



SEMITRANS® 4

Trench IGBT Modules

SKM 800GA176D

Features

- Homogeneous Si
- Trench = Trenchgate technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications*

- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

Remarks

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

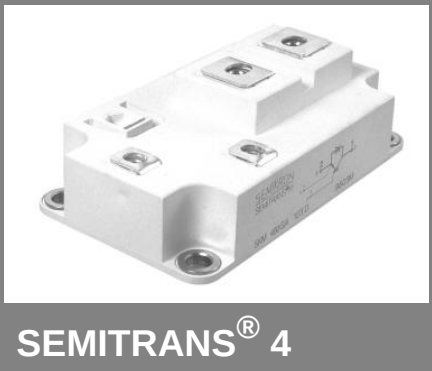
Absolute Maximum Ratings			$T_c = 25\text{ }^{\circ}\text{C}$, unless otherwise specified	
Symbol	Conditions		Values	Units
IGBT				
V_{CES}	$T_j = 25\text{ }^{\circ}\text{C}$		1700	V
I_C	$T_j = 150\text{ }^{\circ}\text{C}$	$T_c = 25\text{ }^{\circ}\text{C}$	830	A
		$T_c = 80\text{ }^{\circ}\text{C}$	590	A
I_{CRM}	$I_{CRM}=2 \times I_{Cnom}$		1200	A
V_{GES}			± 20	V
t_{psc}	$V_{CC} = 1200\text{ V}$; $V_{GE} \leq 20\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$ $V_{CES} < 1700\text{ V}$		10	μs
Inverse Diode				
I_F	$T_j = 150\text{ }^{\circ}\text{C}$	$T_c = 25\text{ }^{\circ}\text{C}$	630	A
		$T_c = 80\text{ }^{\circ}\text{C}$	440	A
I_{FRM}	$I_{FRM}=2 \times I_{Fnom}$		1200	A
I_{FSM}	$t_p = 10\text{ ms}$; sin.	$T_j = 150\text{ }^{\circ}\text{C}$	3600	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			- 40 ... + 150	$^{\circ}\text{C}$
T_{stg}			- 40 ... + 125	$^{\circ}\text{C}$
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 = 24 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			V
	T _j = 125 °C		0,9			V
r _{CE}	V _{GE} = 15 V T _j = 25°C		1,7			mΩ
	T _j = 125°C		2,5			mΩ
V _{CE(sat)}	I _{Cnom} = 600 A, V _{GE} = 15 V T _j = 25°C _{chiplev.}		2			V
	T _j = 125°C _{chiplev.}		2,45			V
C _{ies}	V _{CE} = 25, V _{GE} = 0 V f = 1 MHz		39,6			nF
C _{oes}			2,2			nF
C _{res}			2,5			nF
Q _G	V _{GE} = -8V...+15V		4800			nC
t _{d(on)}	R _{Gon} = 3 Ω		230			ns
t _r			90			ns
E _{on}			335			mJ
t _{d(off)}	R _{Goff} = 3 Ω		1030			ns
t _f			160			ns
E _{off}			245			mJ
R _{th(j-c)}	per IGBT		0,04			K/W



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Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 600$ A; $V_{GE} = 0$ V		$T_j = 25\text{ }^{\circ}\text{C}_{chiplev.}$	1,6	V
			$T_j = 125\text{ }^{\circ}\text{C}_{chiplev.}$	1,6	V
V_{F0}	$T_j = 25\text{ }^{\circ}\text{C}$		1,1	1,3	V
r_F	$T_j = 25\text{ }^{\circ}\text{C}$		0,83	1	mΩ
I_{RRM}	$I_F = 600$ A		650		A
Q_{rr}	$di/dt = 6400$ A/μs		230		μC
E_{rr}	$V_{GE} = -15$ V; $V_{CC} = 1200$ V		155		mJ
$R_{th(j-c)D}$	per diode			0,07	K/W
Module					
L_{CE}			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25\text{ }^{\circ}\text{C}$	0,18		mΩ
		$T_{case} = 125\text{ }^{\circ}\text{C}$	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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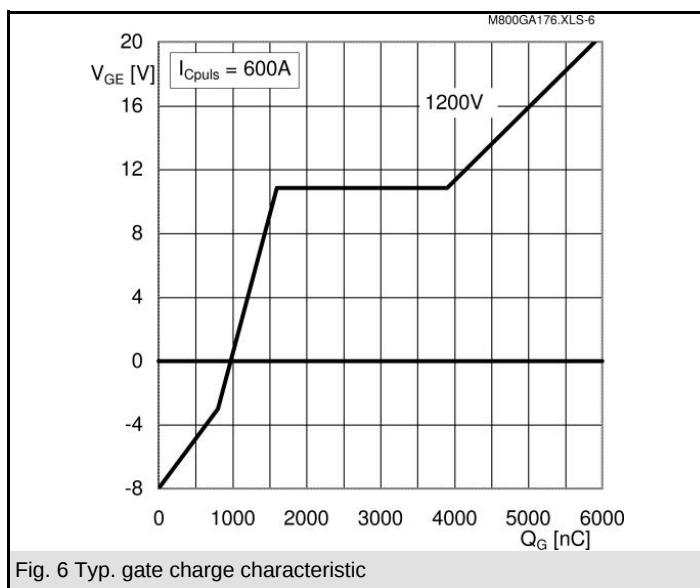
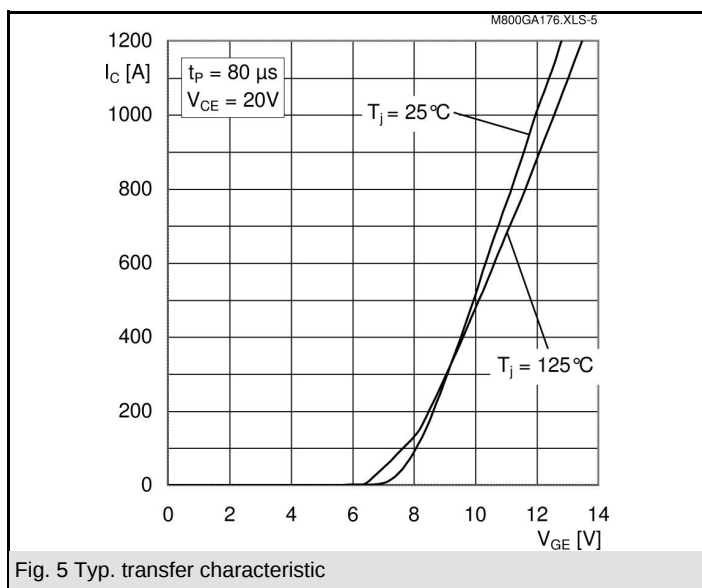
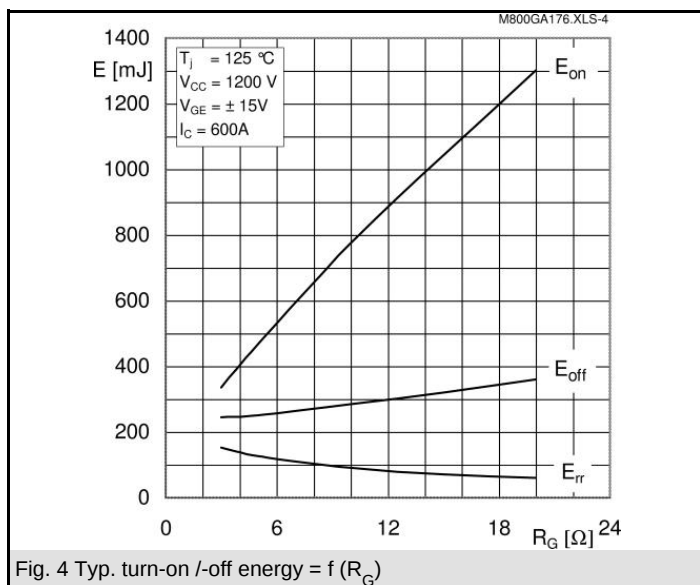
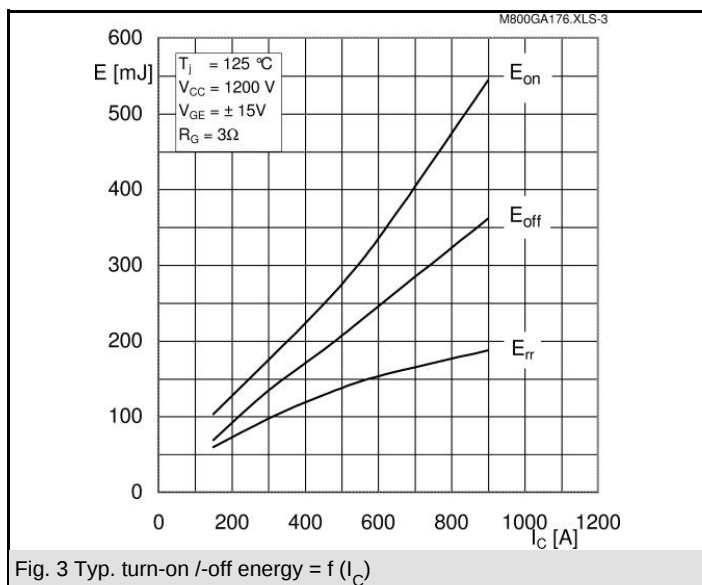
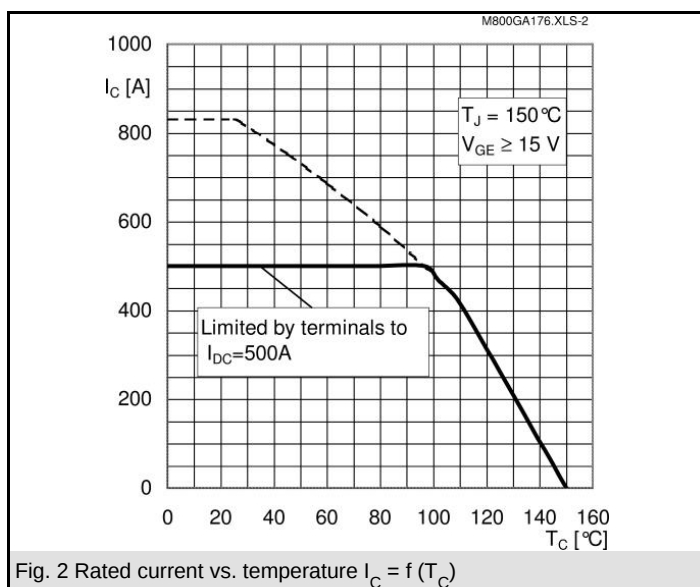
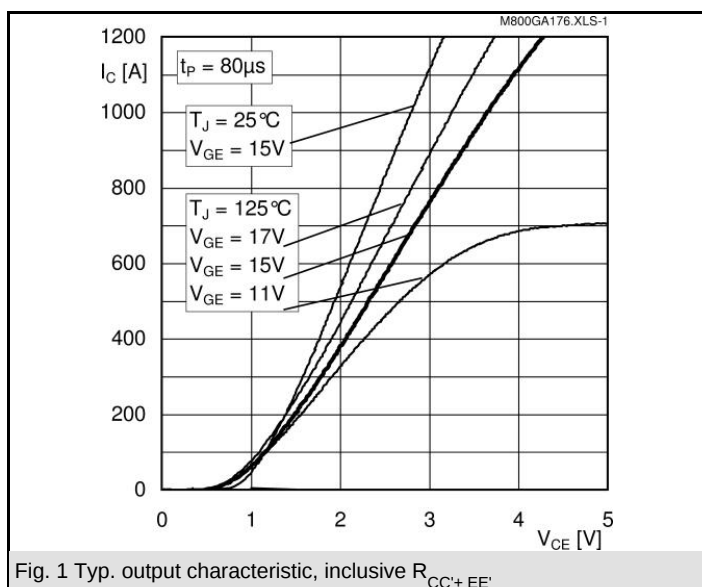
Remarks

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

Z_{th}			
Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	$i = 1$	28	mk/W
R_i	$i = 2$	9,5	mk/W
R_i	$i = 3$	2,17	mk/W
R_i	$i = 4$	0,33	mk/W
τ_{ui}	$i = 1$	0,0447	s
τ_{ui}	$i = 2$	0,02	s
τ_{ui}	$i = 3$	0,0015	s
τ_{ui}	$i = 4$	0,0025	s
$Z_{th(j-c)D}$			
R_i	$i = 1$	46	mk/W
R_i	$i = 2$	17	mk/W
R_i	$i = 3$	5,9	mk/W
R_i	$i = 4$	1,1	mk/W
τ_{ui}	$i = 1$	0,05	s
τ_{ui}	$i = 2$	0,0075	s
τ_{ui}	$i = 3$	0,002	s
τ_{ui}	$i = 4$	0,0002	s



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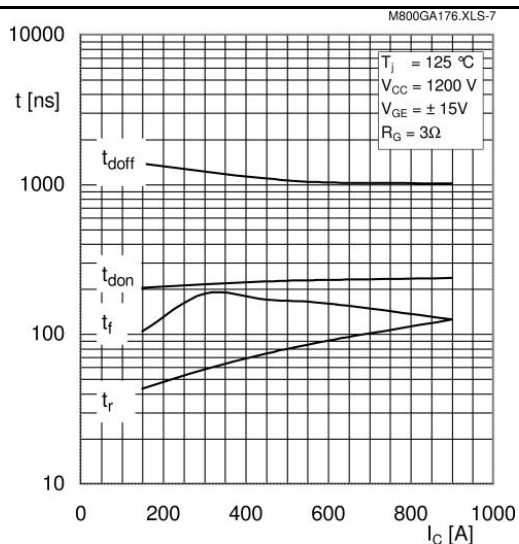


Fig. 7 Typ. switching times vs. I_C

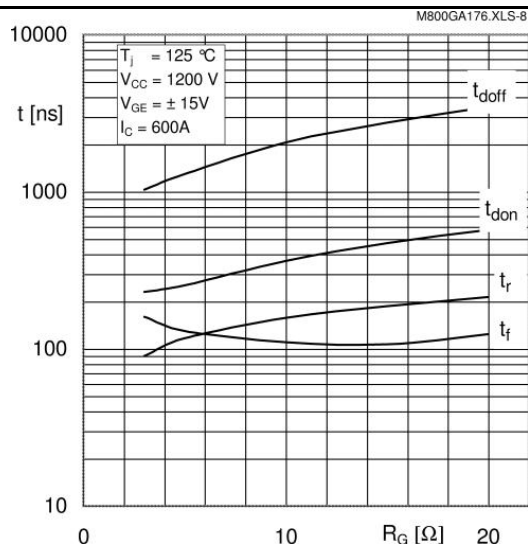


Fig. 8 Typ. switching times vs. gate resistor R_G

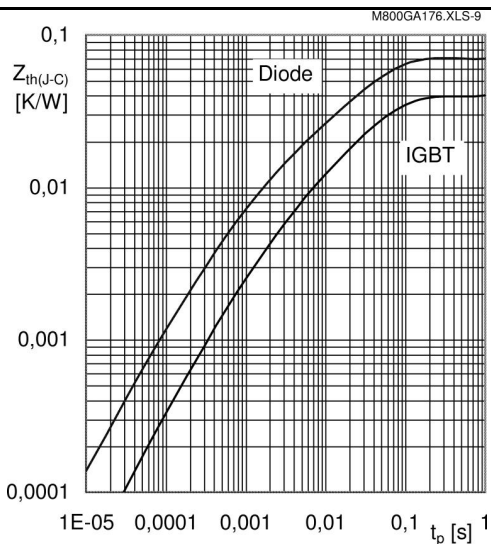


Fig. 9 Transient thermal impedance

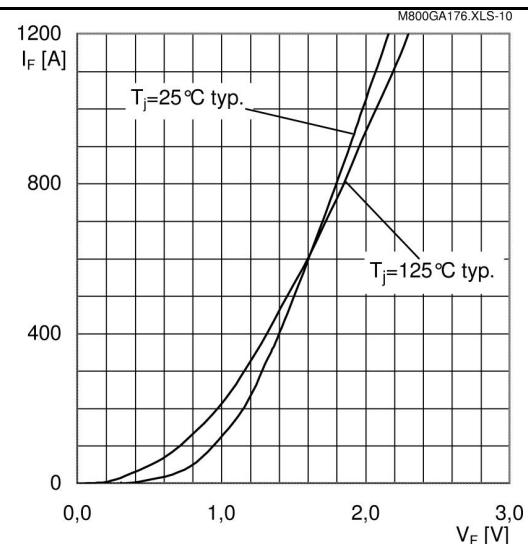


Fig. 10 Typ. CAL diode forward characteristic

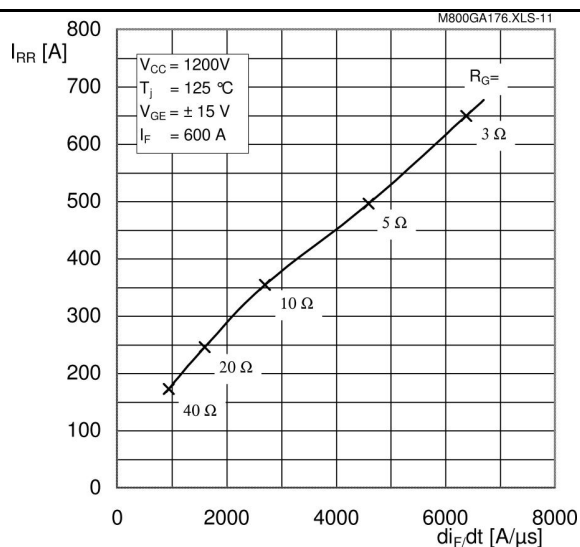


Fig. 11 Typ. CAL diode peak reverse recovery current

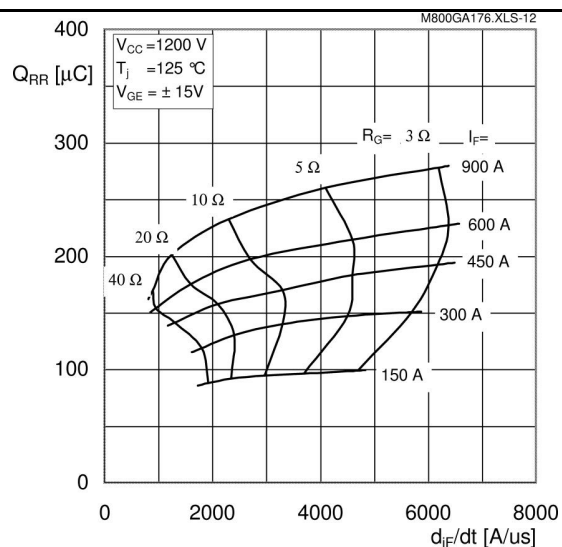


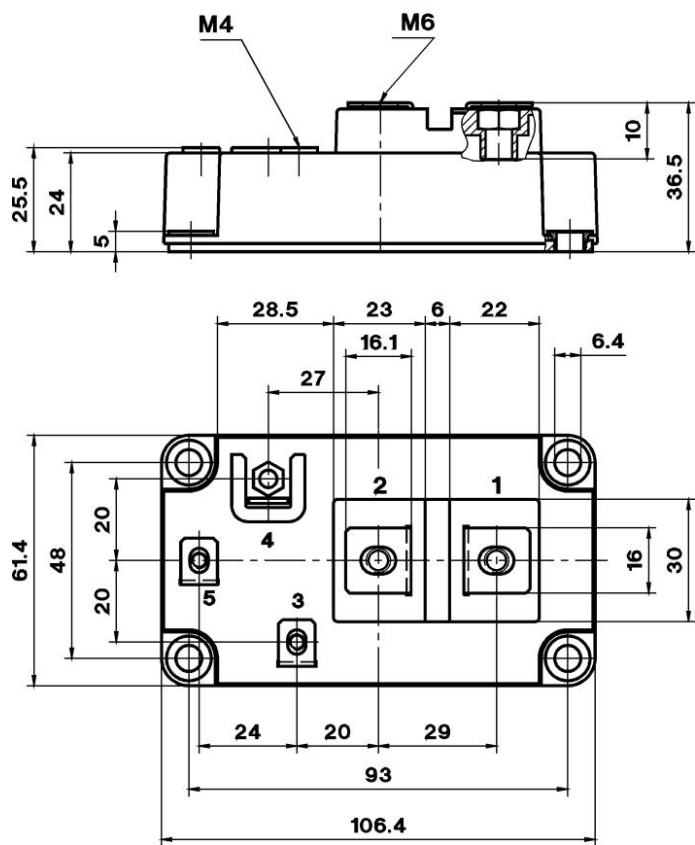
Fig. 12 Typ. CAL diode peak reverse recovery charge

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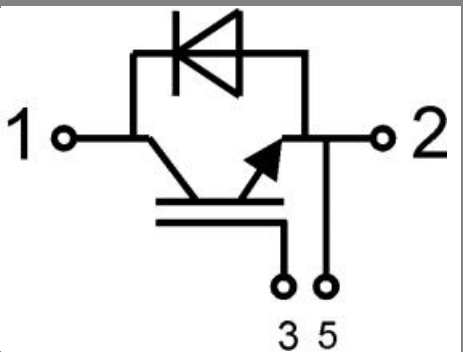
UL Recognized

CASED59

File no. E 63 532



Case D 59



GA Case D 59