



SEMITRANS 4

Trench IGBT Modules

SKM 800GA126D

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

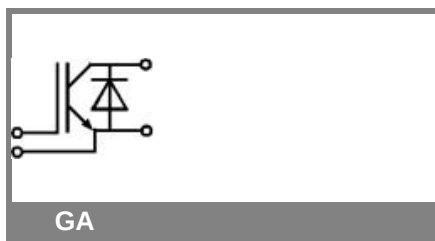
- AC inverter drives
- UPS
- Electronic welders

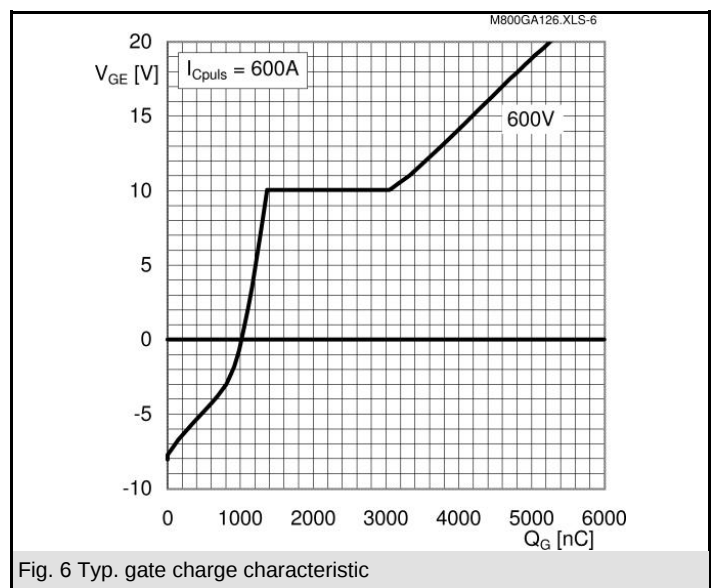
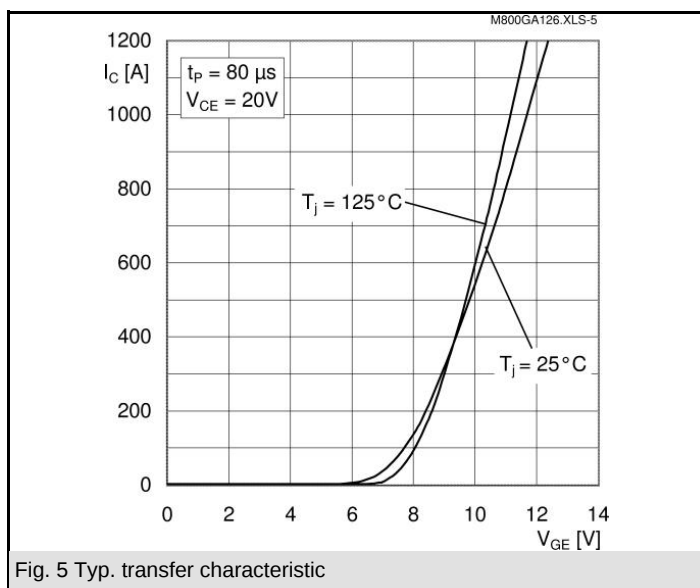
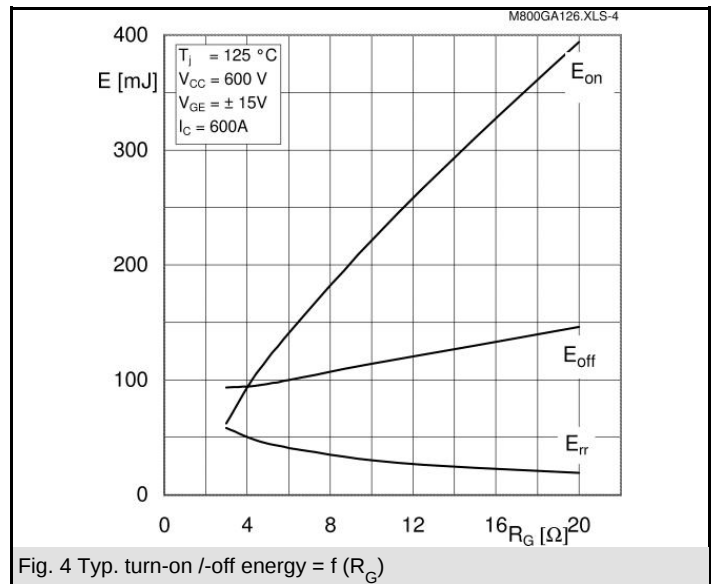
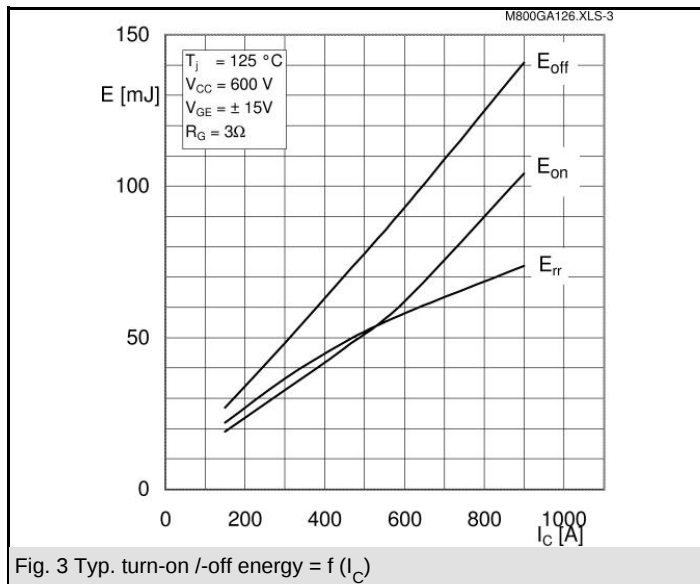
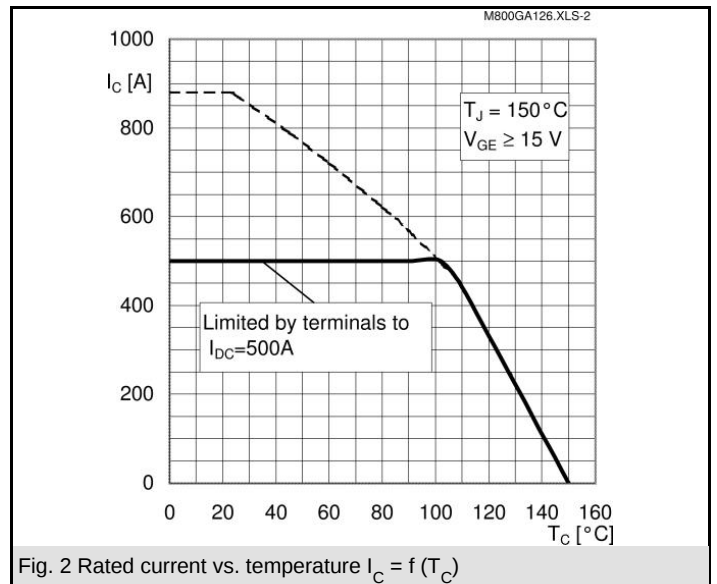
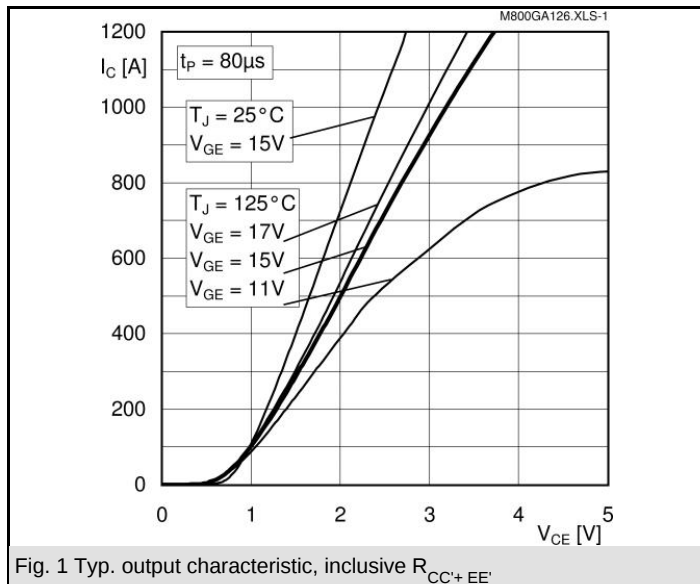
Remarks

- $I_{DC} \leq 500A$ limited by terminals

Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_c = 25 (80)^\circ\text{C}$	960 (620)	A
I_{CRM}	$t_p = 1 \text{ ms}$	1200	A
V_{GES}		± 20	V
T_{vj} (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	$^\circ\text{C}$
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	$T_c = 25 (125)^\circ\text{C}$	680 (470)	A
I_{FRM}	$t_p = 1 \text{ ms}$	1200	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 150^\circ\text{C}$	3600	A

Characteristics		$T_c = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 16 \text{ mA}$	5	5,8	6,5	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25 (125)^\circ\text{C}$		0,2	0,6	mA
$V_{CE(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1 (0,9)	1,15	V
r_{CE}	$V_{GE} = 15 \text{ V}$, $T_j = 25 (125)^\circ\text{C}$		1,2 (1,8)	1,7	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 600 \text{ A}$, $V_{GE} = 15 \text{ V}$, chip level		1,7 (2)	2,15	V
C_{ies}	under following conditions		42		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25 \text{ V}$, $f = 1 \text{ MHz}$		3,3		nF
C_{res}			3,1		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25 (125)^\circ\text{C}$		0,18 (0,22)		m Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$, $I_{Cnom} = 600 \text{ A}$		220		ns
t_r	$R_{Gon} = R_{Goff} = 3 \Omega$, $T_j = 125^\circ\text{C}$		100		ns
$t_{d(off)}$	$V_{GE} = \pm 15 \text{ V}$		860		ns
t_f			135		ns
$E_{on} (E_{off})$			65 (95)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_{Fnom} = 600 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)^\circ\text{C}$		1,6 (1,6)	1,8 (1,8)	V
$V_{(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1 (0,8)	1,1 (0,9)	V
r_T	$T_j = 25 (125)^\circ\text{C}$		1 (1,3)	1,1 (1,5)	m Ω
I_{RRM}	$I_{Fnom} = 600 \text{ A}$; $T_j = 125 ()^\circ\text{C}$		540		A
Q_{rr}	$di/dt = 6000 \text{ A}/\mu\text{s}$		125		μC
E_{rr}	$V_{GE} = 0 \text{ V}$		59		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,042	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,09	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





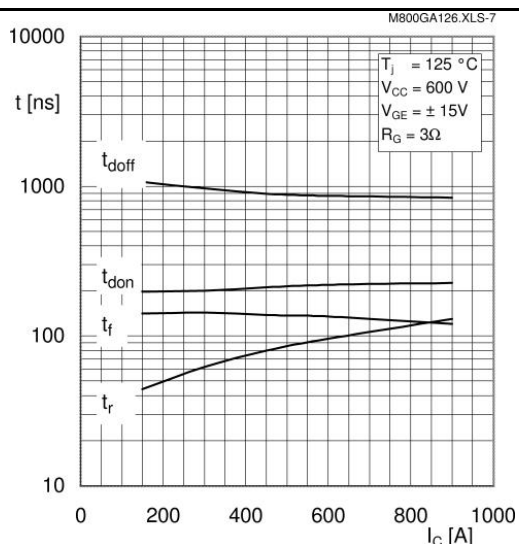


Fig. 7 Typ. switching times vs. I_C

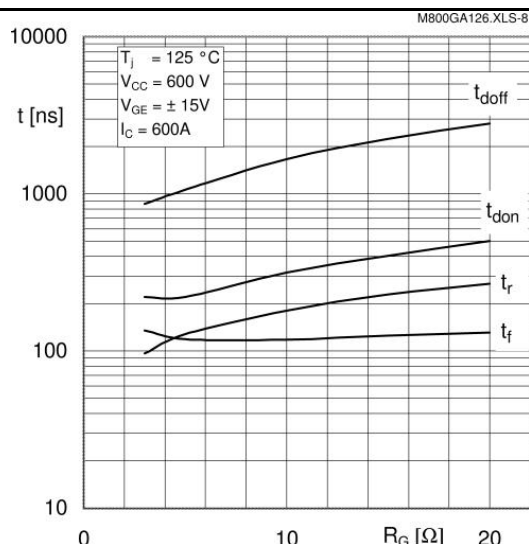


Fig. 8 Typ. switching times vs. gate resistor R_G

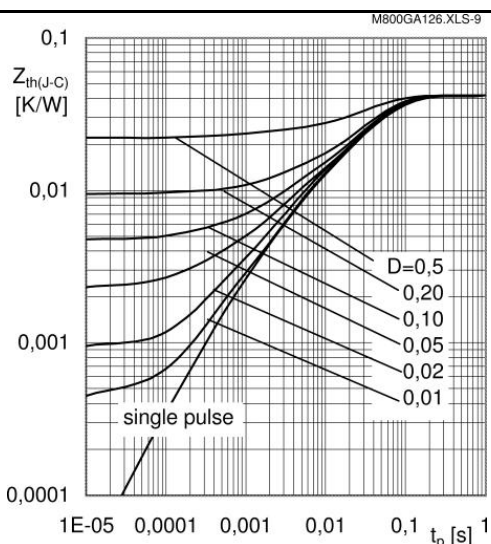


Fig. 9 Transient thermal impedance of IGBT

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

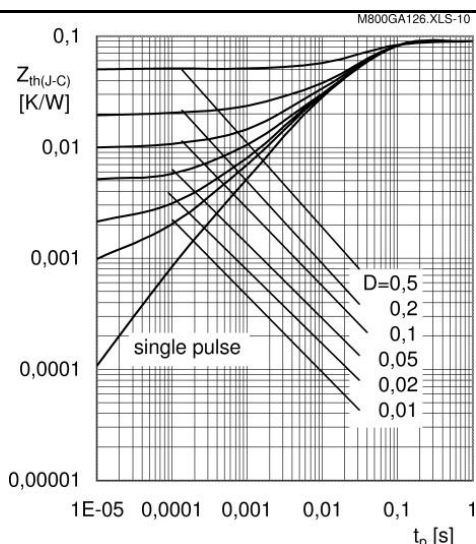


Fig. 10 Transient thermal impedance of Inverse CAL Diode

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

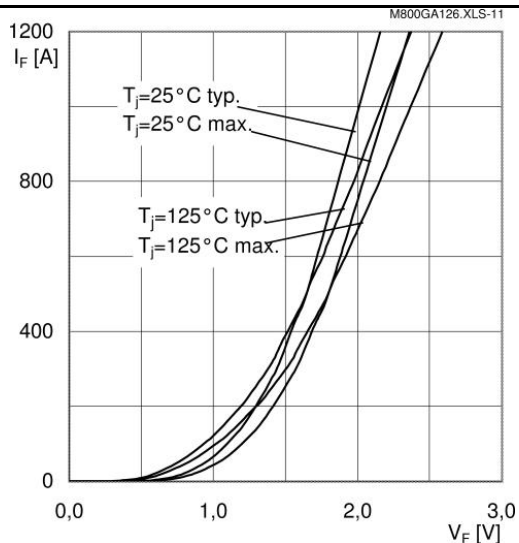


Fig. 11 CAL diode forward characteristic

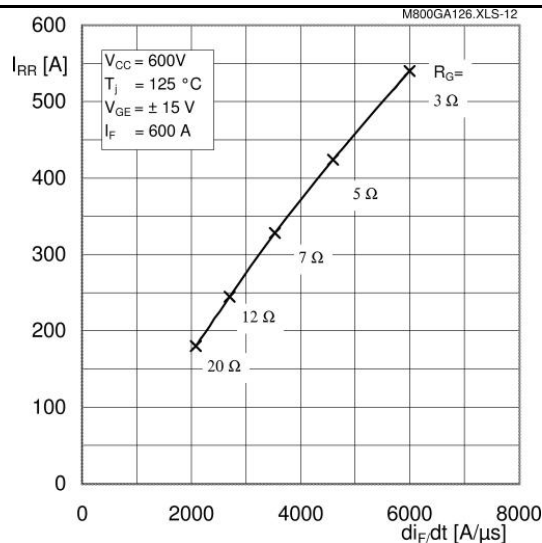
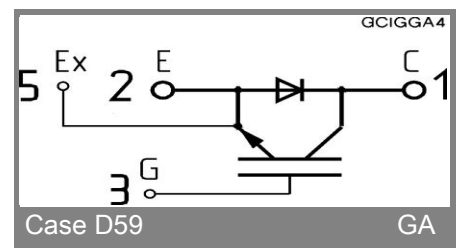
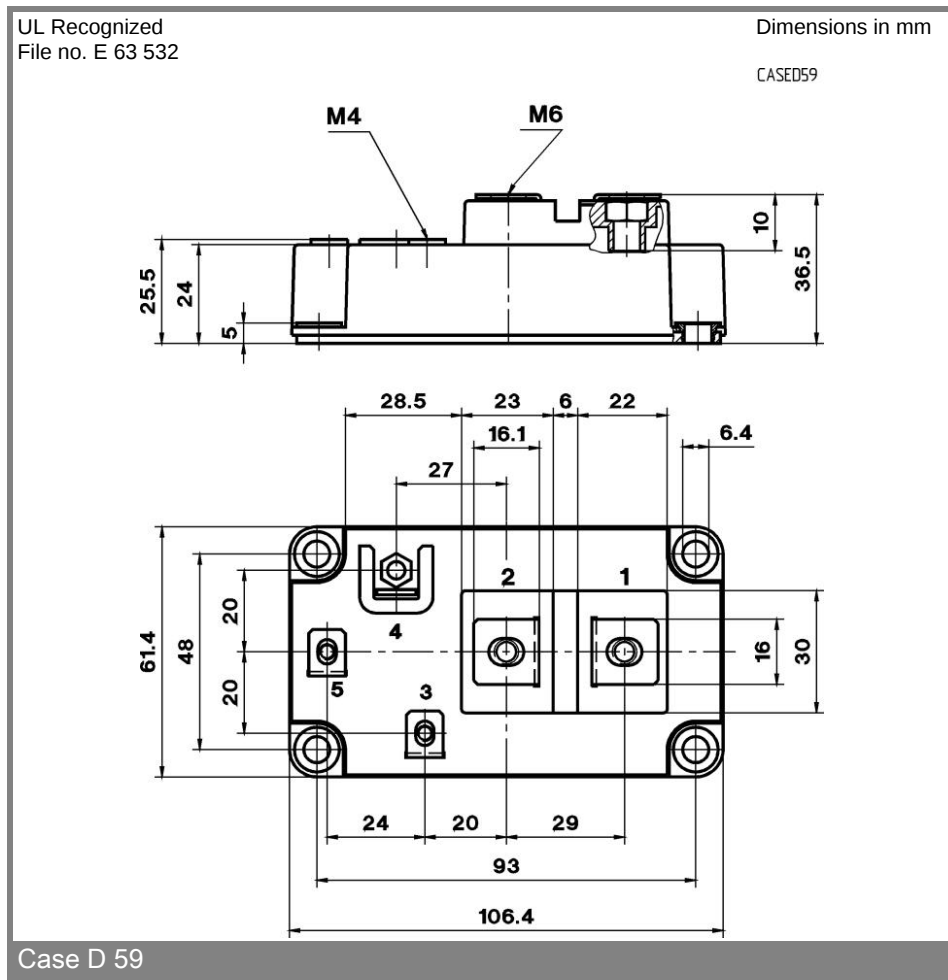
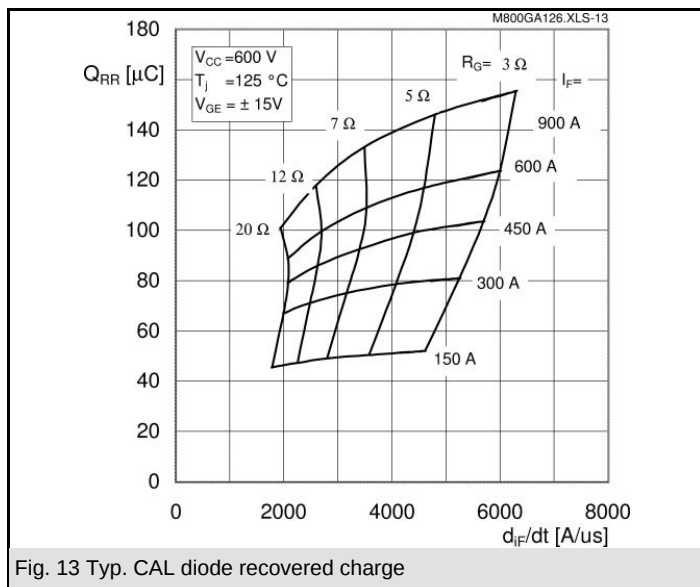


Fig. 12 Typ. CAL diode peak reverse recovery current



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

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