



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 $6 \times I_C$

Typical Applications*

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

Remarks

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

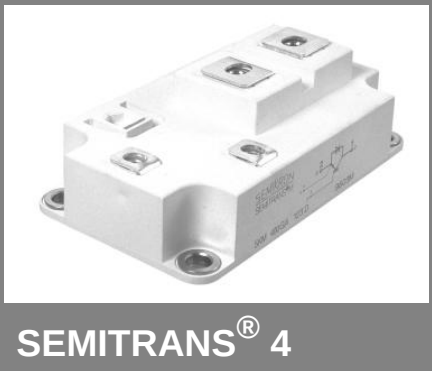
Absolute Maximum Ratings		T _{case} = 25°C, unless otherwise specified		
Symbol	Conditions		Values	Units
IGBT				
V _{CES}	T _j = 25 °C		1700	V
I _C	T _j = 150 °C	T _c = 25 °C	660	A
		T _c = 80 °C	470	A
I _{CRM}	I _{CRM} =2xI _{Cnom}		800	A
V _{GES}			± 20	V
t _{psc}	V _{CC} = 1200 V; V _{GE} ≤ 20 V; T _j = 125 °C V _{CES} < 1700 V		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 T _j = 125 °C		1	1,2	V
			0,9	1,1	V
r _{CE}	V _{GE} = 15 V T _j = 25°C T _j = 125°C		2,5	3,1	mΩ
			3,9	4,5	mΩ
V _{CE(sat)}	I _{Cnom} = 400 A, V _{GE} = 15 V T _j = 25°C _{chiplev.} T _j = 125°C _{chiplev.}		2	2,45	V
			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		290	ns
t _r				70	ns
E _{on}	R _{Goff} = 3 Ω	T _j = 125 °C V _{GE} = ±15V		255	mJ
t _{d(off)}				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 di/dt = 5700 A/μs V _{GE} = -15V V; V _{CC} = 1200 V	T _j = 125 °C		510		A
Q _{rr}				155		μC
E _{rr}				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.

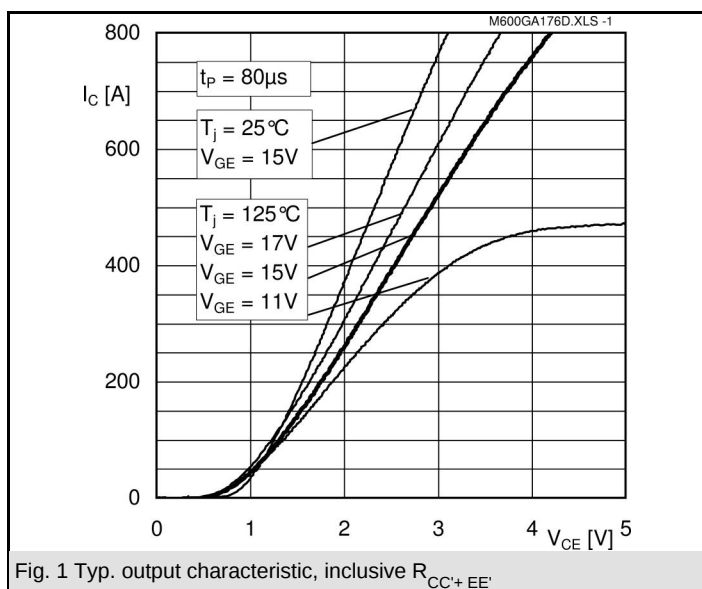


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

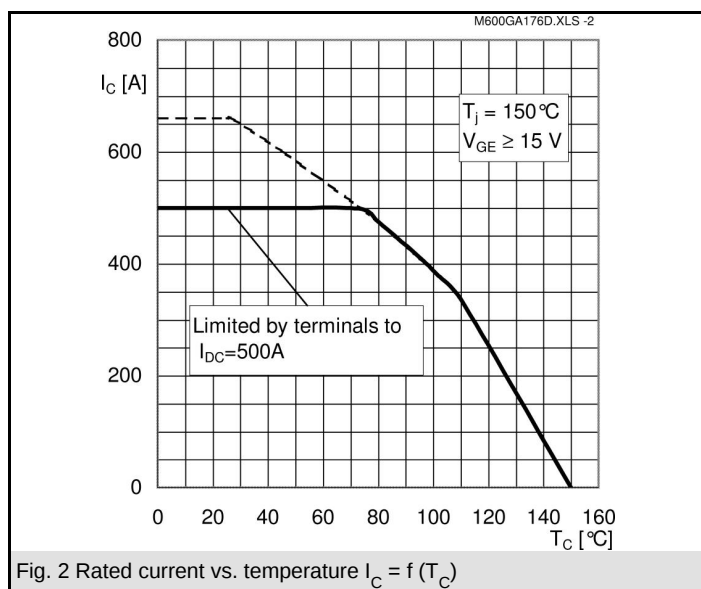


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

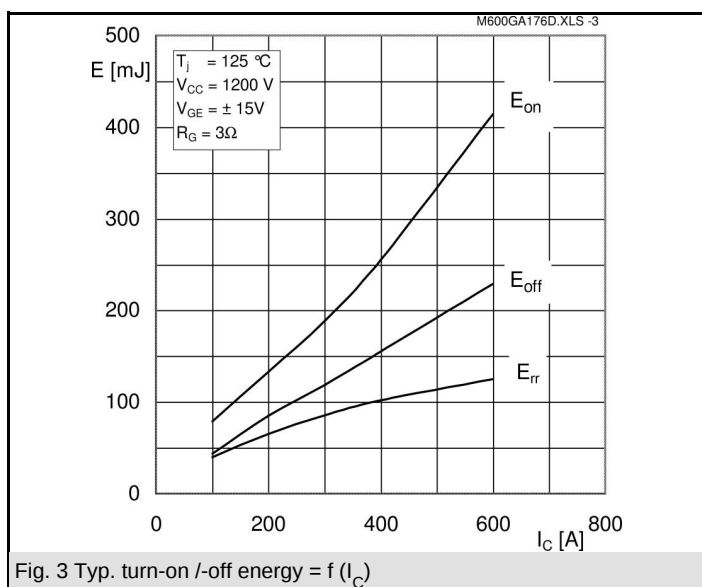


Fig. 3 Typ. turn-on /off energy = $f(I_C)$

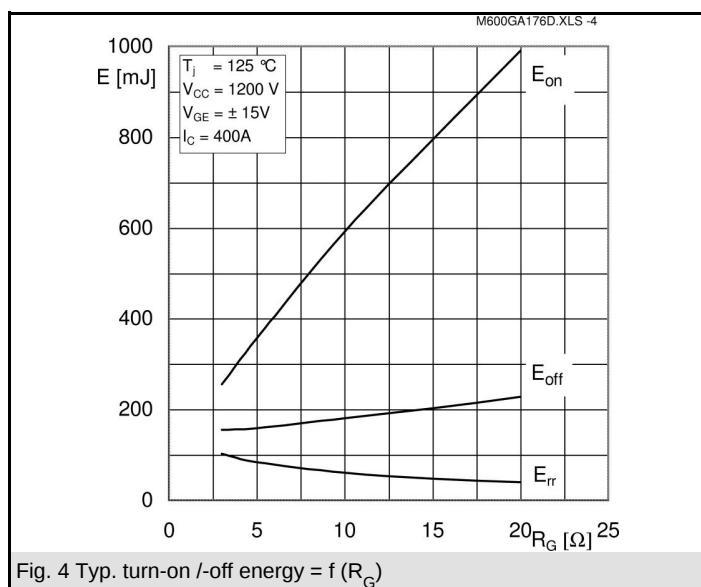


Fig. 4 Typ. turn-on /off energy = $f(R_G)$

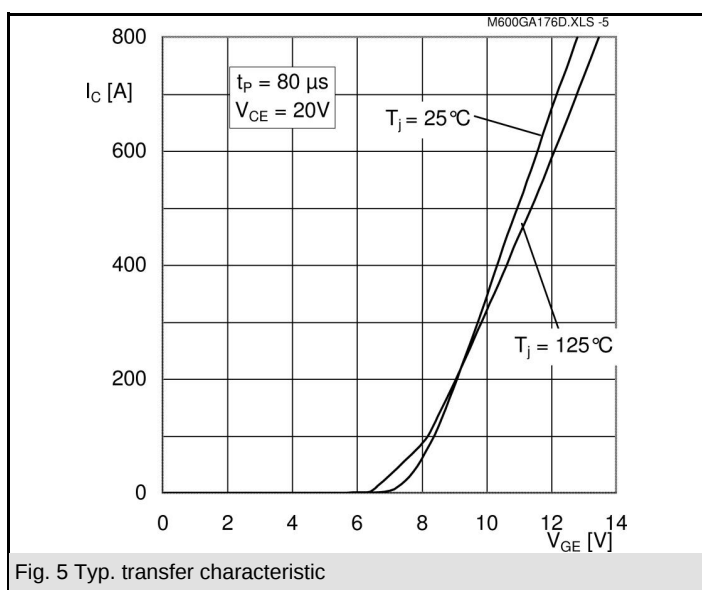


Fig. 5 Typ. transfer characteristic

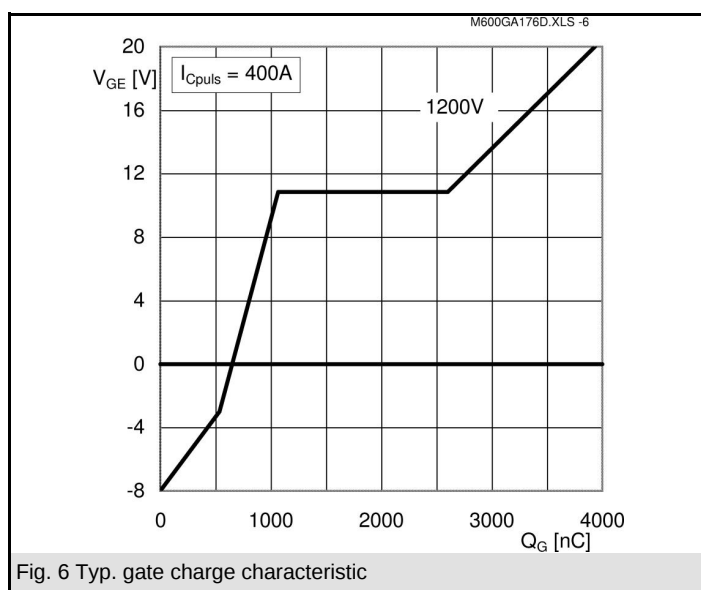


Fig. 6 Typ. gate charge characteristic

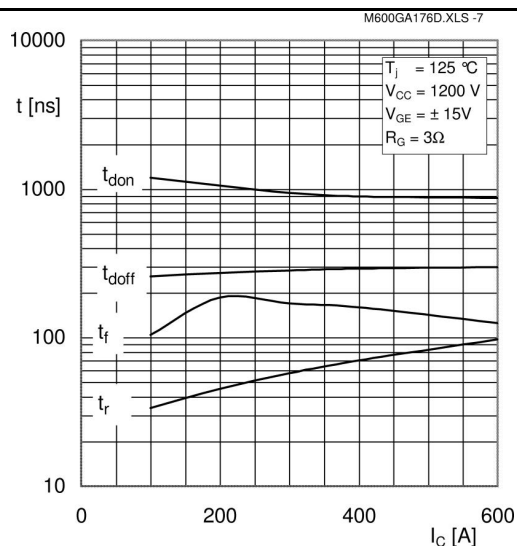


Fig. 7 Typ. switching times vs. I_C

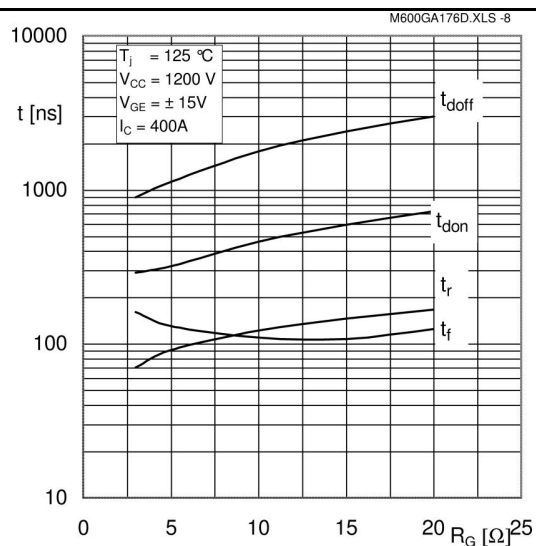


Fig. 8 Typ. switching times vs. gate resistor R_G

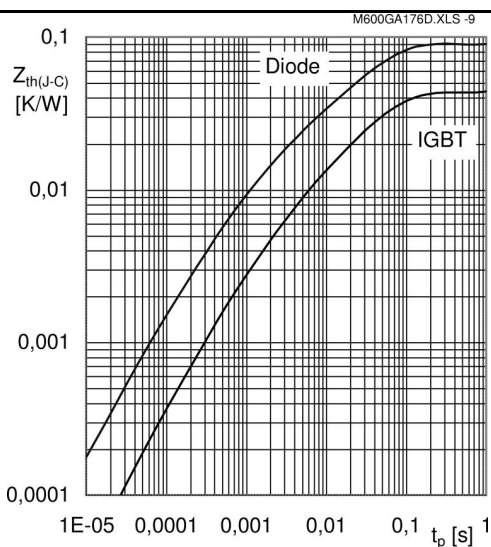


Fig. 9 Transient thermal impedance

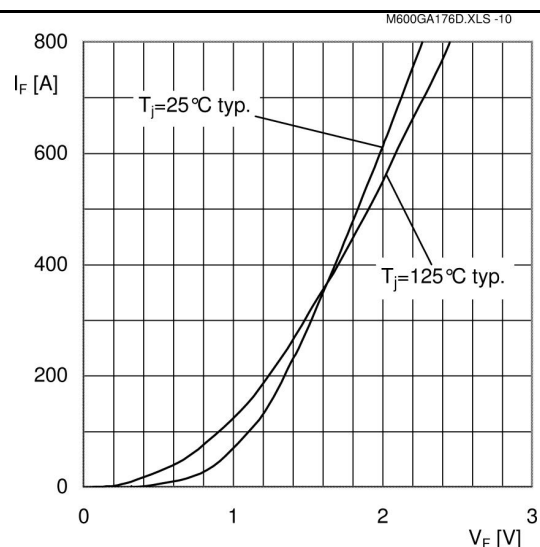


Fig. 10 CAL diode forward characteristic

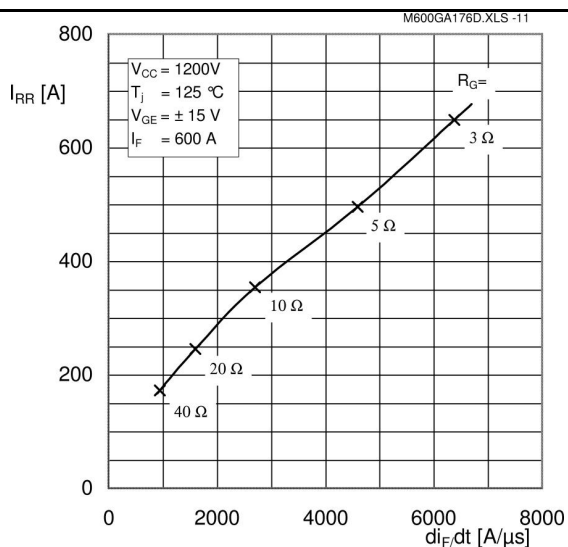


Fig. 11 Typ. CAL diode peak reverse recovery current

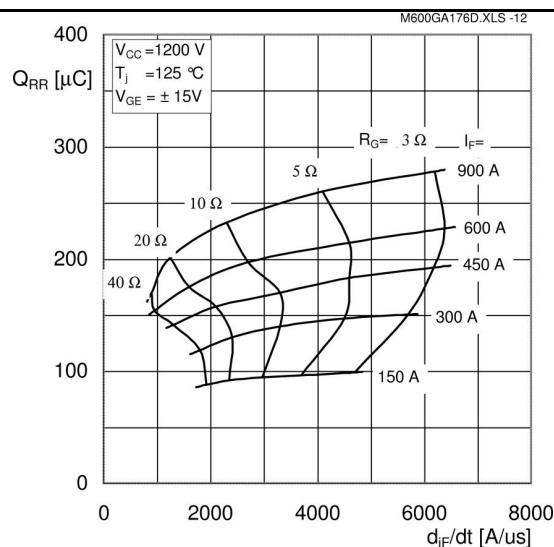


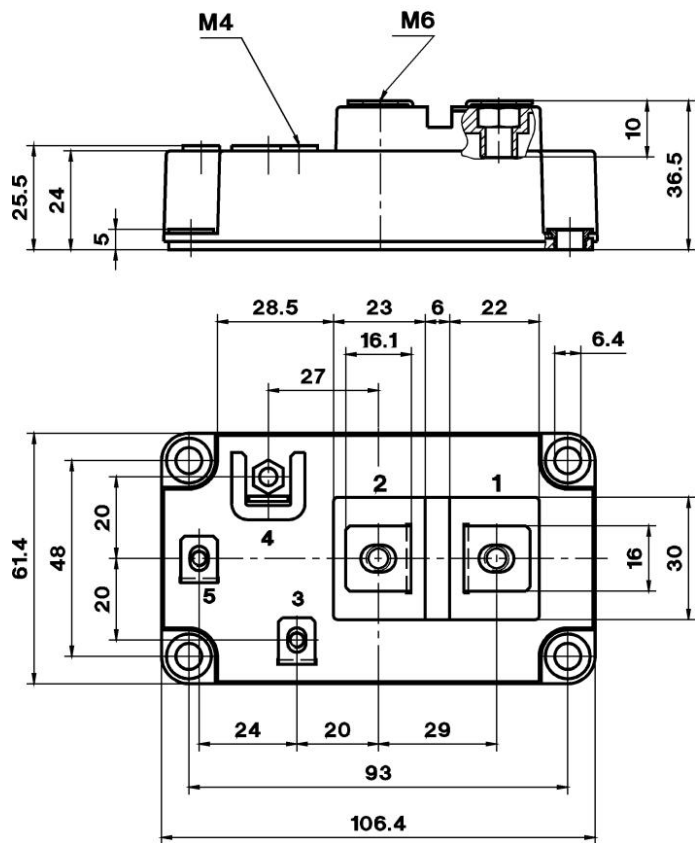
Fig. 12 Typ. CAL diode recovered charge

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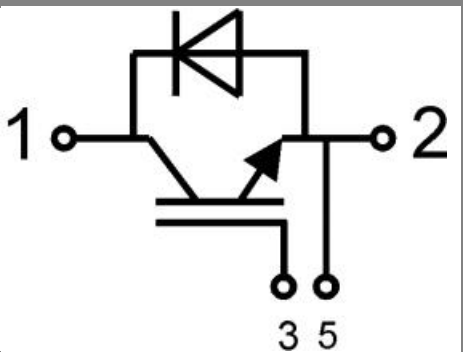
UL Recognized

CASED59

File no. 63 532



Case D 59



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Case D59