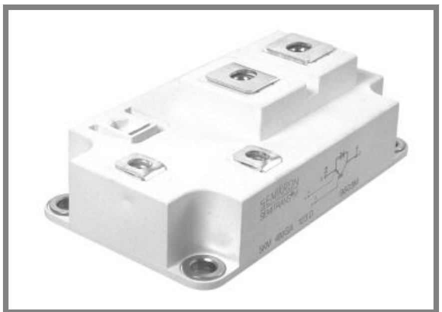
SKM 800GA176D



SEMITRANS® 4

Trench IGBT Modules

SKM 800GA176D

Preliminary Data

Features

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

Typical Applications

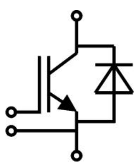
- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

Remarks

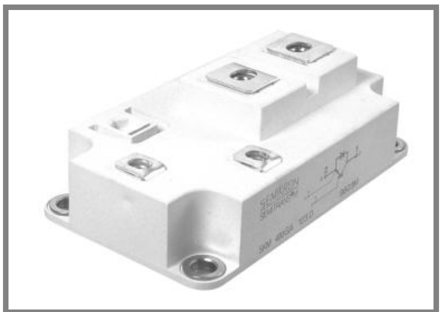
- $I_{DC} \leq$ 500 A limited for $T_{Terminal}$ = 100 °C

Absolute Maximum Ratings		T_c = 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	830	A
		T_c = 80 °C	590	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		1200	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	630	A
		T_c = 80 °C	440	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		1200	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.		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		0,2	0,6	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		1,7	2,1	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	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		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	V_{CC} = 1200V		230		ns
t_r		I_{Cnom}= 600A		90		ns
E_{on}		T_j = 125 °C		335		mJ
$t_{d(off)}$	R_{Goff} = 3 Ω	V_{GE} = ± 15V		1030		ns
t_f				160		ns
E_{off}				245		mJ
$R_{th(j-c)}$	per IGBT				0,04	K/W



GA



SEMITRANS® 4

Trench IGBT Modules

SKM 800GA176D

Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x 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 °C

GA

Characteristics

Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 600 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		1,6	1,9	V
		T_j = 125 °C$_{chiplev.}$		1,6		V
V_{F0}		T_j = 25 °C		1,1	1,3	V
r_F		T_j = 25 °C		0,83	1	mΩ
I_{RRM}	I_{Fnom} = 600 A	T_j = 125 °C		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 °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.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

SEMITRANS® 4

Trench IGBT Modules

SKM 800GA176D

Preliminary Data

Features

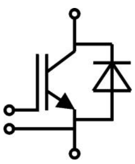
- Homogeneous Si
- Trench = Trenchgate technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_c

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 °C



GA

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
tau_i	i = 1	0,0447	s
tau_i	i = 2	0,02	s
tau_i	i = 3	0,0015	s
tau_i	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
tau_i	i = 1	0,05	s
tau_i	i = 2	0,0075	s
tau_i	i = 3	0,002	s
tau_i	i = 4	0,0002	s

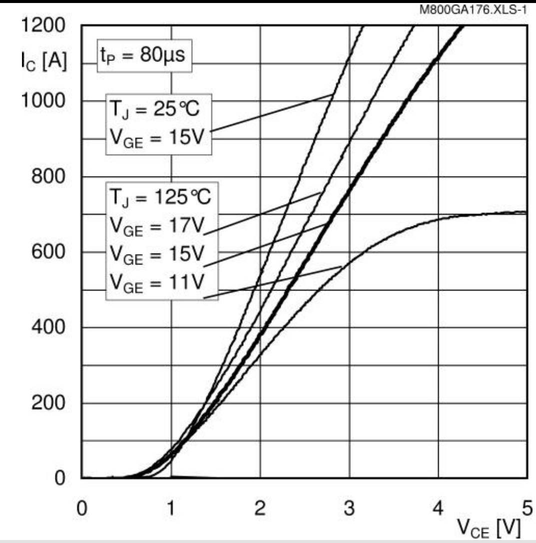


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

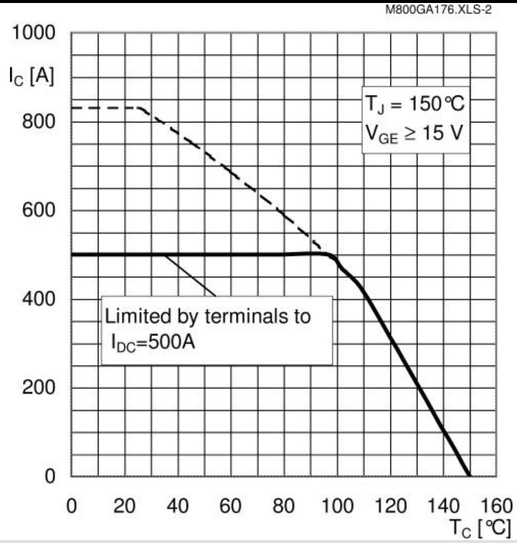


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

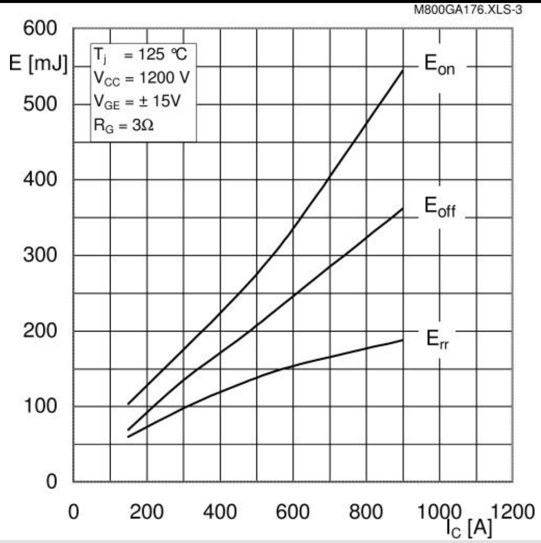


Fig. 3 Typ. turn-on /-off energy = f (I_C)

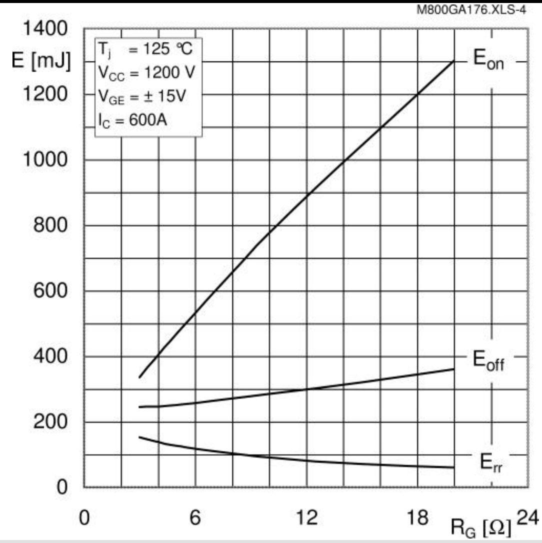


Fig. 4 Typ. turn-on /-off energy = f (R_G)

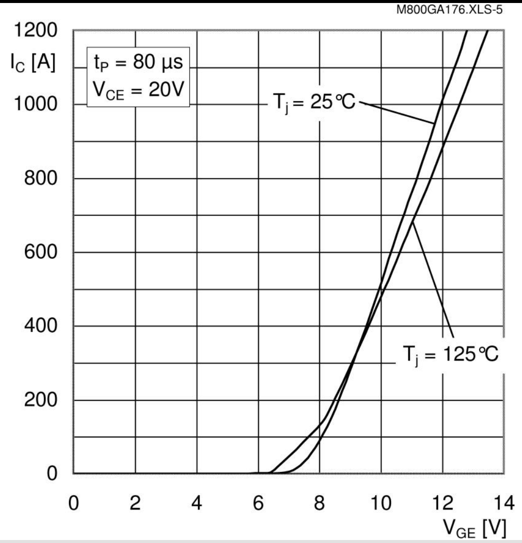


Fig. 5 Typ. transfer characteristic

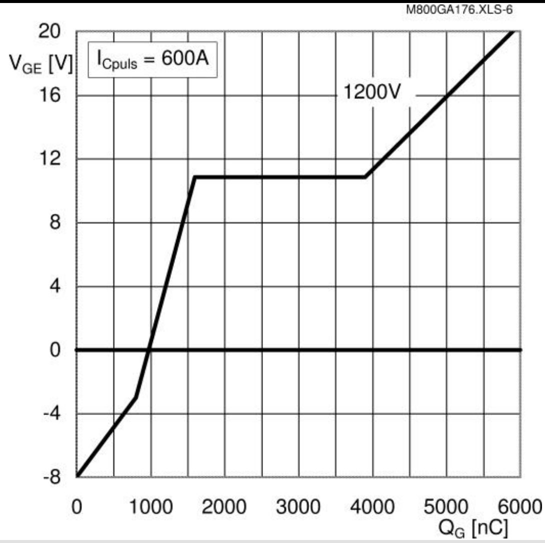


Fig. 6 Typ. gate charge characteristic

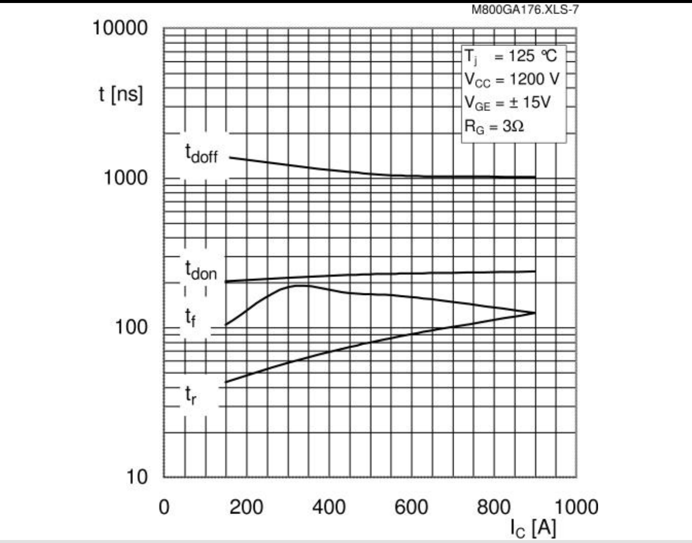


Fig. 7 Typ. switching times vs. I_C

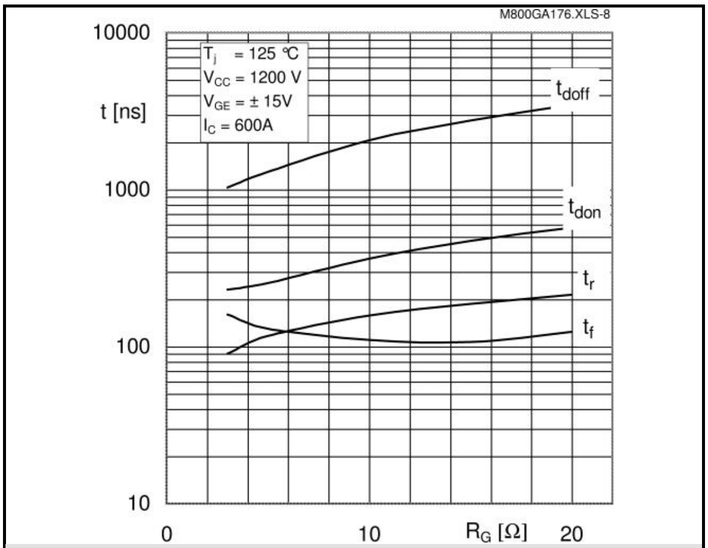


Fig. 8 Typ. switching times vs. gate resistor R_G

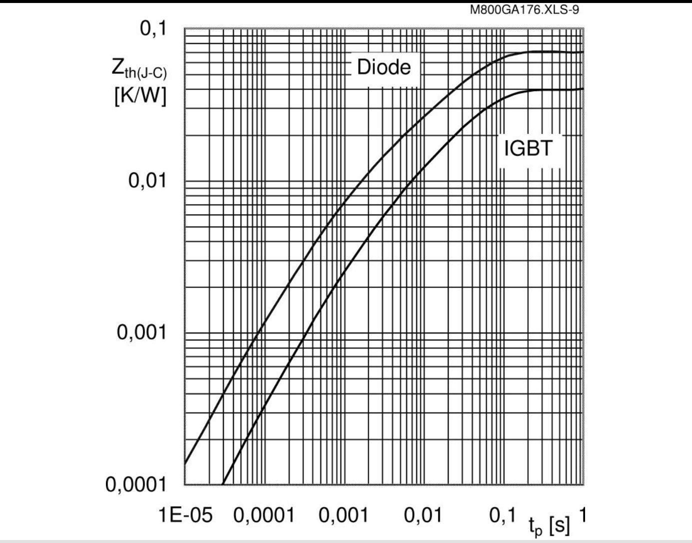


Fig. 9 Transient thermal impedance

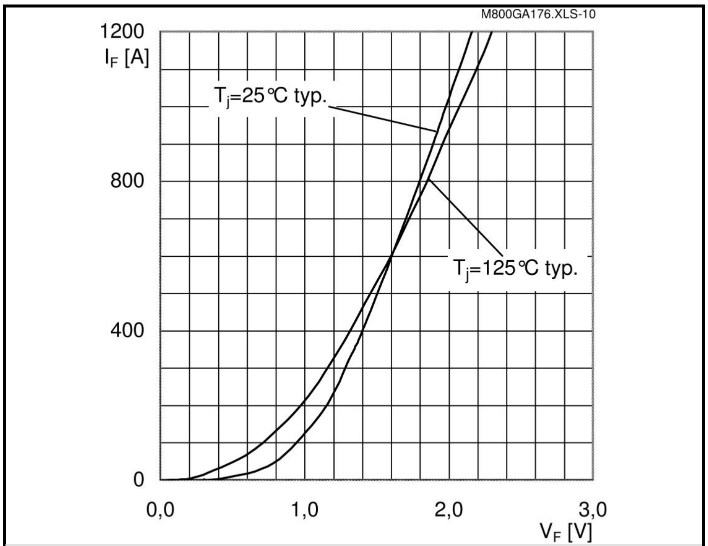


Fig. 10 Typ. CAL diode forward characteristic

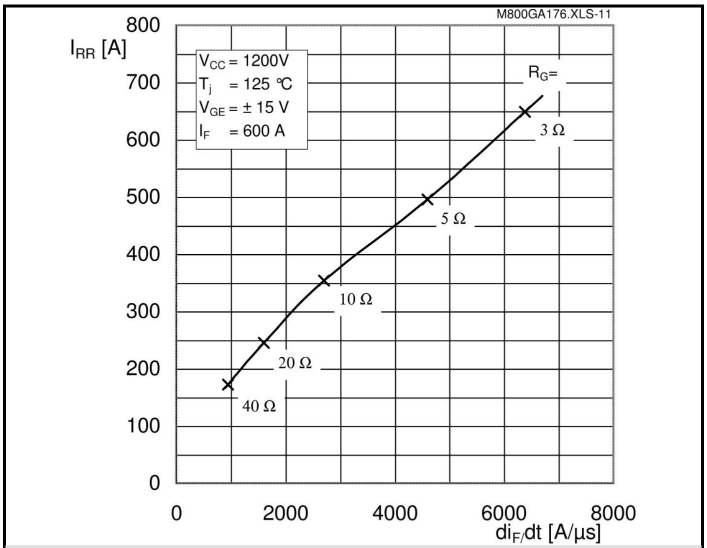


Fig. 11 Typ. CAL diode peak reverse recovery current

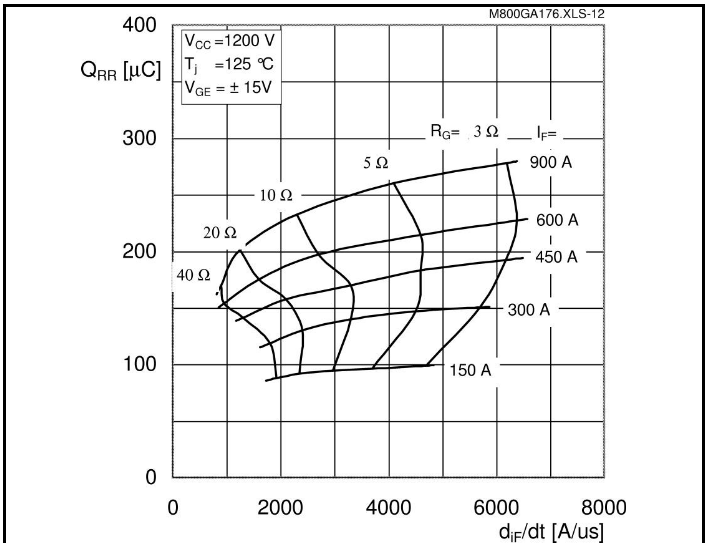
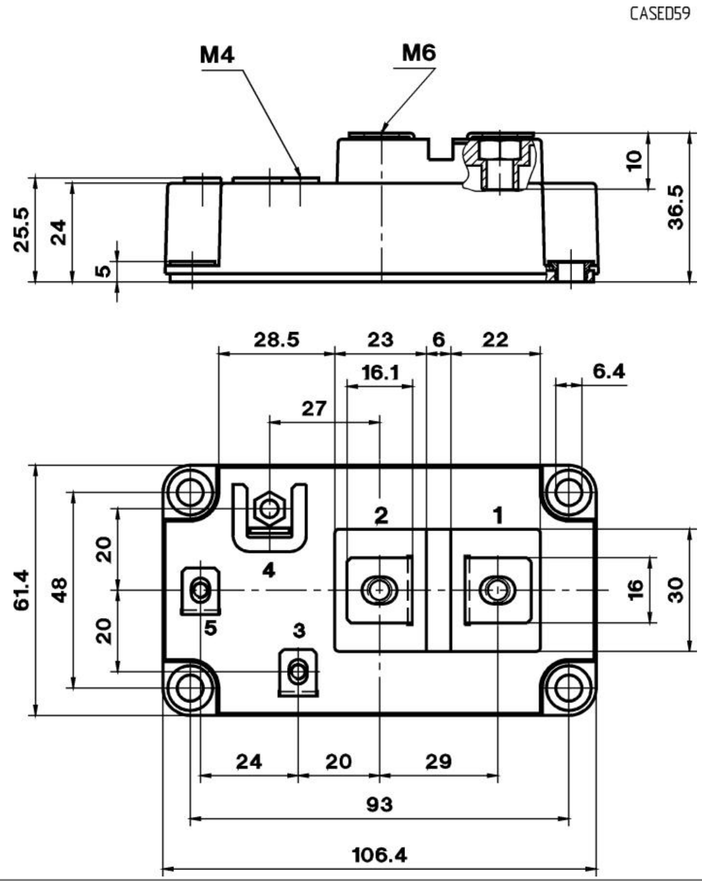
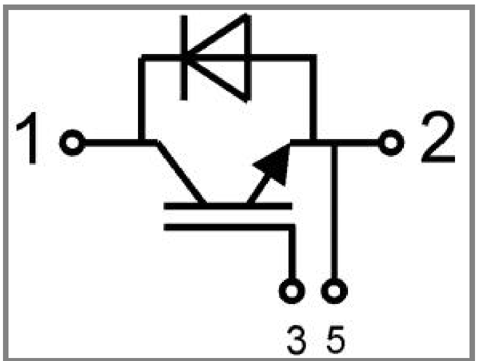


Fig. 12 Typ. CAL diode peak reverse recovery charge



Case D 59



GA Case D 59

