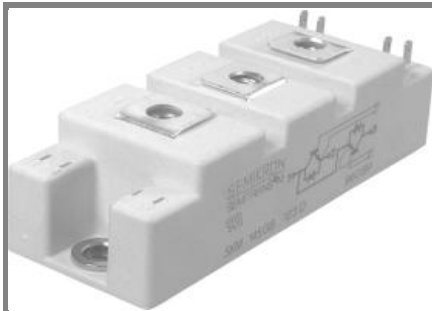


SKM 145GB123D



SEMITRANS™ 2

IGBT Modules

SKM 145GB123D

SKM 145GAL123D

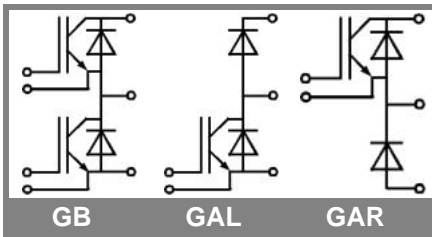
SKM 145GAR123D

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		$T_c = 25\text{ °C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_c = 25\text{ (80) °C}$	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)	°C
V_{isol}	AC, 1 min.	2500	V

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

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

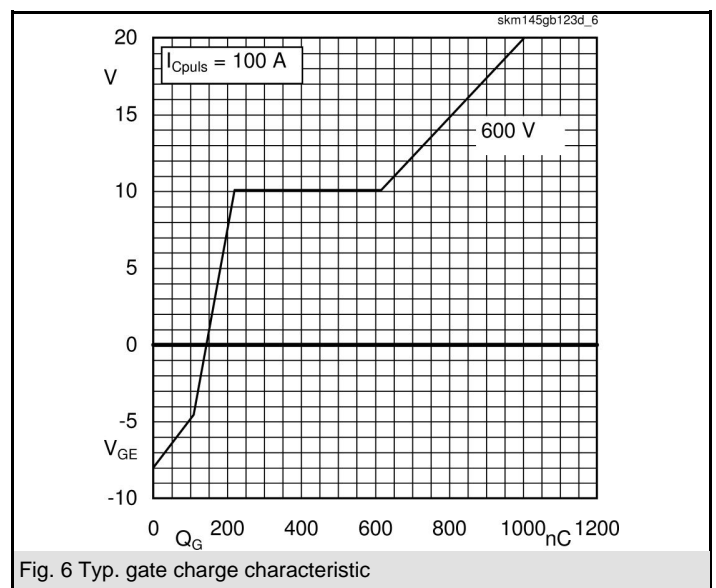
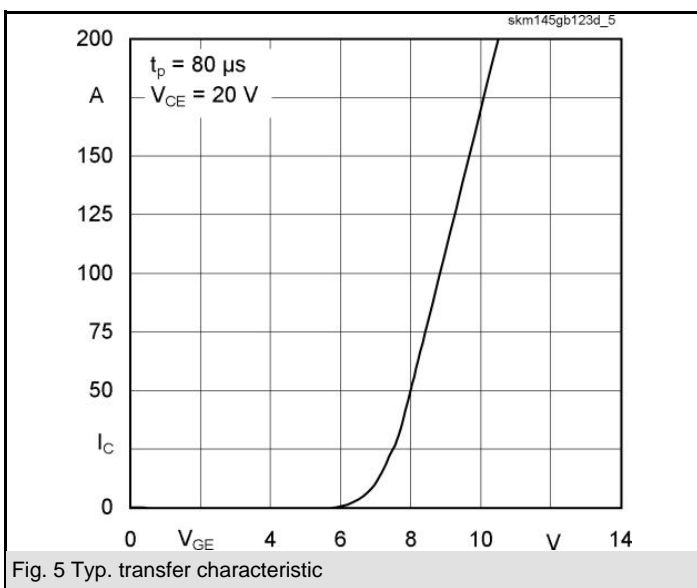
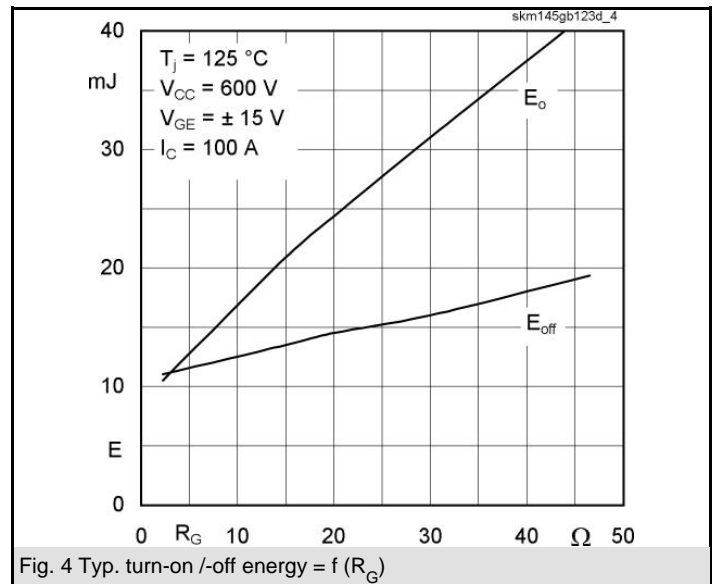
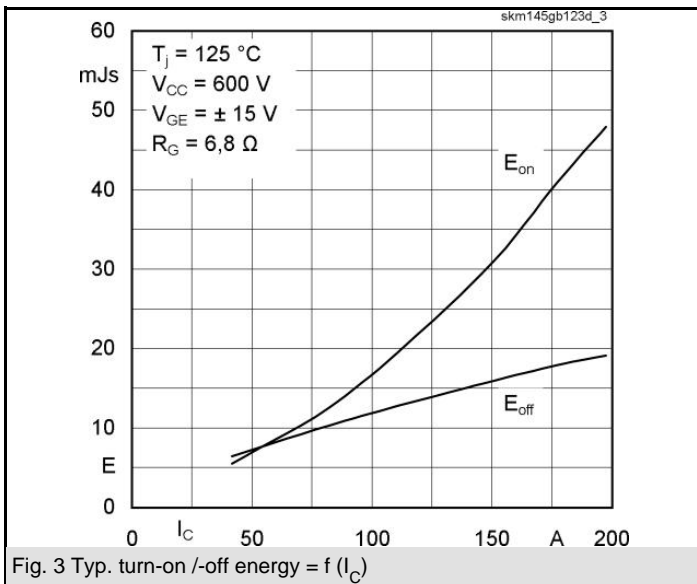
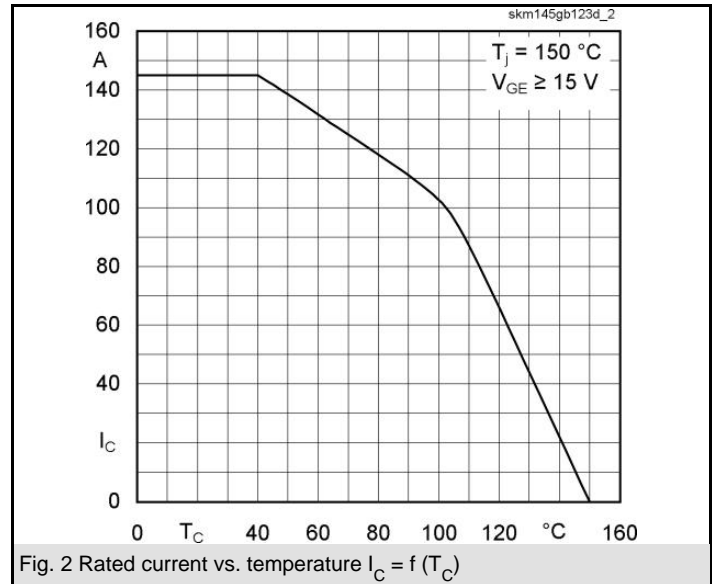
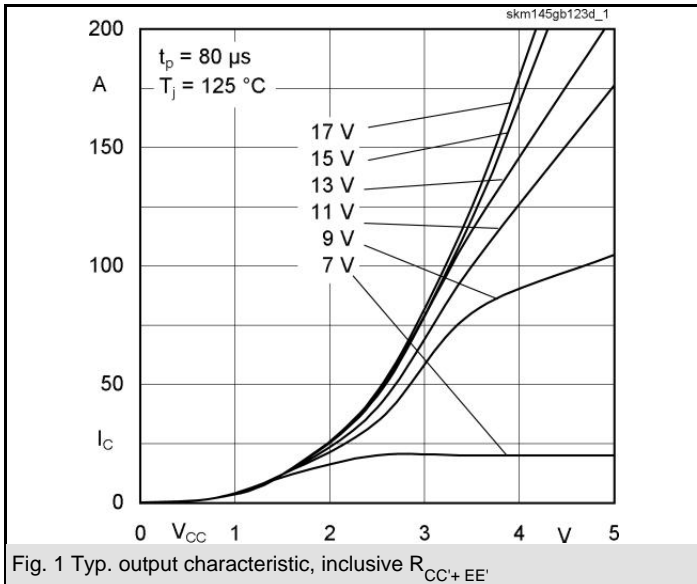
Characteristics		$T_c = 25\text{ °C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 4\text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25\text{ (125) °C}$		0,1	0,3	mA
$V_{CE(TO)}$	$T_j = 25\text{ (125) °C}$		1,4 (1,6)	1,6 (1,8)	V
r_{CE}	$V_{GE} = 15\text{ V}$, $T_j = 25\text{ (125) °C}$		11 (15)	14 (19)	mΩ
$V_{CE(sat)}$	$I_{Cnom} = 100\text{ A}$, $V_{GE} = 15\text{ V}$, 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 $T_c = 25\text{ (125) °C}$		0,75 (1)		mΩ
$t_{d(on)}$	$V_{CC} = 600\text{ V}$, $I_{Cnom} = 100\text{ A}$		160	320	ns
t_r	$R_{Gon} = R_{Goff} = 6,8\text{ Ω}$, $T_j = 125\text{ °C}$		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		$T_c = 25\text{ °C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
$V_F = V_{EC}$	$I_{Fnom} = 100\text{ A}$; $V_{GE} = 0\text{ V}$; $T_j = 25\text{ (125) °C}$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125\text{ () °C}$			1,2	V
r_T	$T_j = 125\text{ () °C}$		8	11	mΩ
I_{RRM}	$I_{Fnom} = 100\text{ A}$; $T_j = 25\text{ (125) °C}$		35 (50)		A
Q_{rr}	$di/dt = 1000\text{ A/μs}$		5 (14)		μC
E_{rr}	$V_{GE} = V$				mJ

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

Thermal characteristics		$T_c = 25\text{ °C}$, 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		$T_c = 25\text{ °C}$, 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



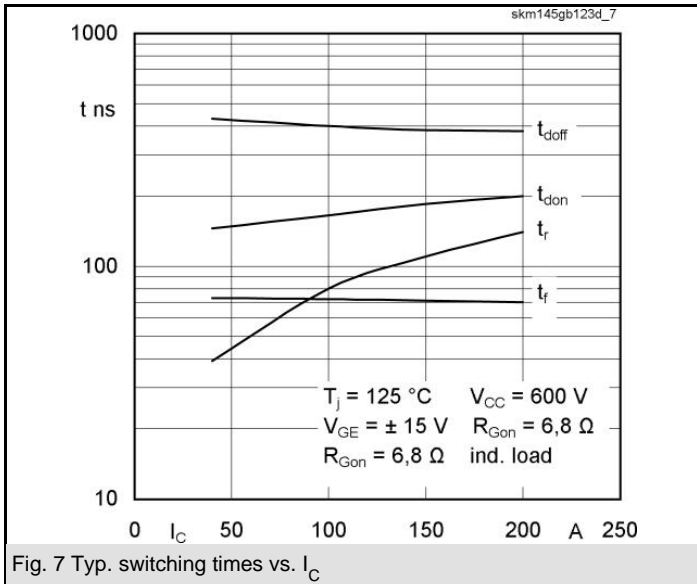


Fig. 7 Typ. switching times vs. I_C

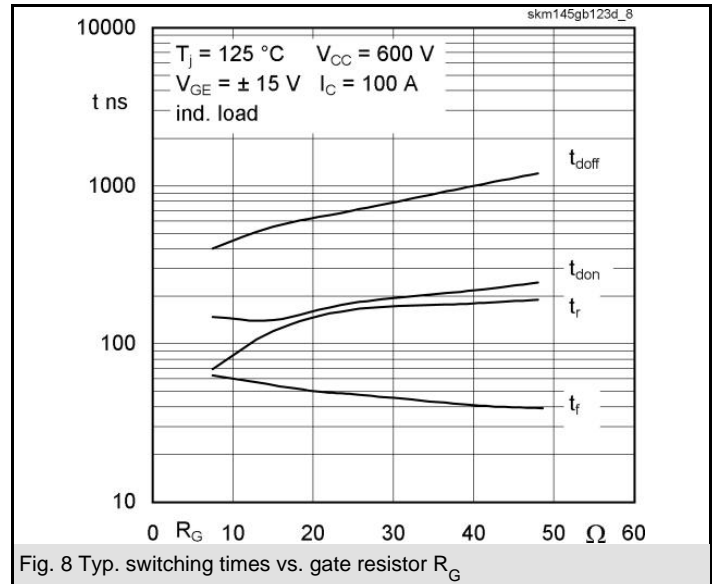


Fig. 8 Typ. switching times vs. gate resistor R_G

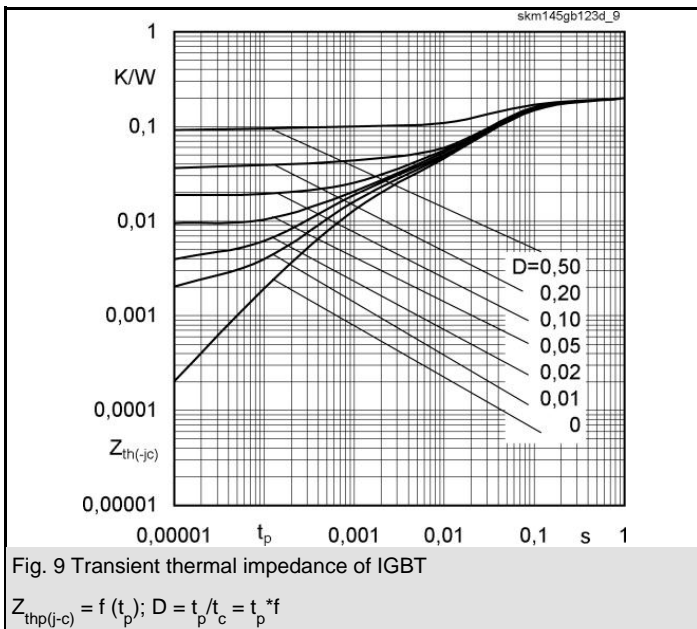


Fig. 9 Transient thermal impedance of IGBT

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

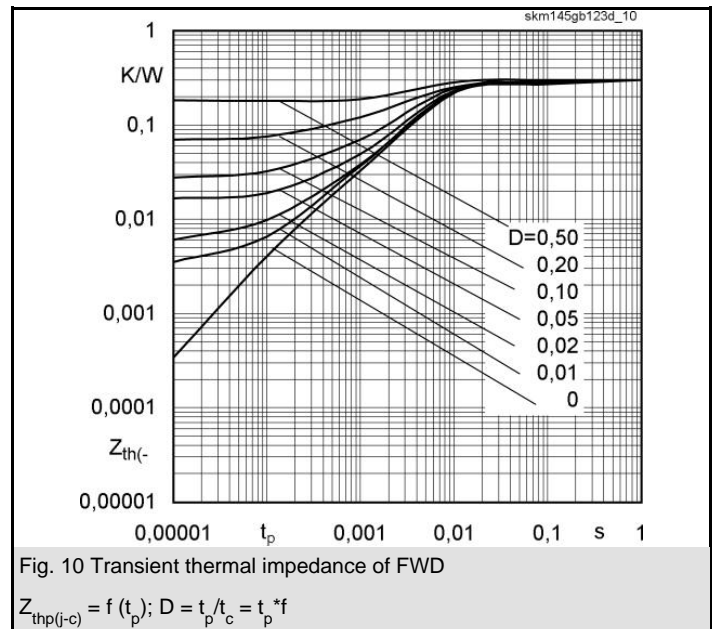


Fig. 10 Transient thermal impedance of FWD

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

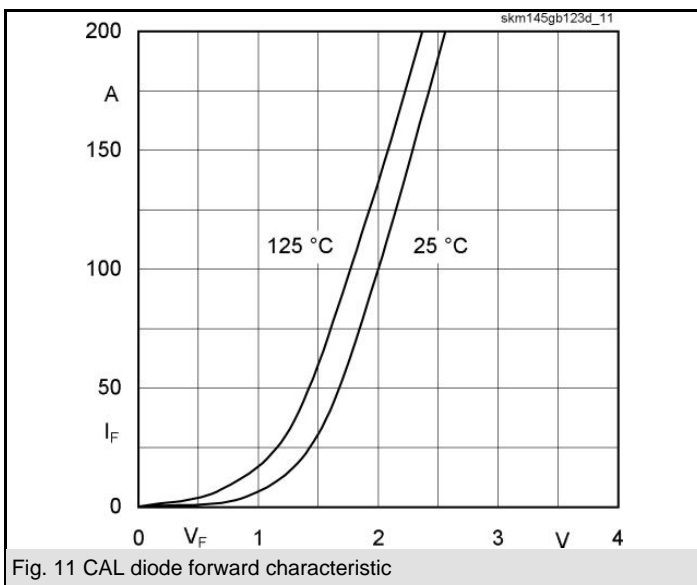


Fig. 11 CAL diode forward characteristic

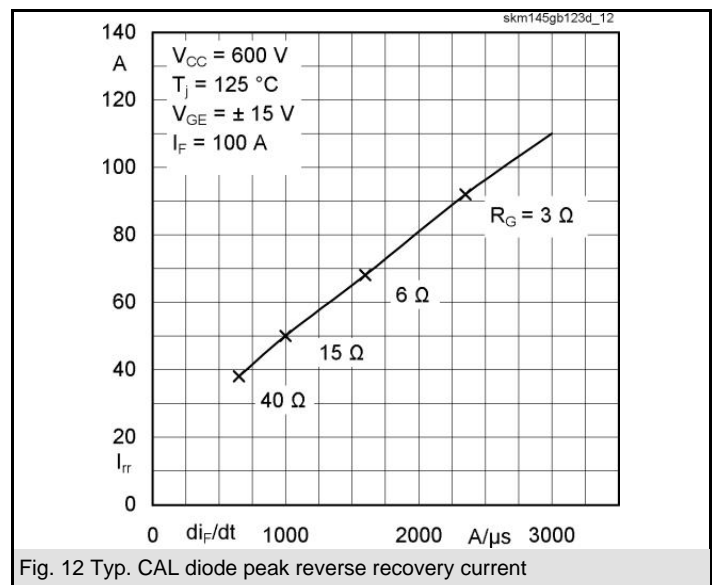
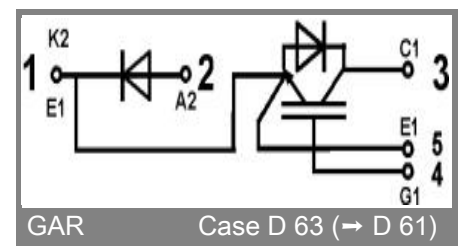
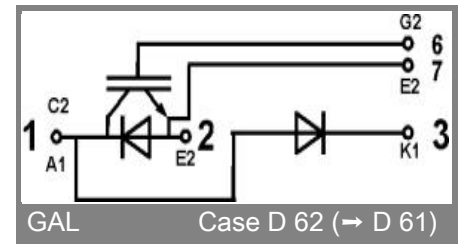
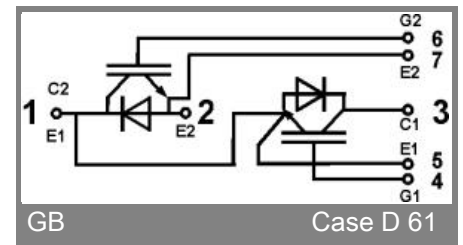
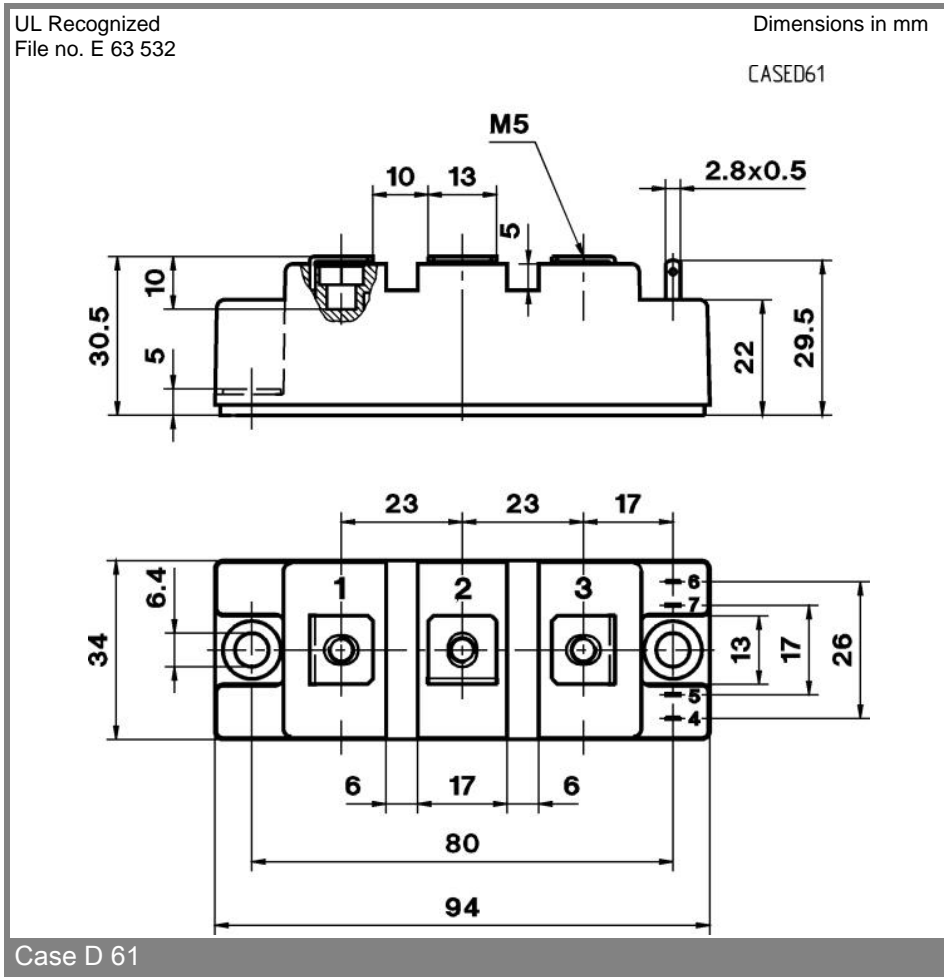
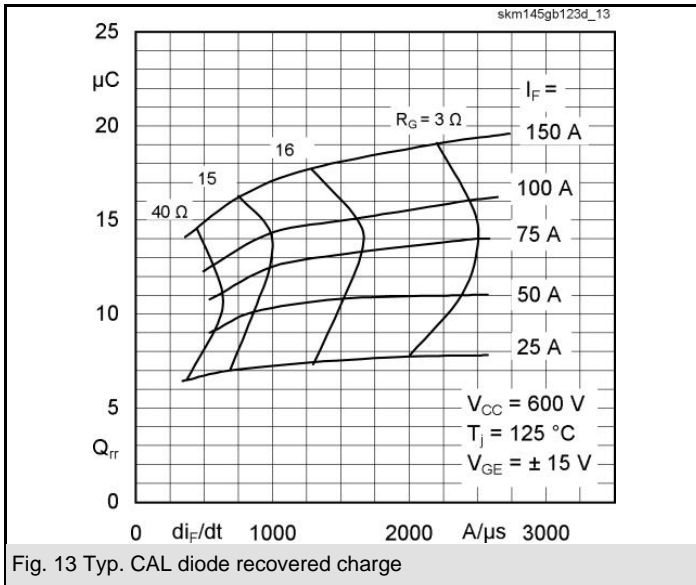


Fig. 12 Typ. CAL diode peak reverse recovery current

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

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