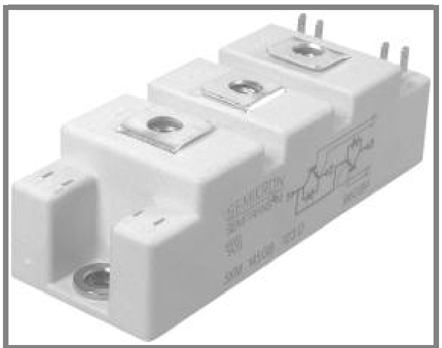
SKM 100GB176D



SEMITRANS® 2

Trench IGBT Modules

SKM 100GB176D

Preliminary Data

Features

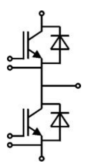
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C

Typical Applications

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

Absolute Maximum Ratings		T_{case} = 25°C, unless otherwise specified		
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 150 °C	T_c = 25 °C	125	A
		T_c = 80 °C	90	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		150	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 1200 V; $V_{GE} \leq$ 20 V; V_{CES} < 1700 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_c = 25 °C	100	A
		T_c = 80 °C	70	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		150	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	720	A
Module				
$I_{t(RMS)}$			200	A
T_{vj}			- 40 ... +150	°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 = 3 mA		5,2	5,8	6,4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,1	0,3	mA
V_{CE0}		T_j = 25 °C		1	1,2	V
		T_j = 125 °C		0,9	1,1	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		13	16,7	mΩ
		T_j = 125°C		20	24	mΩ
$V_{CE(sat)}$	I_{Cnom} = 75 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		2	2,45	V
		T_j = 125°$C_{chiplev.}$		2,4	2,9	V
C_{ies}				5,7		nF
C_{oes}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		0,28		nF
C_{res}				0,22		nF
Q_G	V_{GE}=-8V/+15V			620		nC
R_{Gint}	T_j = 25 °C			8,5		Ω
$t_{d(on)}$				280		ns
t_r	R_{Gon} = 4,2 Ω	V_{CC} = 1200V		40		ns
E_{on}	di/dt = 1680 A/µs	I_{Cnom}= 75A		44		mJ
$t_{d(off)}$	R_{Goff} = 4,2 Ω	T_j = 125 °C		680		ns
t_f	di/dt = 490 A/µs	V_{GE}=-15V		140		ns
E_{off}		L_s = 20 nH		28,5		mJ
$R_{th(j-c)}$	per IGBT				0,24	K/W



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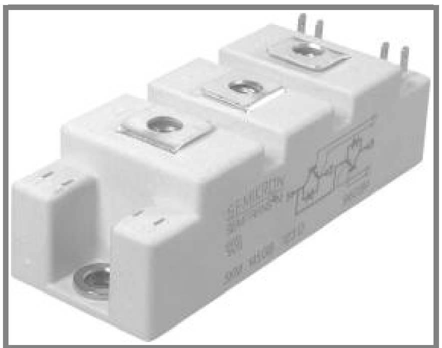

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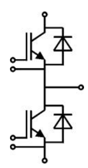

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 75 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		1,6	1,9	V
		T_j = 125 °$C_{chiplev.}$		1,6	1,9	V
V_{F0}		T_j = 25 °C		1,1	1,3	V
		T_j = 125 °C		0,9	1,1	V
r_F		T_j = 25 °C		6,7	8	mΩ
		T_j = 125 °C		9,3	11	mΩ
I_{RRM}	I_{Fnom} = 75 A	T_j = 125 °C		78,5		A
Q_{rr}	di/dt = 1650 A/µs	L_S = 20 nH		29,6		µC
E_{rr}	V_{GE} = -15V ; V_{CC} = 1200 V			21,4		mJ
$R_{th(j-c)D}$	per diode				0,45	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					160	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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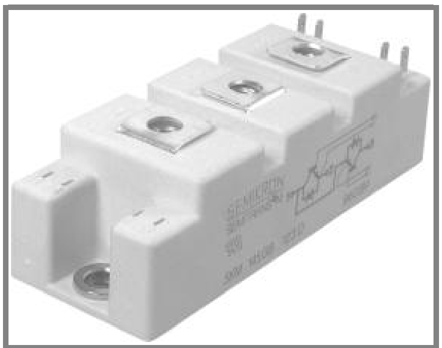

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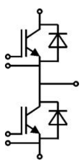

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	160	mk/W
R_i	i = 2	60	mk/W
R_i	i = 3	16,5	mk/W
R_i	i = 4	3,5	mk/W
tau_i	i = 1	0,1056	s
tau_i	i = 2	0,009	s
tau_i	i = 3	0,0011	s
tau_i	i = 4	0,0005	s
$Z_{th(j-c)D}$			
R_i	i = 1	270	mk/W
R_i	i = 2	139	mk/W
R_i	i = 3	37	mk/W
R_i	i = 4	4	mk/W
tau_i	i = 1	0,0475	s
tau_i	i = 2	0,0104	s
tau_i	i = 3	0,0011	s
tau_i	i = 4	0,0003	s

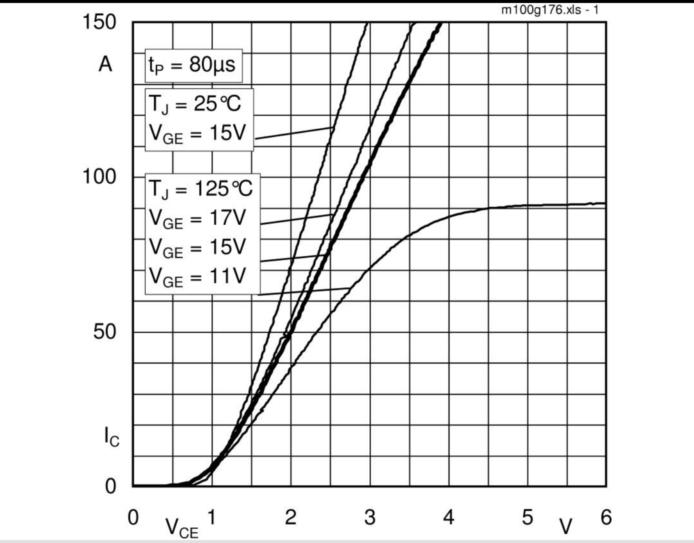

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

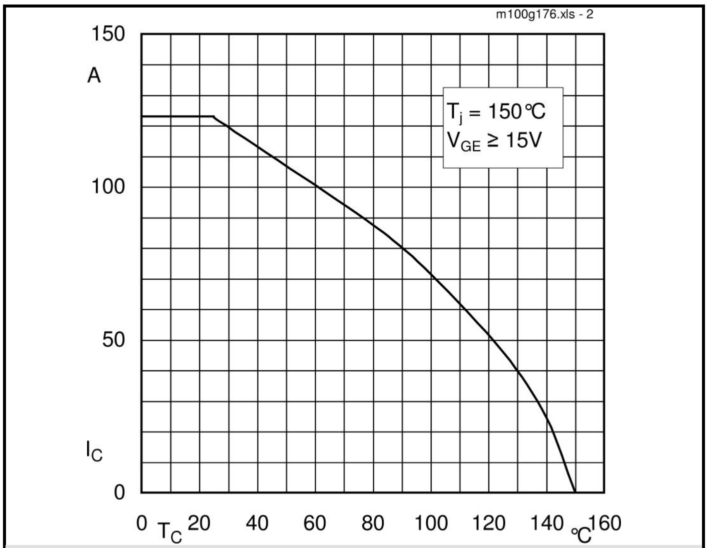

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

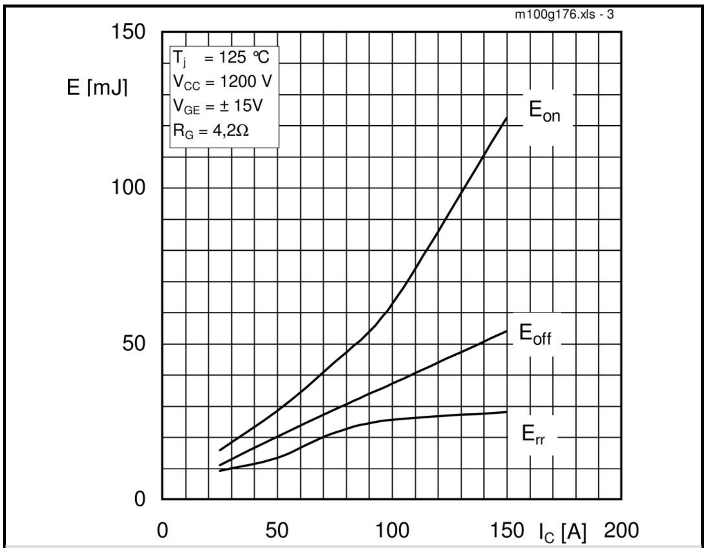

Fig. 3 Typ. turn-on /-off energy = f (I_C)

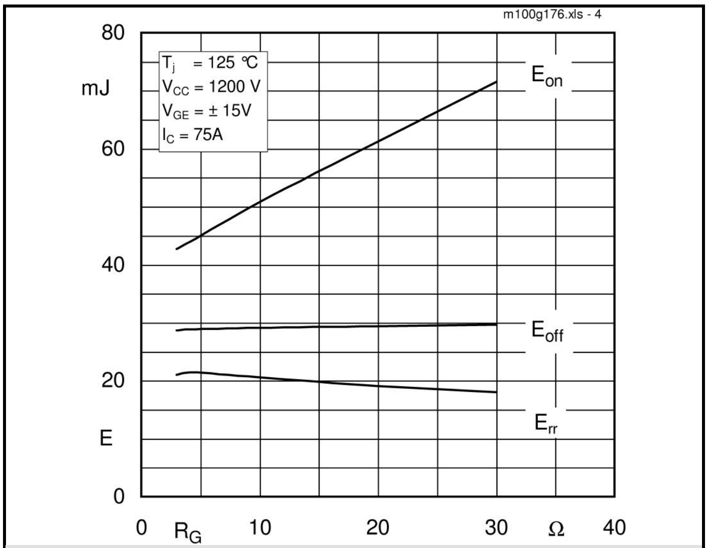

Fig. 4 Typ. turn-on /-off energy = f (R_G)

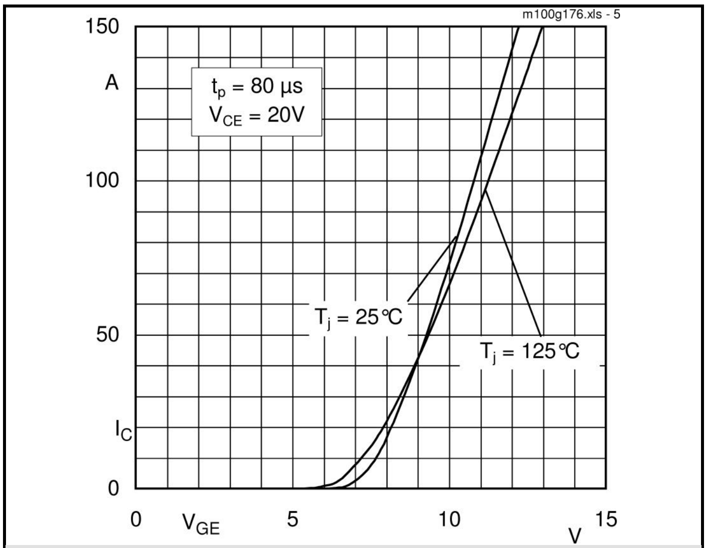

Fig. 5 Typ. transfer characteristic

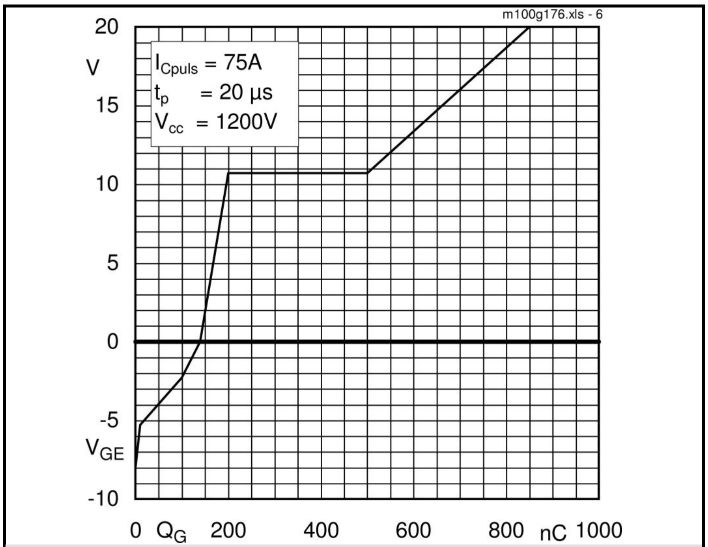

Fig. 6 Typ. gate charge characteristic

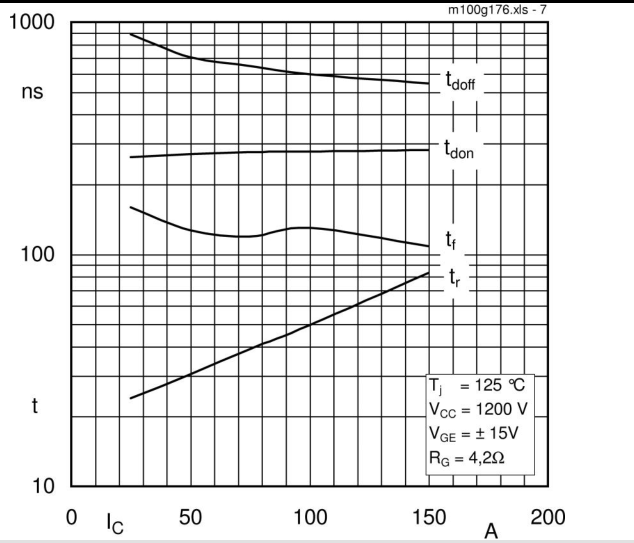

Fig. 7 Typ. switching times vs. I_C

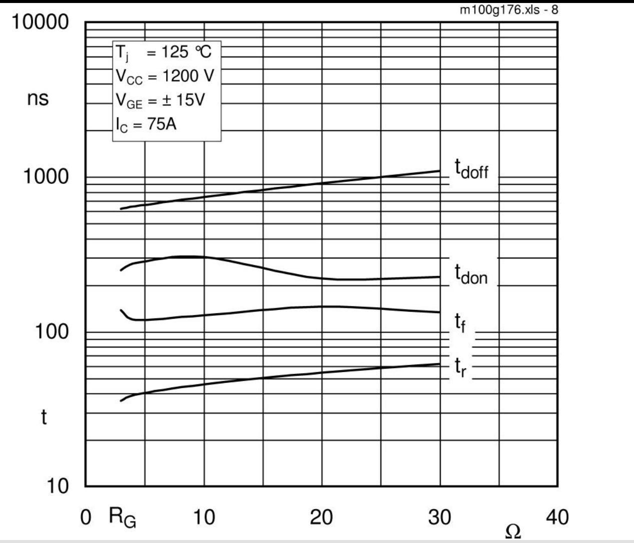

Fig. 8 Typ. switching times vs. gate resistor R_G

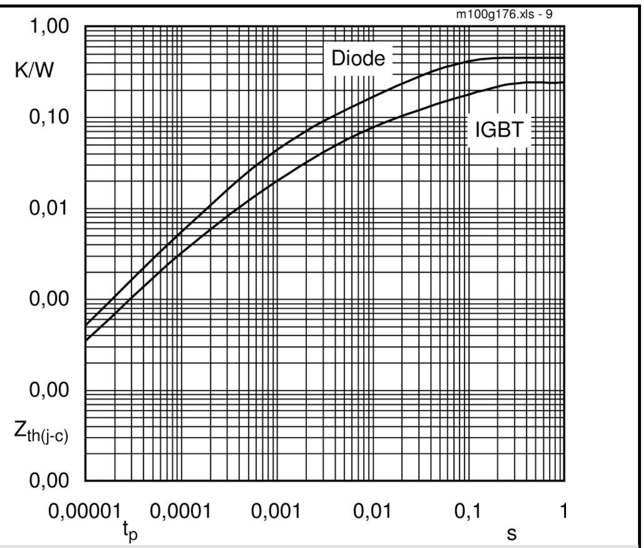

Fig. 9 Transient thermal impedance

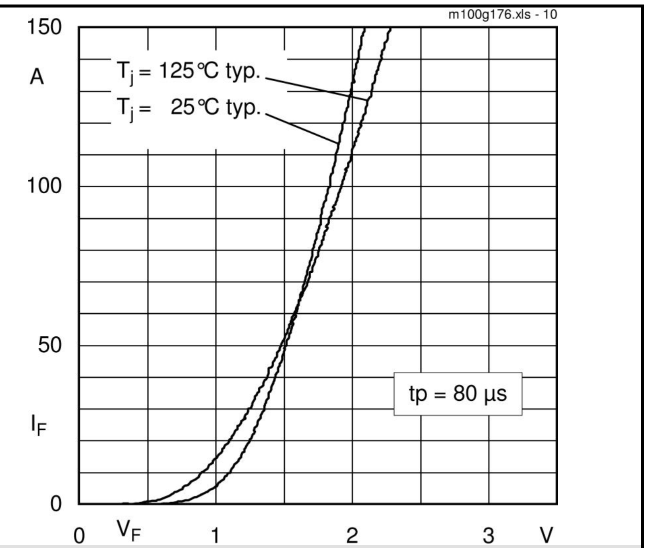

Fig. 10 CAL diode forward characteristic

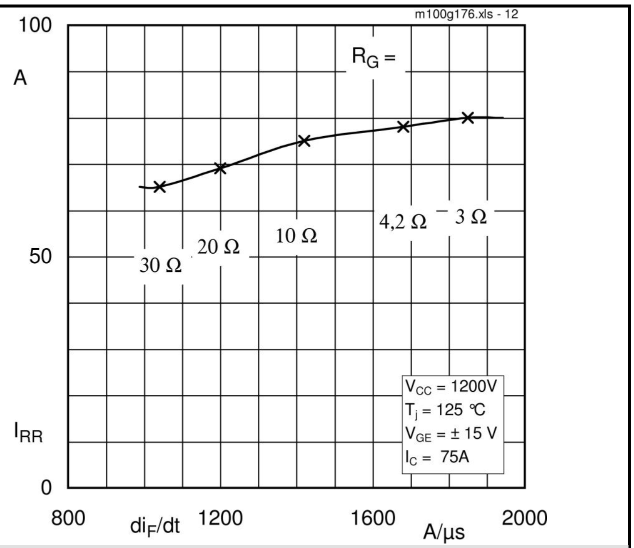

Fig. 11 Typ. CAL diode peak reverse recovery current

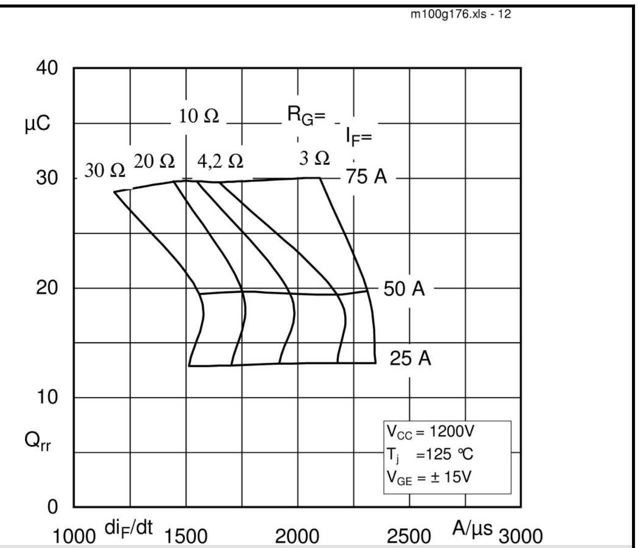

Fig. 12 Typ. CAL diode recovered charge

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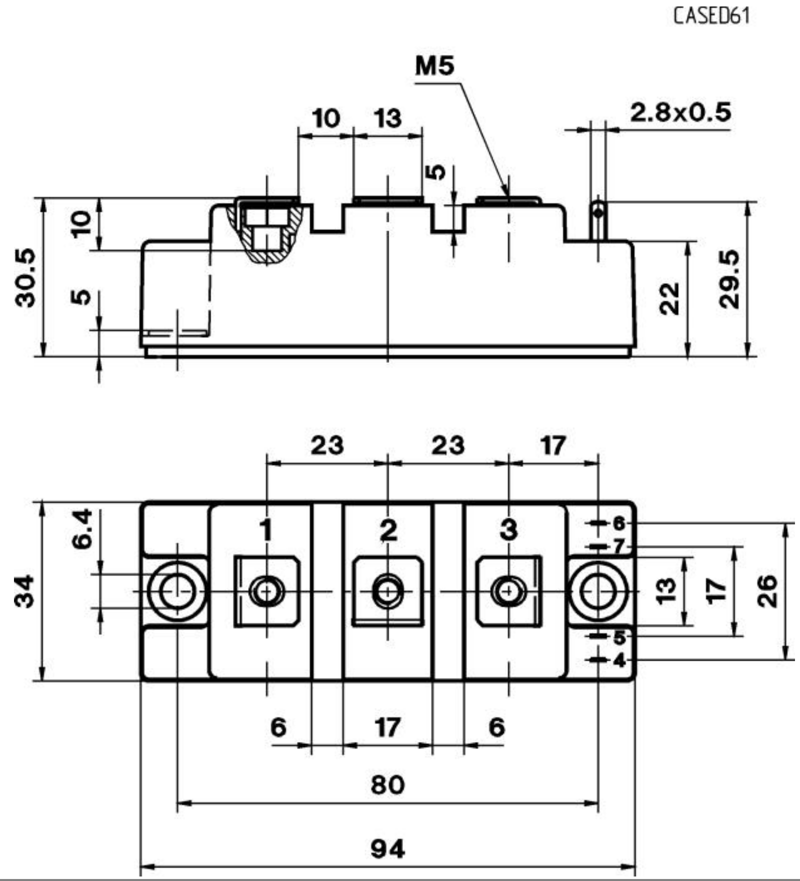
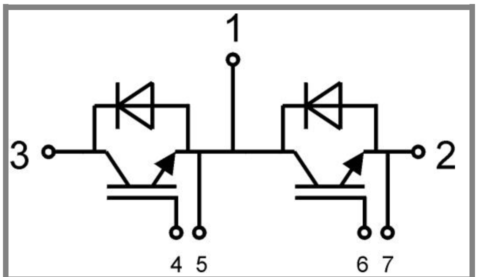


Case D 61



GB Case D 61