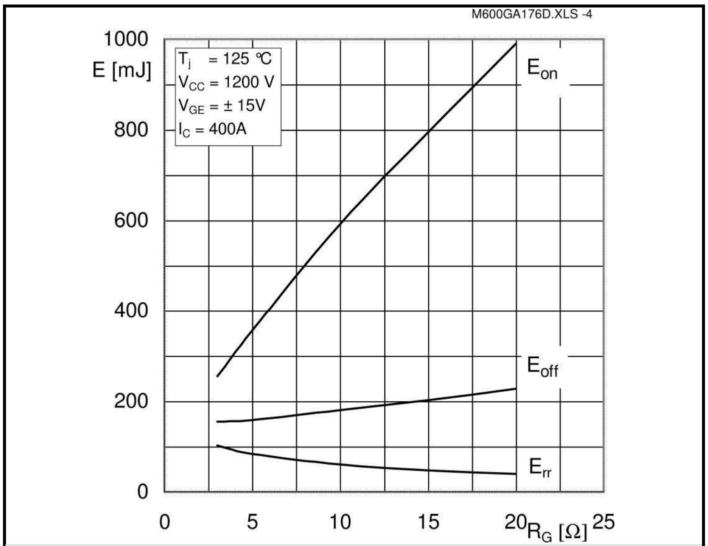

Fig. 4 Typ. turn-on /-off energy = f (R_G)

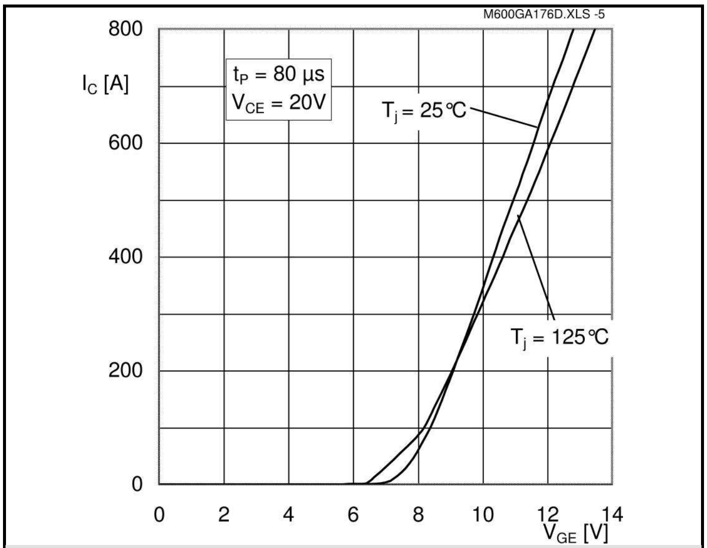

Fig. 5 Typ. transfer characteristic

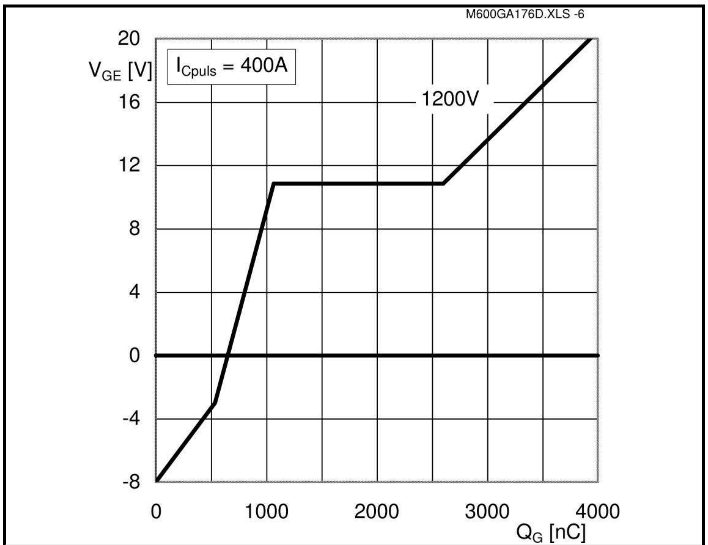

Fig. 6 Typ. gate charge characteristic

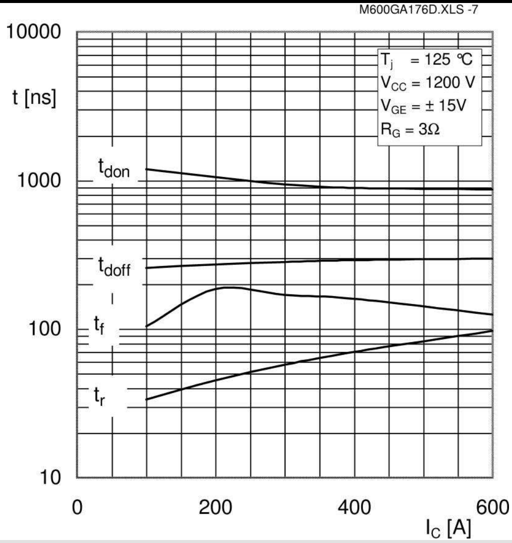

Fig. 7 Typ. switching times vs. I_C

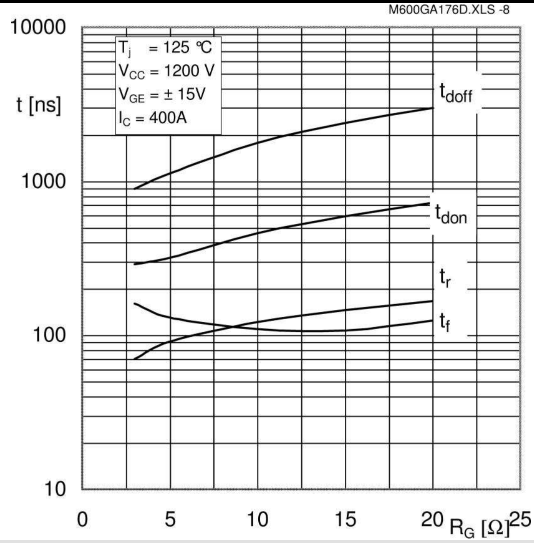

Fig. 8 Typ. switching times vs. gate resistor R_G

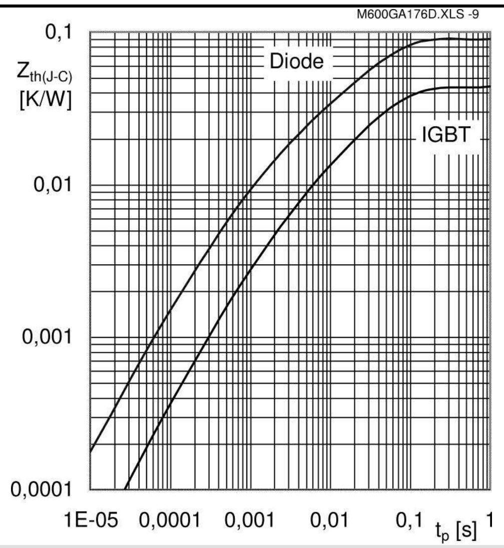

Fig. 9 Transient thermal impedance

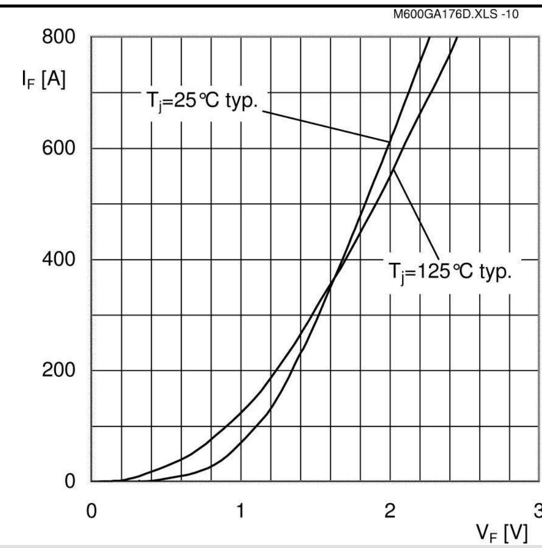

Fig. 10 CAL diode forward characteristic

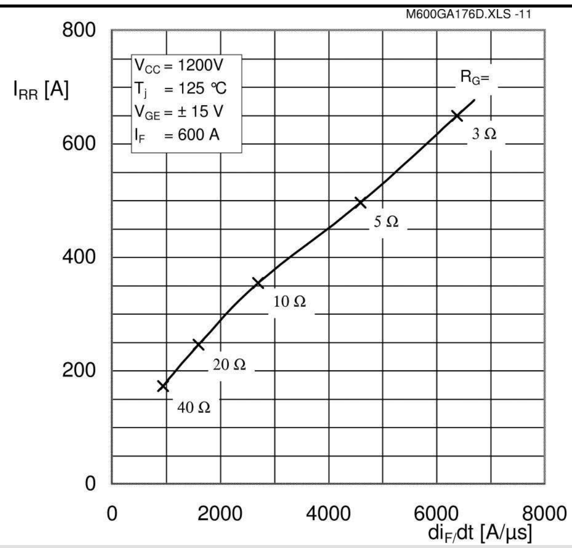

Fig. 11 Typ. CAL diode peak reverse recovery current

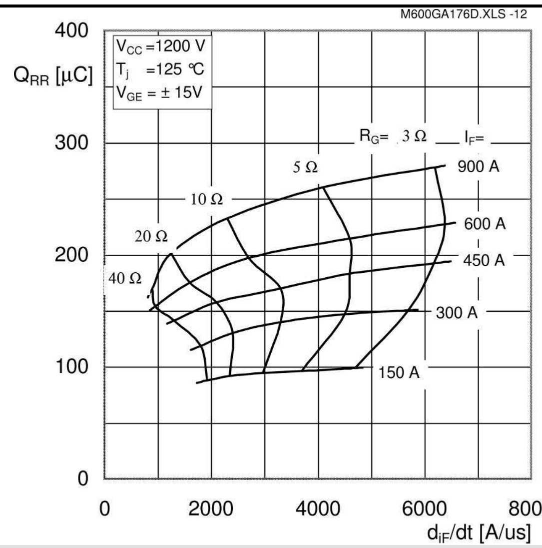

Fig. 12 Typ. CAL diode recovered charge

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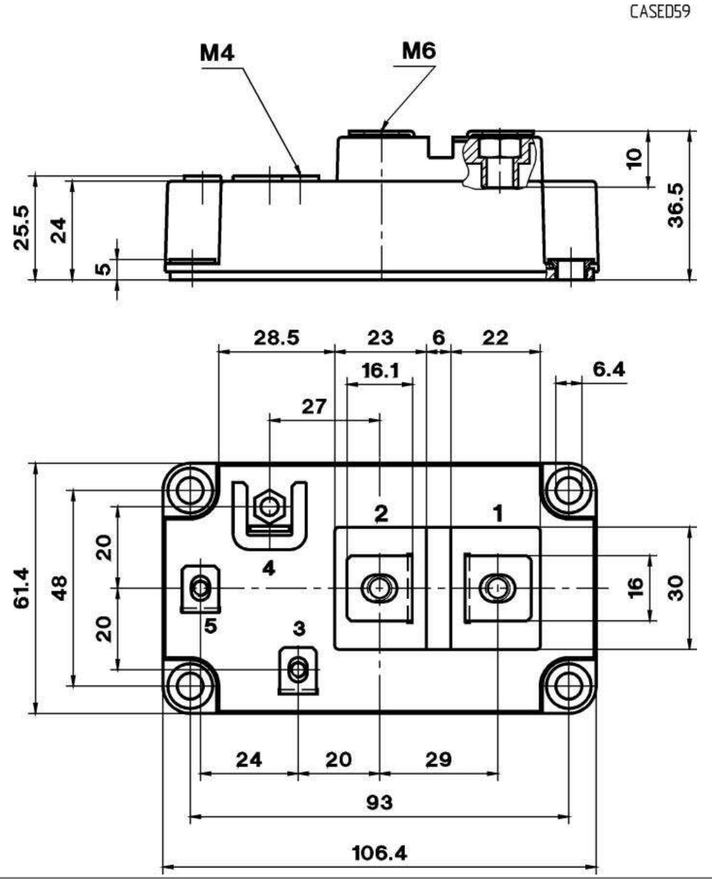
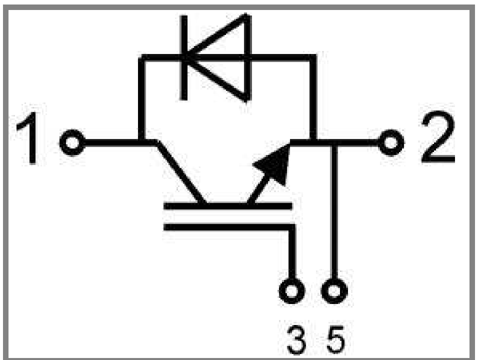


Case D 59



GA Case D59

