



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 $6 \times I_C$

Typical Applications

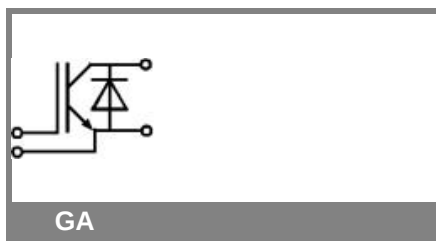
- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

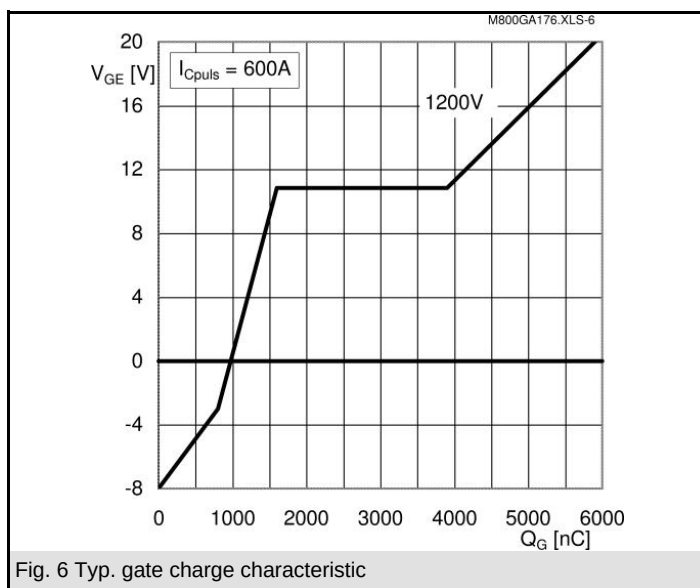
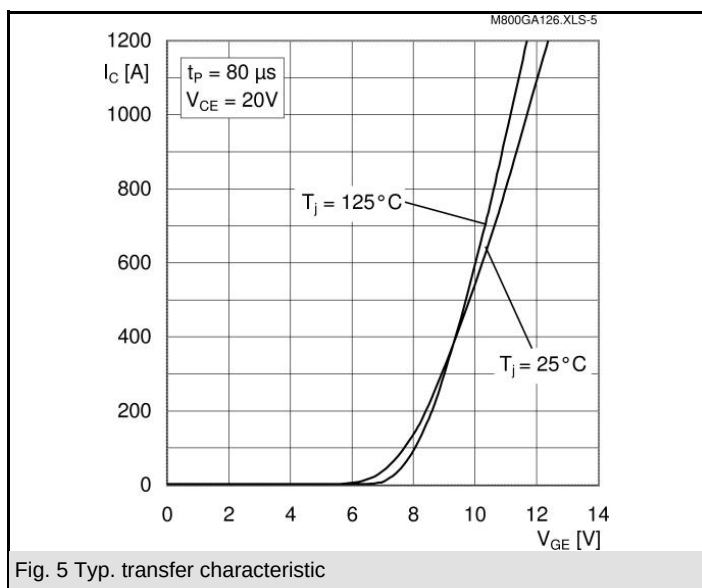
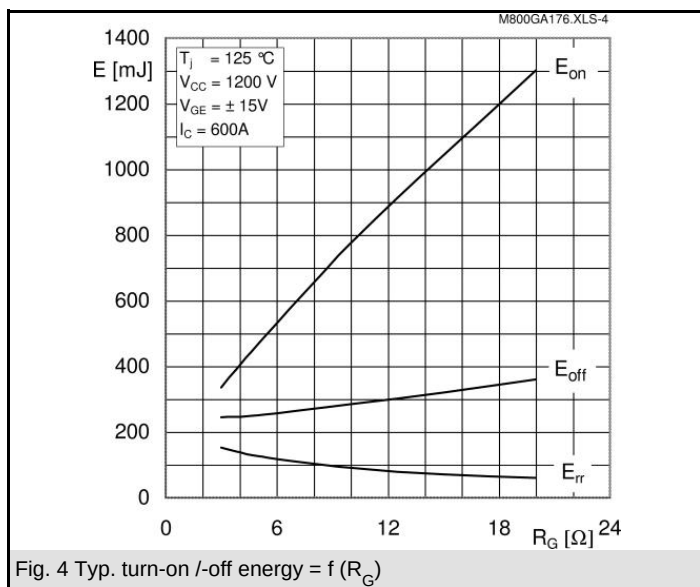
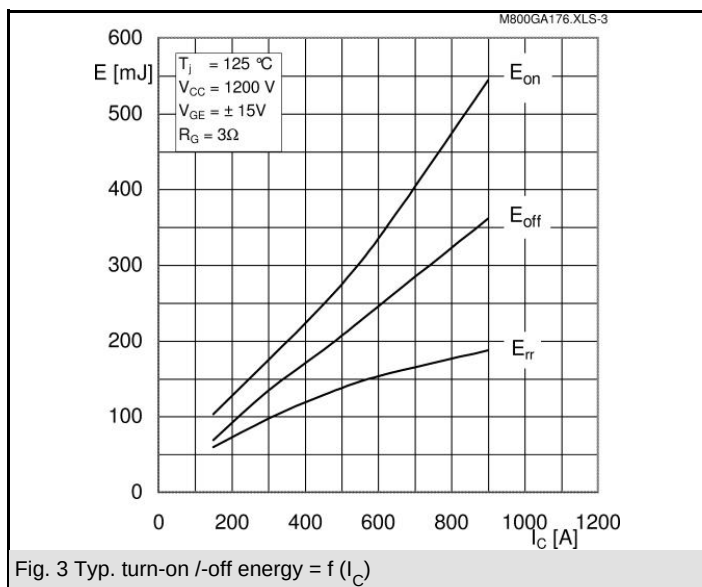
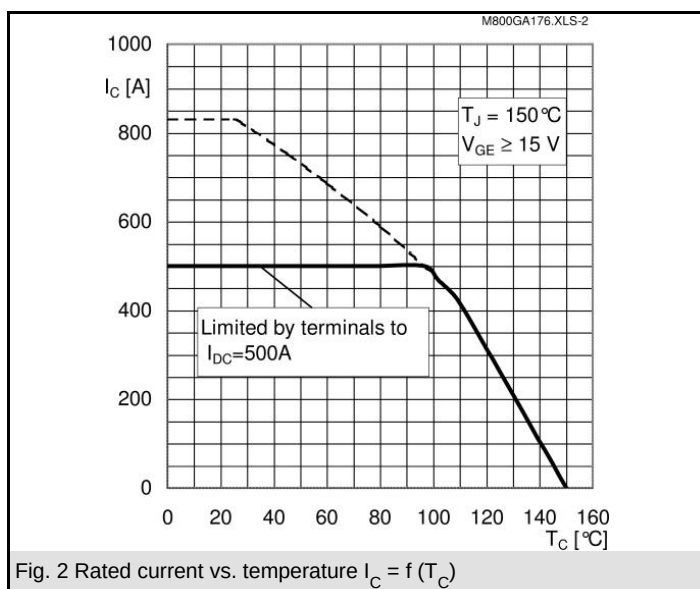
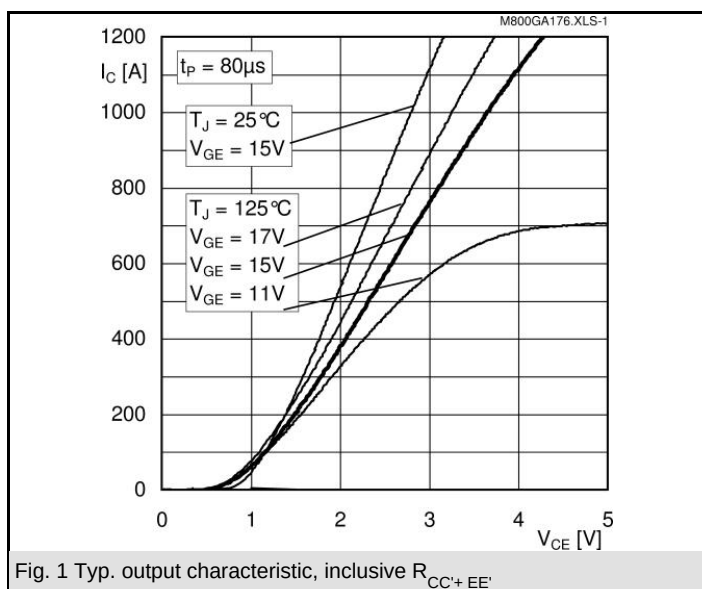
Remarks

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

Absolute Maximum Ratings		$T_c = 25$ °C, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1700	V
I_C	$T_c = 25$ (80) °C	830 (590)	A
I_{CRM}	$t_p = 1$ ms	1200	A
V_{GES}		± 20	V
T_{vj} (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	°C
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	$T_c = 25$ (80) °C	630 (440)	A
I_{FRM}	$t_p = 1$ ms	1200	A
I_{FSM}	$t_p = 10$ ms; sin.; $T_j = 150$ °C	3600	A

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}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25$ (125) °C		0,2	0,6	mA
$V_{CE(TO)}$	$T_j = 25$ (125) °C		1 (0,9)	1,2 (1,1)	V
r_{CE}	$V_{GE} = 15$ V, $T_j = 25$ (125) °C		1,7 (2,5)	2,1	mΩ
$V_{CE(sat)}$	$I_{Cnom} = 600$ A, $V_{GE} = 15$ V, chip level		2 (2,45)	2,45 (2,9)	V
C_{ies}	under following conditions		53		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25$ V, $f = 1$ MHz		3,5		nF
C_{res}			2,5		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25$ (125) °C		0,18 (0,22)		mΩ
$t_{d(on)}$	$V_{CC} = 1200$ V, $I_{Cnom} = 600$ A		230		ns
t_r	$R_{Gon} = R_{Goff} = 3$ Ω, $T_j = 125$ °C		90		ns
$t_{d(off)}$	$V_{GE} = \pm 15$ V		1030		ns
t_f			160		ns
$E_{on} (E_{off})$			335 (245)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_{Fnom} = 600$ A; $V_{GE} = 0$ V; $T_j = 25$ (125) °C		1,6 (1,6)	1,9	V
$V_{(TO)}$	$T_j = 25$ (125) °C		1,1	1,3	V
r_T	$T_j = 25$ (125) °C		0,83	1	mΩ
I_{RRM}	$I_{Fnom} = 600$ A; $T_j = 25$ (125) °C		(650)		A
Q_{rr}	$di/dt = 6400$ A/μs		(230)		μC
E_{rr}	$V_{GE} = 0$ V		(155)		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,04	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,07	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6, M4	2,5		5	Nm
w				330	g





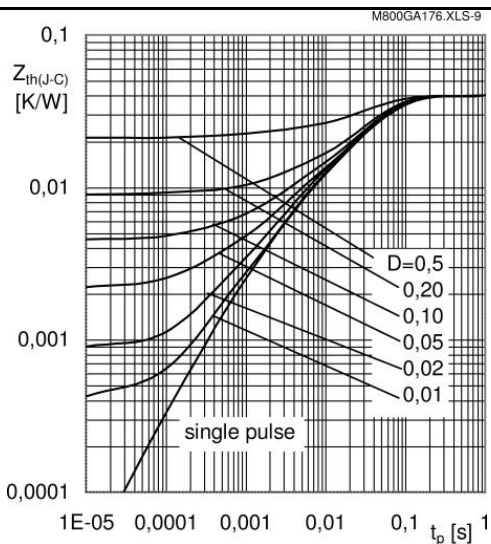
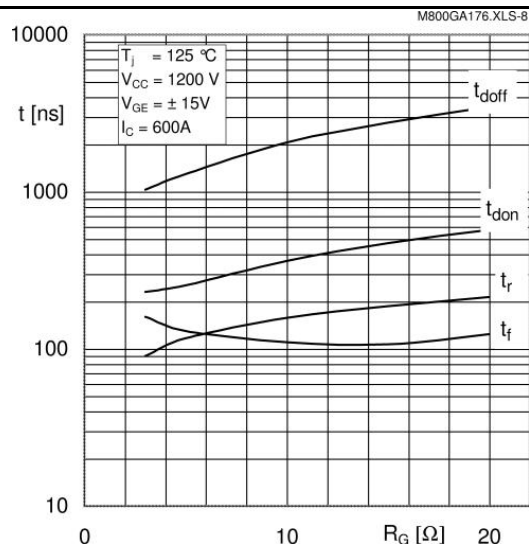
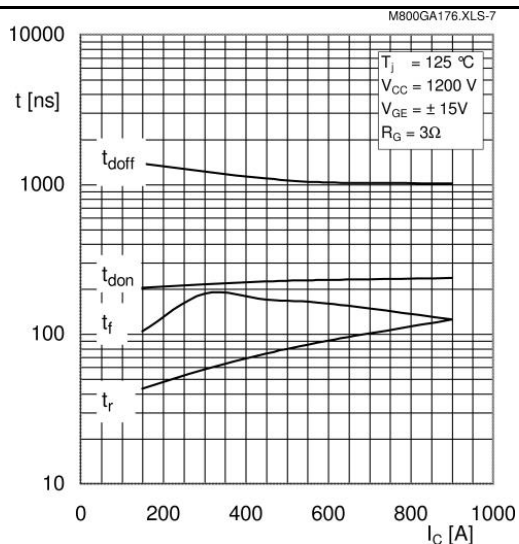


Fig. 9 Transient thermal impedance of IGBT

$$Z_{th(j-c)} = f(t_p); D = t_p/t_c = t_p \cdot f$$

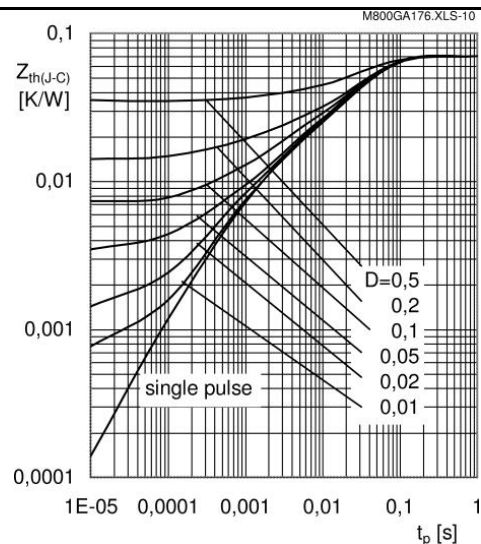


Fig. 10 Transient thermal impedance of Inverse CAL Diode

$$Z_{th(j-c)} = f(t_p); D = t_p/t_c = t_p \cdot f$$

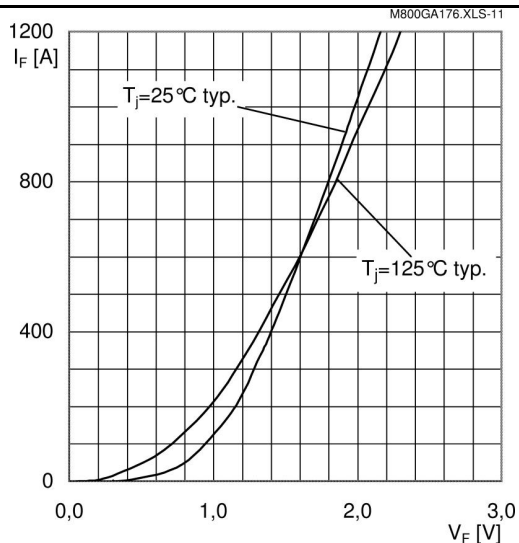


Fig. 11 CAL diode forward characteristic

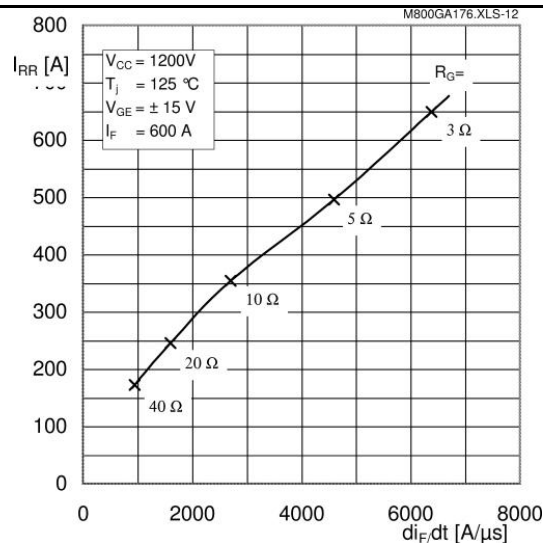
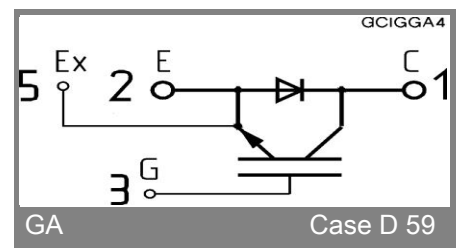
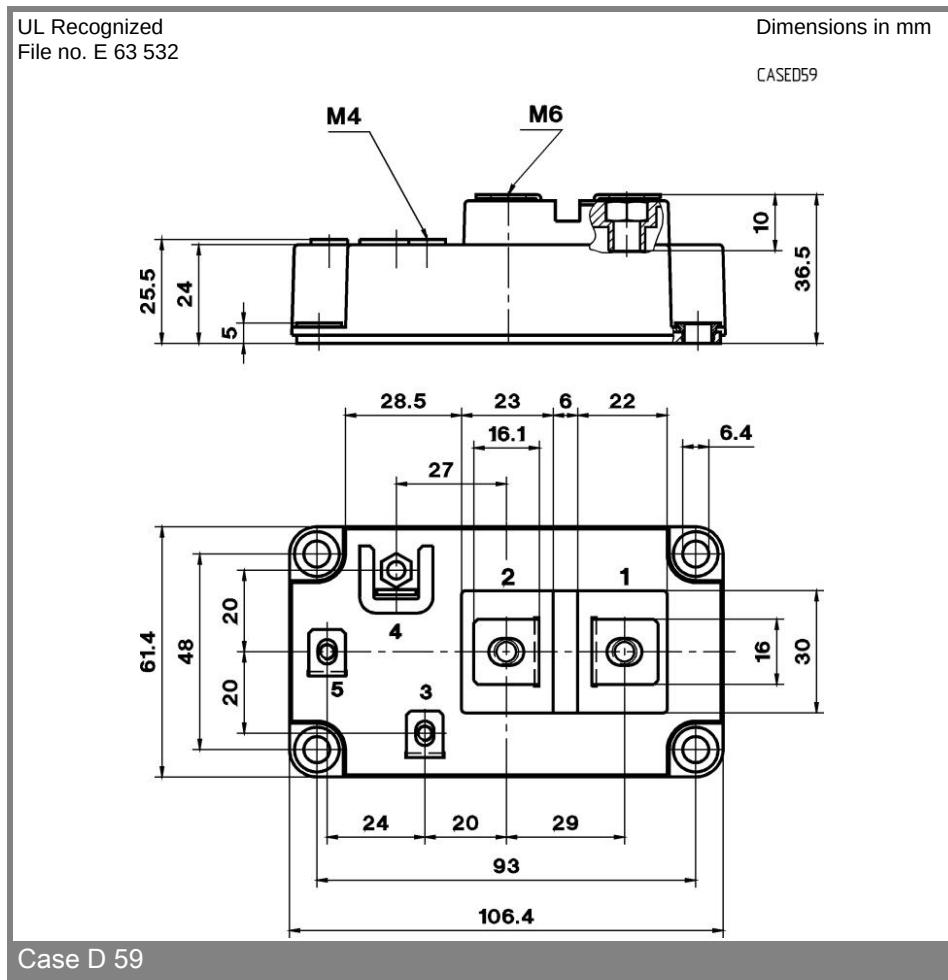
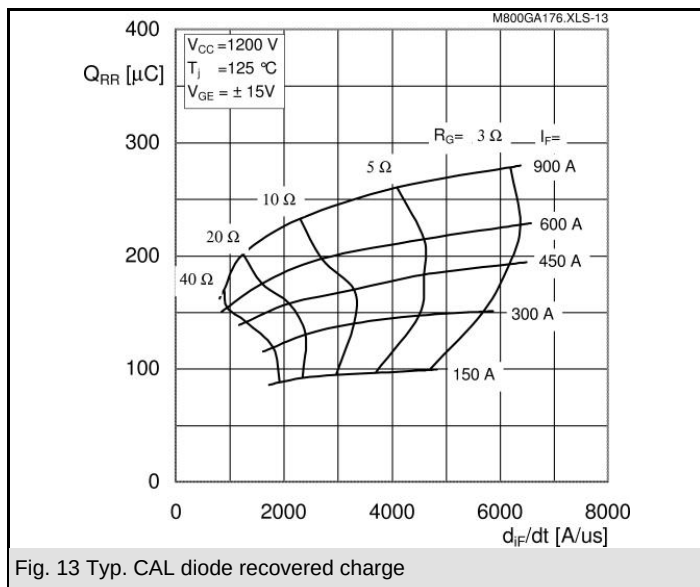


Fig. 12 Typ. CAL diode peak reverse recovery current



This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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