

SKM 145GB123D



SEMITRANS™ 2

IGBT Modules

SKM 145GB123D

SKM 145GAL123D

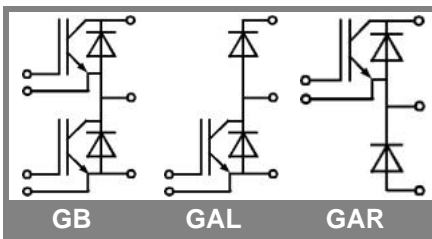
SKM 145GAR123D

Features

- MOS input (voltage controlled)
- N channel, Homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding
- Large clearance (10 mm) and creepage distances (20 mm)

Typical Applications

- Switching (not for linear use)



Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_c = 25 (80)^\circ\text{C}$	145 (110)	A
I_{CRM}	$t_p = 1 \text{ ms}$	200	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.	2500	V

Inverse diode		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
I_F	$T_c = 25 (80)^\circ\text{C}$	130 (90)	A
I_{FRM}	$t_p = 1 \text{ ms}$	200	A
I_{FSM}	$t_p = 10 \text{ ms}; \text{sin.}; T_j = 150^\circ\text{C}$	1100	A

Freewheeling diode		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
I_F	$T_c = 25 (80)^\circ\text{C}$	170 (115)	A
I_{FRM}	$t_p = 1 \text{ ms}$	300	A
I_{FSM}	$t_p = 10 \text{ ms}; \text{sin.}; T_j = 150^\circ\text{C}$	1450	A

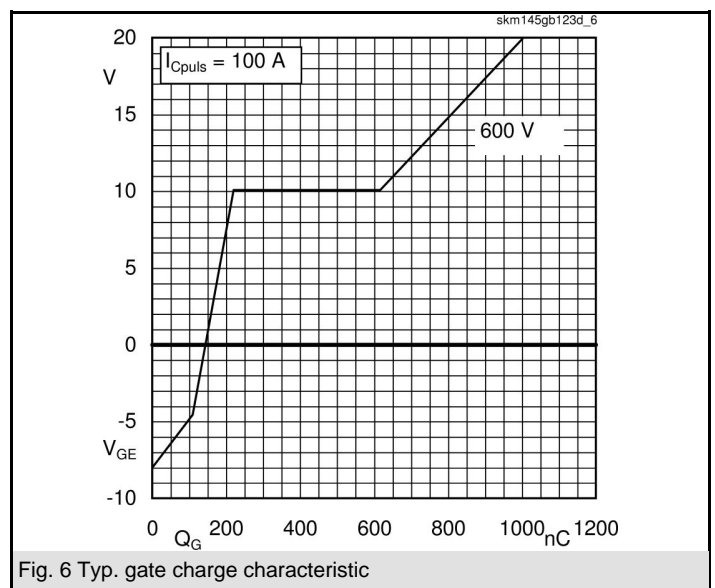
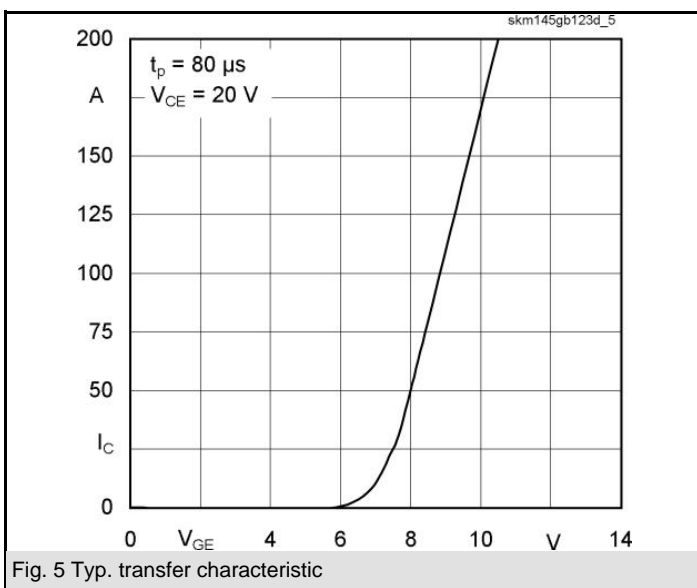
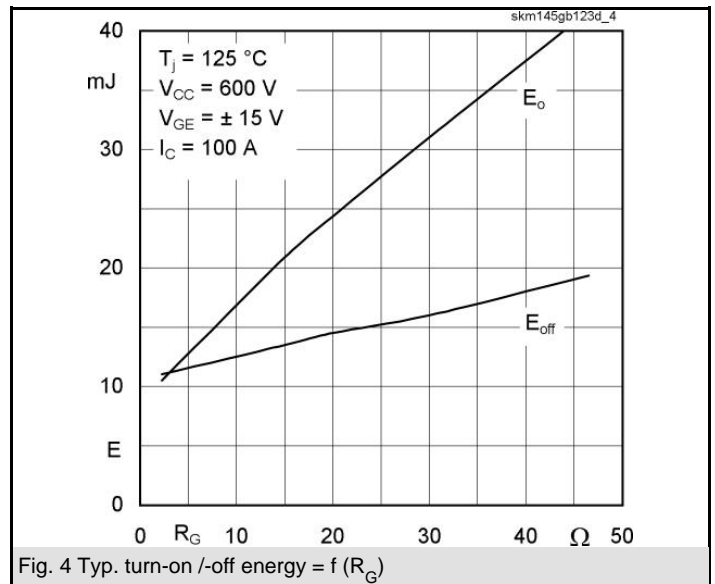
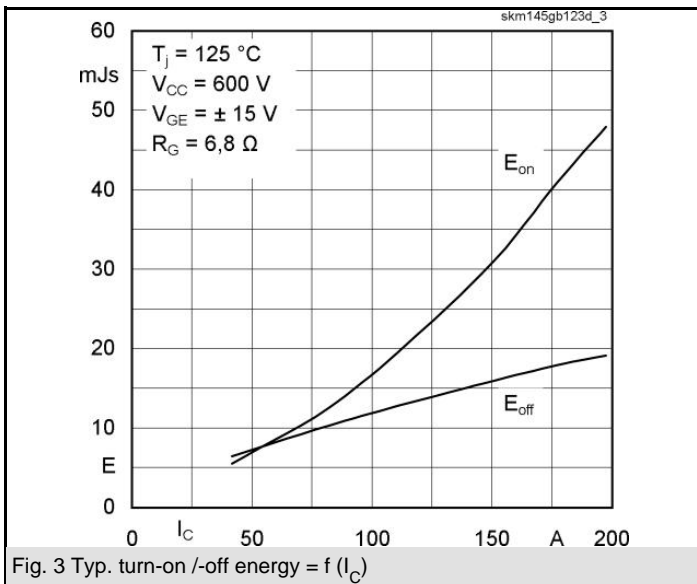
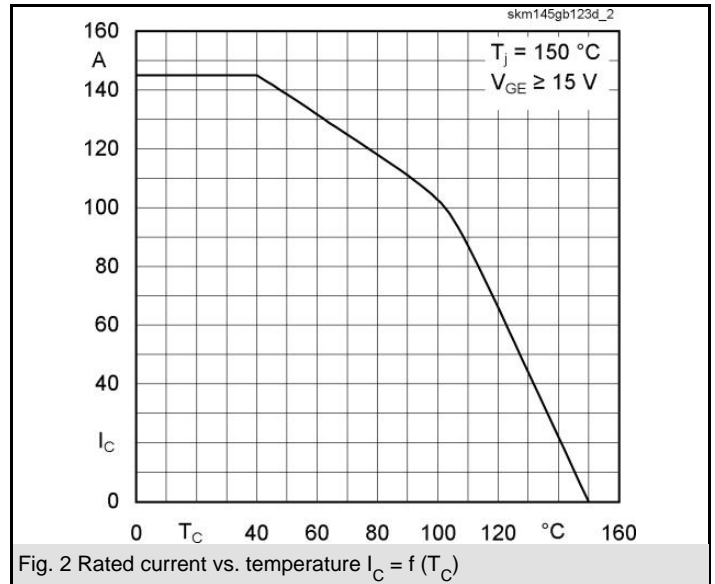
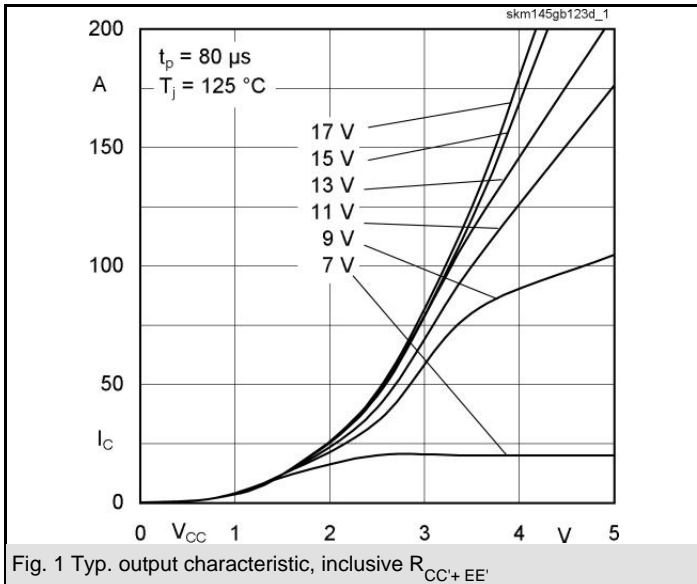
Characteristics		$T_c = 25^\circ\text{C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 4 \text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0, V_{CE} = V_{CES}, T_j = 25 (125)^\circ\text{C}$		0,1	0,3	mA
$V_{CE(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1,4 (1,6)	1,6 (1,8)	V
r_{CE}	$V_{GE} = 15 \text{ V}, T_j = 25 (125)^\circ\text{C}$		11 (15)	14 (19)	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 100 \text{ A}, V_{GE} = 15 \text{ V}, \text{chip level}$		2,5 (3,1)	3 (3,7)	V
C_{res}	under following conditions		6,5	8,5	nF
C_{oes}	$V_{GE} = 0, V_{CE} = 25 \text{ V}, f = 1 \text{ MHz}$		1	1,5	nF
C_{res}			0,5	0,6	nF
L_{CE}				30	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25 (125)^\circ\text{C}$		0,75 (1)		m Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}, I_{Cnom} = 100 \text{ A}$		160	320	ns
t_r	$R_{Gon} = R_{Goff} = 6,8 \Omega, T_j = 125^\circ\text{C}$		80	160	ns
$t_{d(off)}$	$V_{GE} = \pm 15 \text{ V}$		400	520	ns
t_f			70	100	ns
$E_{on} (E_{off})$			16 (12)		mJ

Inverse diode		$T_c = 25^\circ\text{C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
$V_F = V_{EC}$	$I_{Fnom} = 100 \text{ A}; V_{GE} = 0 \text{ V}; T_j = 25 (125)^\circ\text{C}$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125 ()^\circ\text{C}$			1,2	V
r_T	$T_j = 125 ()^\circ\text{C}$		8	11	m Ω
I_{RRM}	$I_{Fnom} = 100 \text{ A}; T_j = 25 (125)^\circ\text{C}$		35 (50)		A
Q_{rr}	$di/dt = 1000 \text{ A}/\mu\text{s}$		5 (14)		μC
E_{rr}	$V_{GE} = V$				mJ

FWD		$T_c = 25^\circ\text{C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
$V_F = V_{EC}$	$I_F = 150 \text{ A}; V_{GE} = 0 \text{ V}, T_j = 25 (125)^\circ\text{C}$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125 ()^\circ\text{C}$			1,2	V
r_T	$T_j = 125 ()^\circ\text{C}$			7	m Ω
I_{RRM}	$I_F = 150 \text{ A}; T_j = 25 (125)^\circ\text{C}$		55 (80)		A
Q_{rr}	$di/dt = \text{A}/\mu\text{s}$		8 (23)		μC
E_{rr}	$V_{GE} = V$				mJ

Thermal characteristics		$T_c = 25^\circ\text{C}$, unless otherwise specified		Units	
Symbol	Conditions	min.	typ.	max.	Units
$R_{th(j-c)}$	per IGBT			0,15	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,36	K/W
$R_{th(j-c)FD}$	per FWD			0,3	K/W
$R_{th(c-s)}$	per module			0,05	K/W

Mechanical data		$T_c = 25^\circ\text{C}$, unless otherwise specified		Units	
Symbol	Conditions	min.	typ.	max.	Units
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M5	2,5		5	Nm
w				160	g



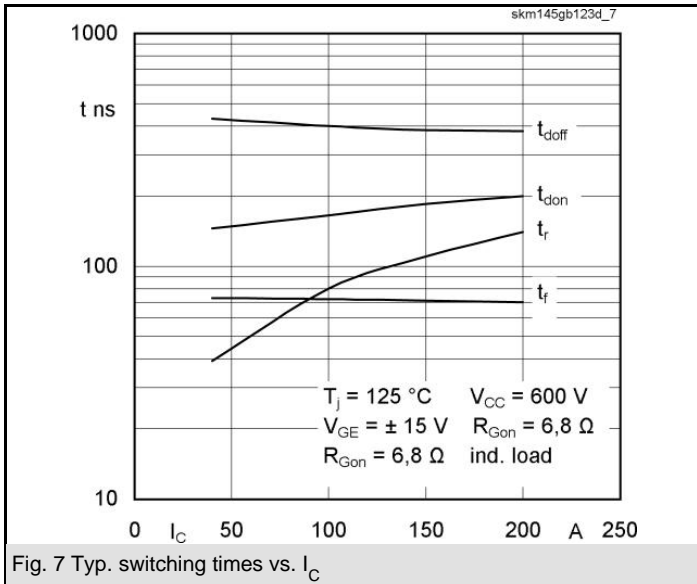


Fig. 7 Typ. switching times vs. I_C

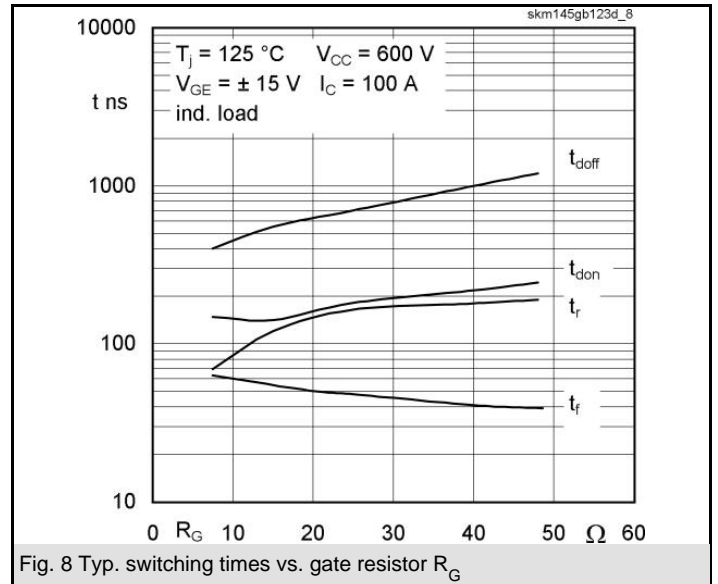


Fig. 8 Typ. switching times vs. gate resistor R_G

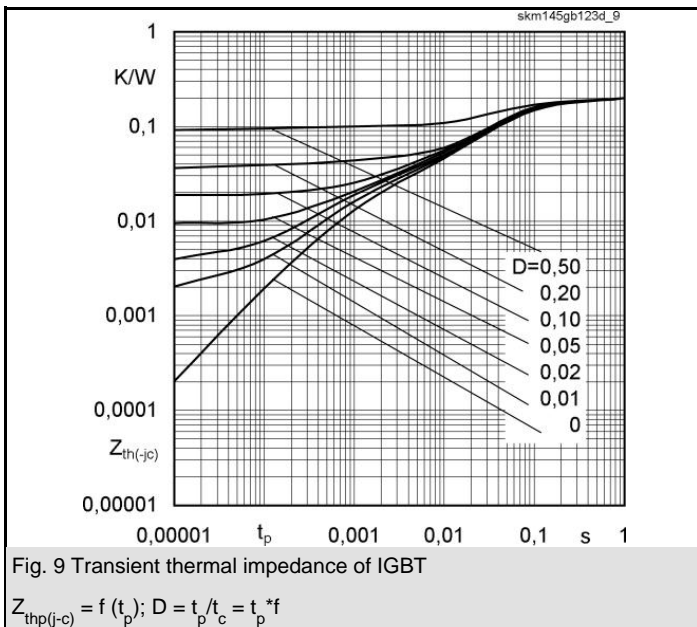


Fig. 9 Transient thermal impedance of IGBT

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

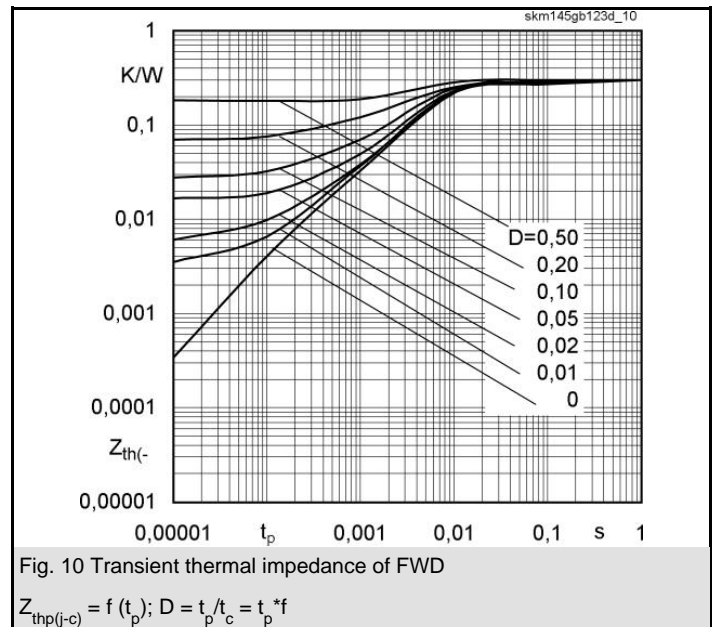


Fig. 10 Transient thermal impedance of FWD

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

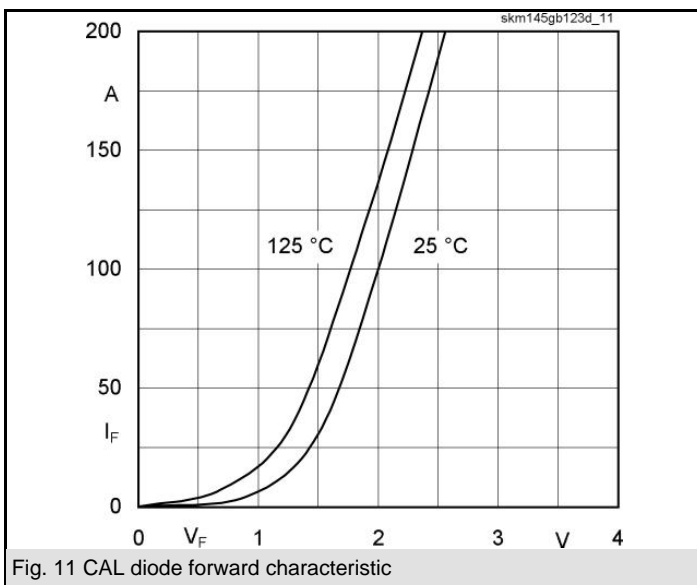


Fig. 11 CAL diode forward characteristic

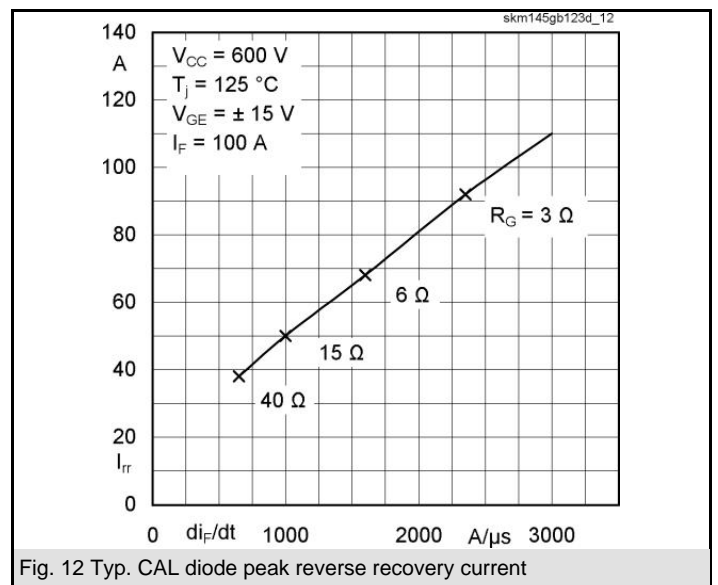
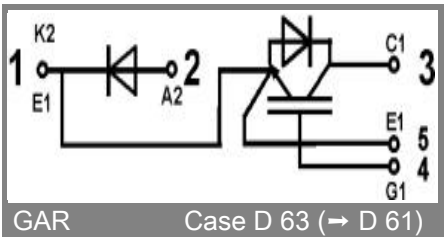
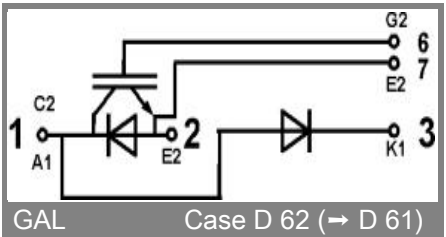
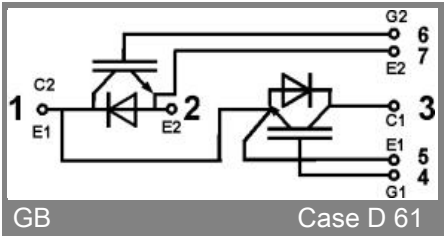
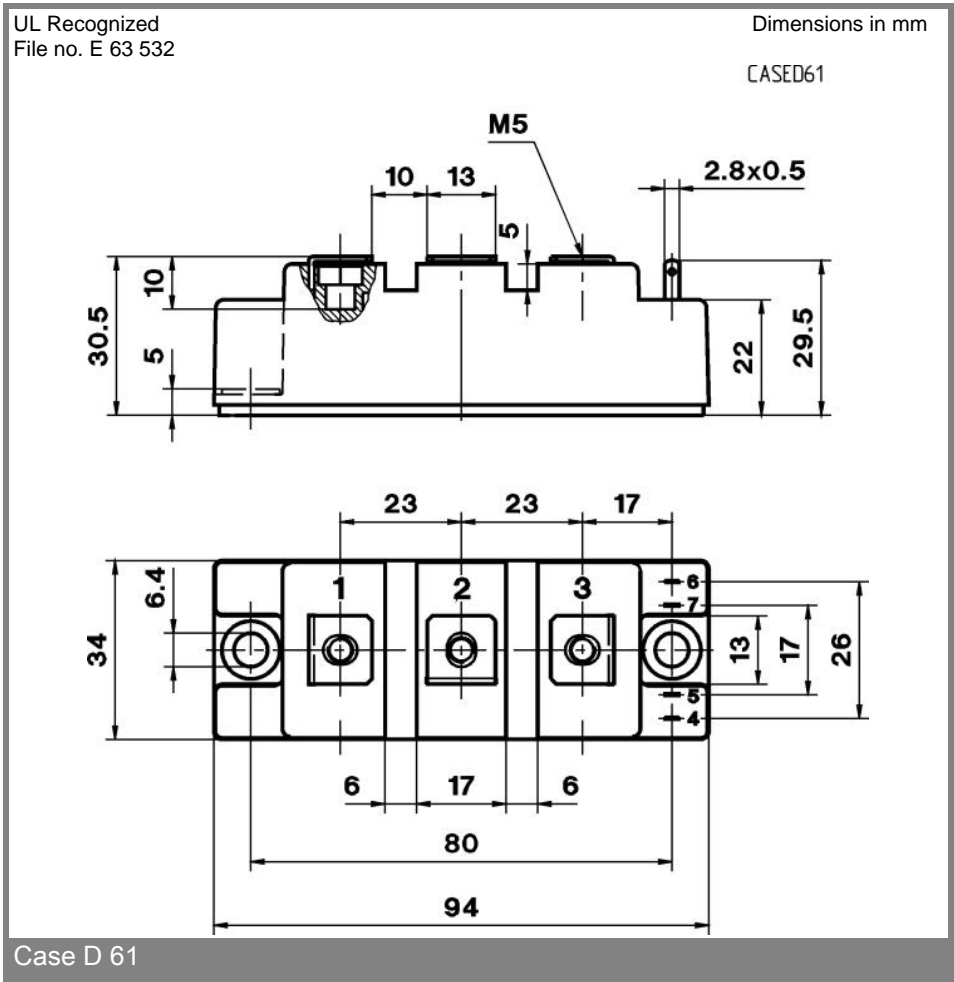
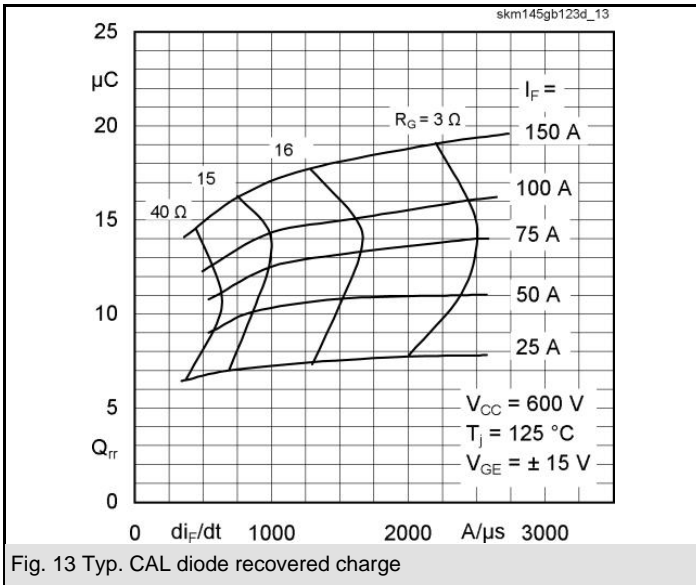


Fig. 12 Typ. CAL diode peak reverse recovery current

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

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