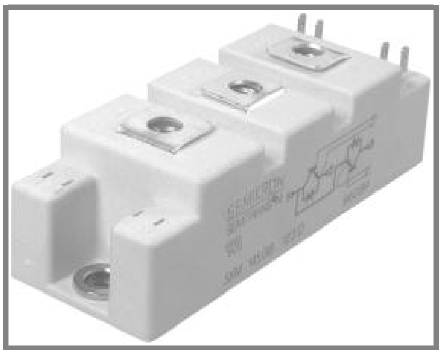
SKM 145GB066D



SEMITRANS® 2

Trench IGBT Modules

SKM 145GB066D

Features

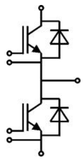
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C

Typical Applications

- AC inverter Drives
- UPS
- Electronic welders

Remarks

- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40 ... +150°C, product rel. results valid for $T_j \leq 150°C$
- SC data: $t_p \leq 6 \mu s$; VGE≤15V; T_j=150°C; $V_{cc} \leq 360V$, use of soft R_G necessary!
- Take care of over-voltage caused by stray induct.



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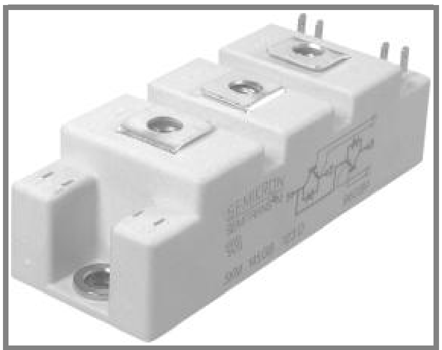
Absolute Maximum Ratings T_{case} = 25°C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		600	V
I_C	T_j = 175 °C	T_c = 25 °C	195	A
		T_c = 80 °C	150	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		300	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 360 V; $V_{GE} \leq$ 15 V; VCES < 600 V	T_j = 150 °C	6	µs
Inverse Diode				
I_F	T_j = 175 °C	T_c = 25 °C	150	A
		T_c = 80 °C	100	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		300	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 175 °C	880	A
Module				
$I_{t(RMS)}$			200	A
T_{vj}			- 40 ... + 175	°C
T_{stg}			- 40 ... + 125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics T_{case} = 25°C, unless otherwise specified

Symbol	Conditions		min.	typ.	max.	Units
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 2,4 mA		5	5,8	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,08	0,25	mA
V_{CE0}		T_j = 25 °C		0,9	1	V
		T_j = 150 °C		0,85	0,9	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		3,7	6	mΩ
		T_j = 150°C		5,7	8	mΩ
$V_{CE(sat)}$	I_{Cnom} = 150 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		1,45	1,9	V
		T_j = 150°$C_{chiplev.}$		1,7	2,1	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		9,25		nF
C_{oes}				0,6		nF
C_{res}				0,28		nF
Q_G	V_{GE} = -8V...+15V			1100		nC
R_{Gint}	T_j = °C			2		Ω
$t_{d(on)}$	R_{Gon} = 4,3 Ω	V_{CC} = 300V I_C= 150A T_j = 150 °C V_{GE} = -8/+15V		150		ns
t_r				52		ns
E_{on}				8,5		mJ
$t_{d(off)}$	R_{Goff} = 4,3 Ω			490		ns
t_f				46		ns
E_{off}				5,5		mJ
$R_{th(j-c)}$	per IGBT				0,3	K/W



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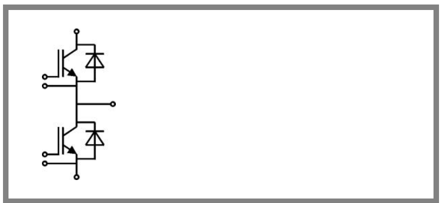

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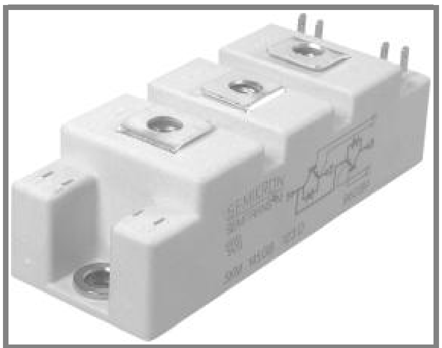
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 150 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		1,4	1,6	V
		T_j = 150 °$C_{chiplev.}$				V
V_{F0}		T_j = 25 °C		0,95	1	V
r_F		T_j = 25 °C		3	4	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C		90		A
Q_{rr}	di/dt = 2100 A/µs			20		µC
E_{rr}	V_{GE} = -8 V; V_{CC} = 300 V			3,5		mJ
$R_{th(j-c)D}$	per diode				0,5	K/W
Module						
L_{CE}					30	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,75		mΩ
		T_{case}= 125 °C		1		mΩ
$R_{th(c-s)}$	per module				0,05	K/W
M_s	to heat sink M6		3		5	Nm
M_t	to terminals M5		2,5		5	Nm
w					150	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.



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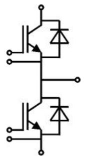

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	220	mk/W
R_i	i = 2	60	mk/W
R_i	i = 3	16,5	mk/W
R_i	i = 4	3,5	mk/W
tau_i	i = 1	0,0447	s
tau_i	i = 2	0,0223	s
tau_i	i = 3	0,0015	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	330	mk/W
R_i	i = 2	137	mk/W
R_i	i = 3	28	mk/W
R_i	i = 4	5	mk/W
tau_i	i = 1	0,05	s
tau_i	i = 2	0,0129	s
tau_i	i = 3	0,002	s
tau_i	i = 4	0,0002	s

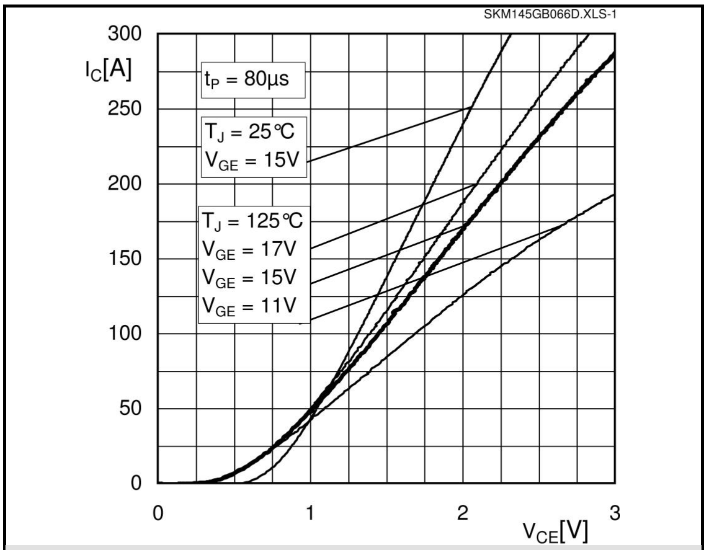

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

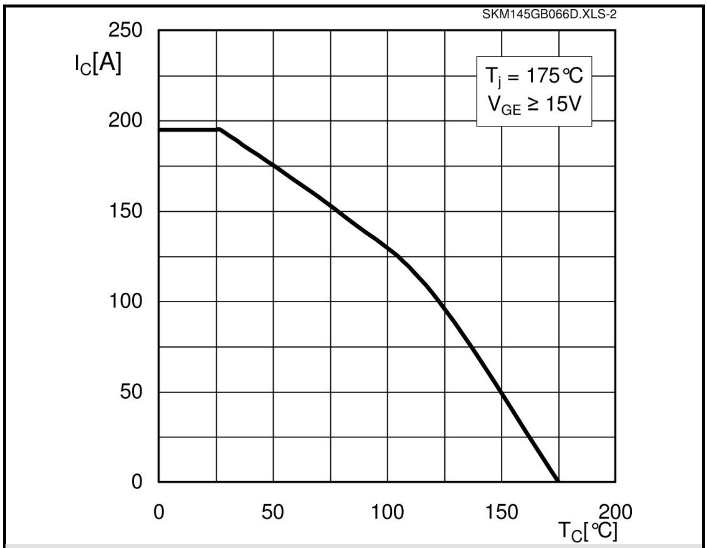

Fig. 2 Rated current vs. temperature $I_C = f (T_C)$

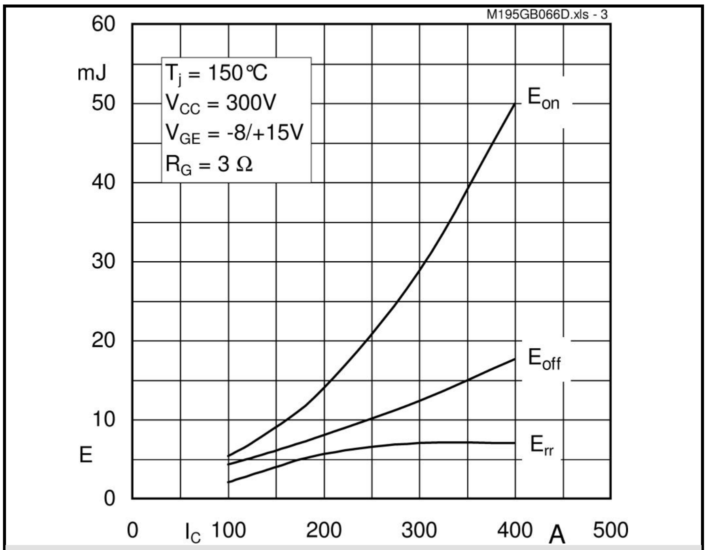

Fig. 3 Typ. turn-on /-off energy = f (I_C)

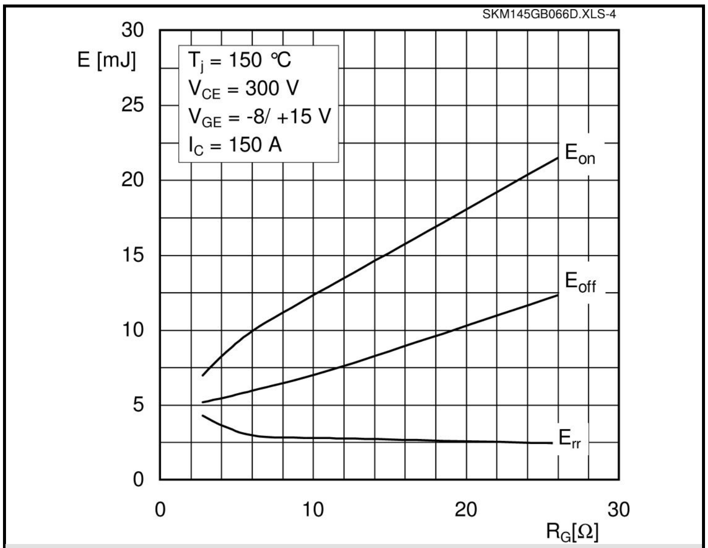

Fig. 4 Typ. turn-on /-off energy = f (R_G)

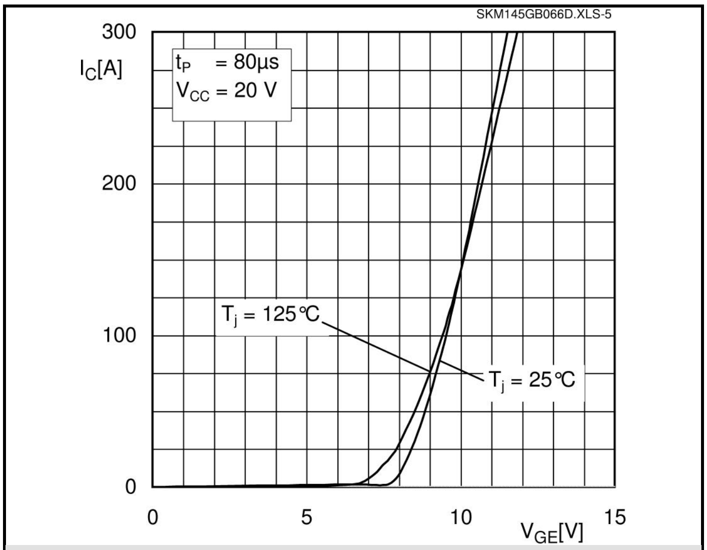

Fig. 5 Typ. transfer characteristic

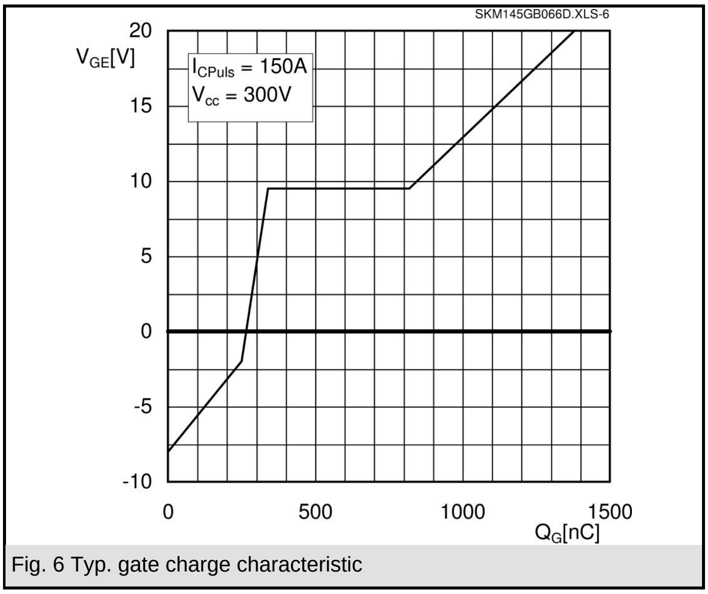

Fig. 6 Typ. gate charge characteristic

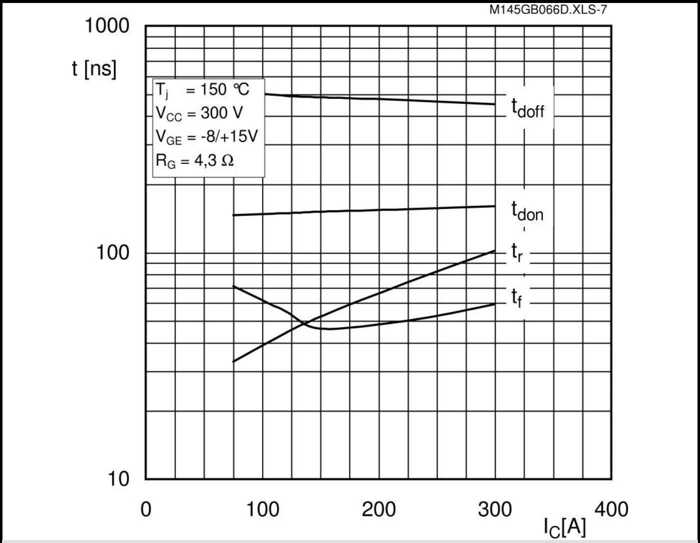

Fig. 7 Typ. switching times vs. I_C

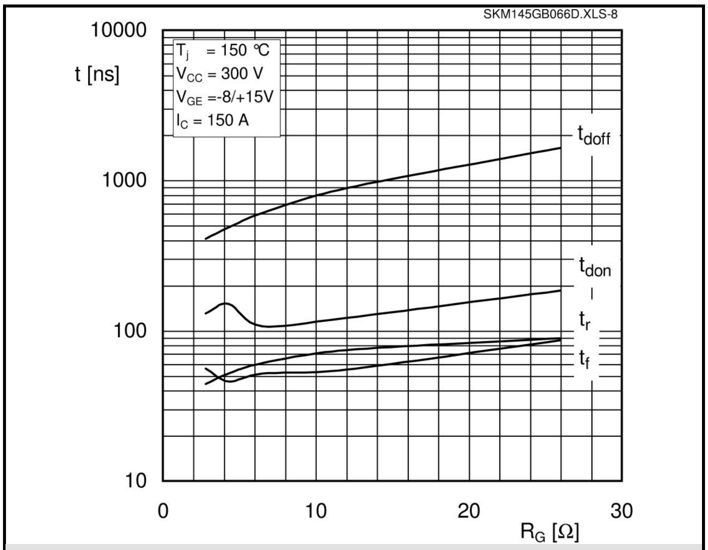

Fig. 8 Typ. switching times vs. gate resistor R_G

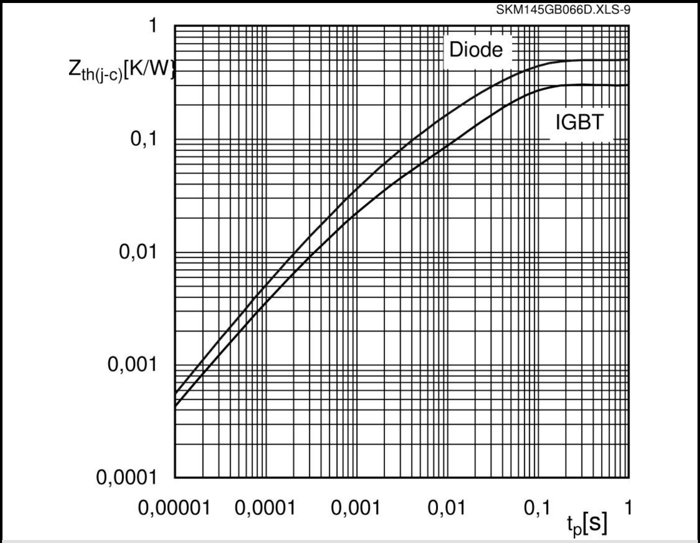

Fig. 9 Transient thermal impedance of IGBT and Diode

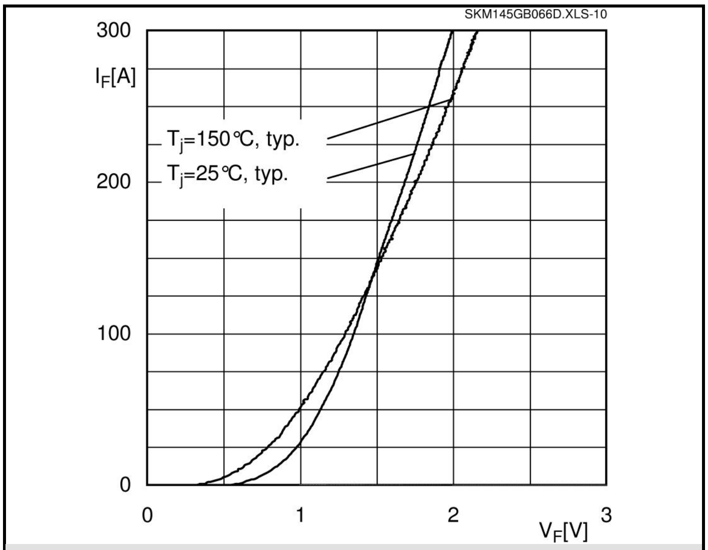

Fig. 10 CAL diode forward characteristic

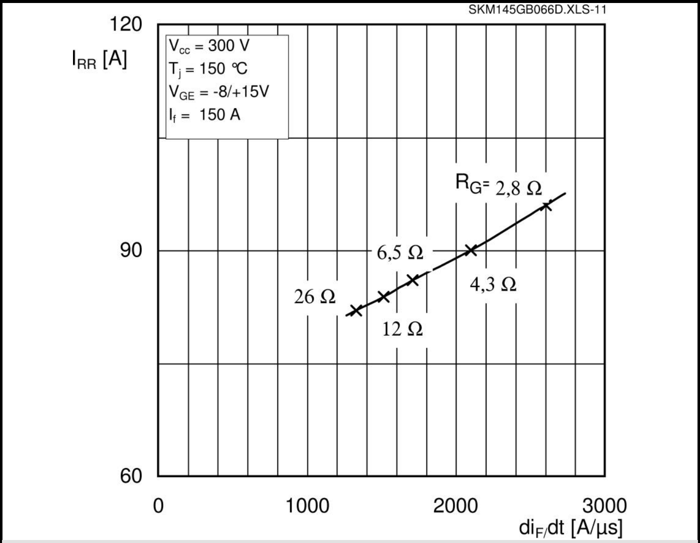

Fig. 11Typ. CAL diode peak reverse recovery current

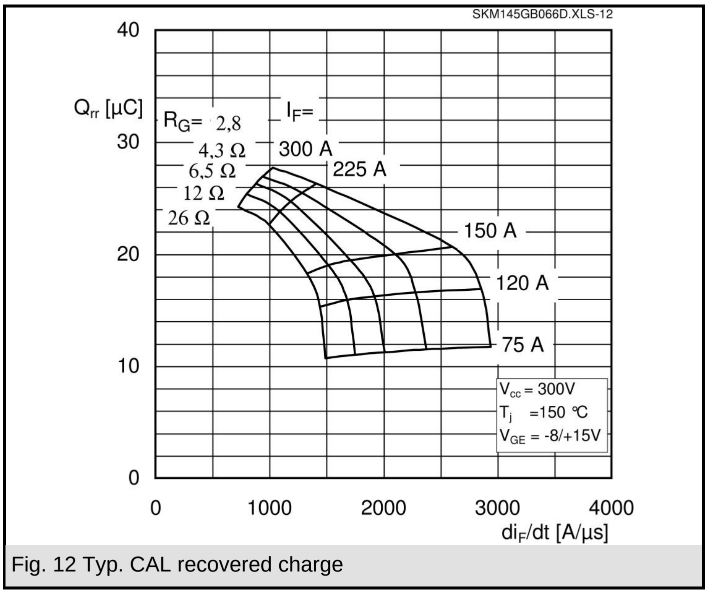

Fig. 12 Typ. CAL recovered charge

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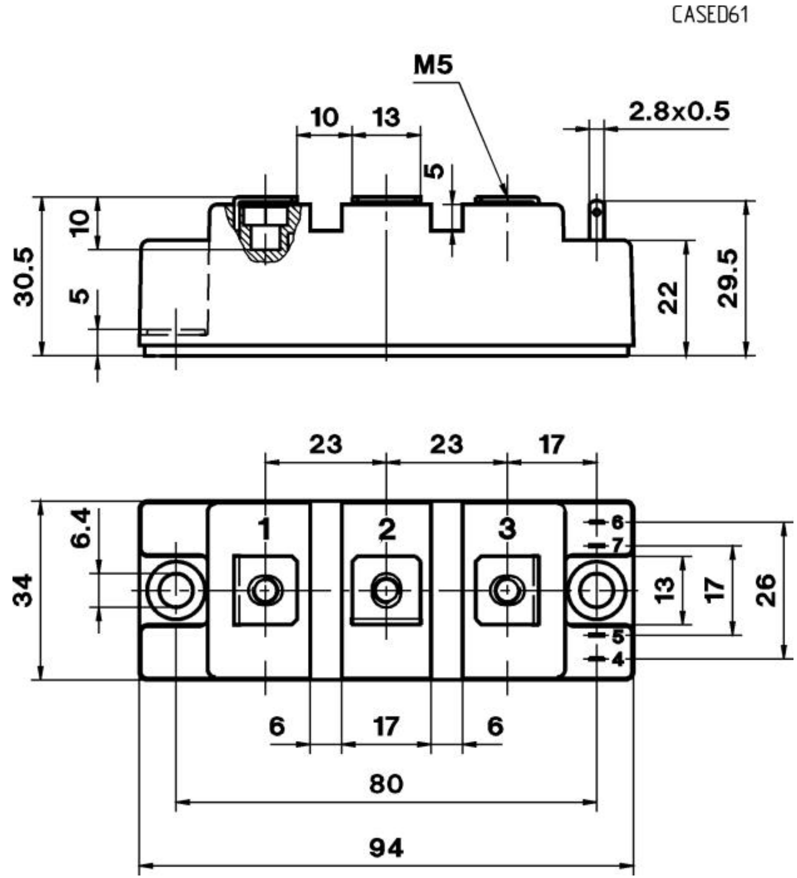
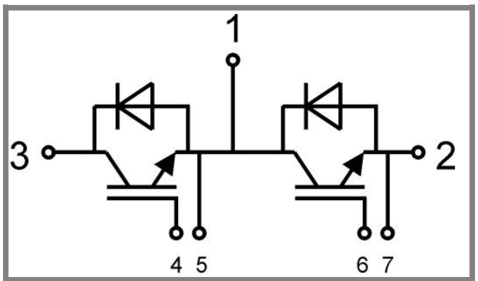


Case D 61



GB Case D61