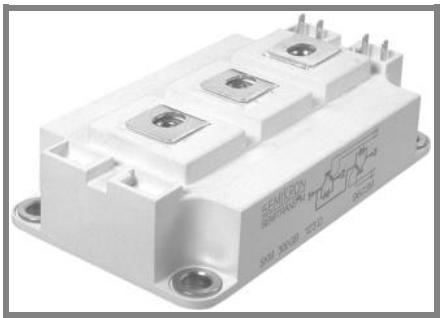
SKM 200GB176D...



SEMITRANS® 3

Trench IGBT Modules

SKM 200GB176D

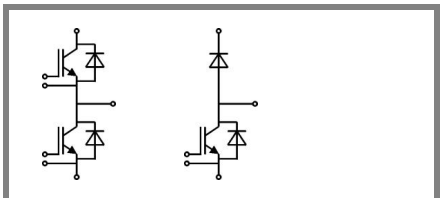
SKM 200GAL176D

Features

- Homogeneous Si
- Trench = Trenchgate technology
- V_{CEsat} 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.)



GB **GAL**

Absolute Maximum Ratings			T_c = 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	260	A
		T_c = 80 °C	180	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		300	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	210	A
		T_c = 80 °C	140	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		300	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	1100	A
Freewheeling Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	210	A
		T_{case} = 80 °C	140	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		300	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	1100	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			- 40 ... + 150	°C
T_{stg}			-40...+125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics			T_c = 25 °C, unless otherwise specified			
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 6 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		6,7	8,3	mΩ
		T_j = 125°C		10	12	mΩ
$V_{CE(sat)}$	I_{Cnom} = 150 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}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		11,4		nF
C_{oes}				0,55		nF
C_{res}				0,44		nF
Q_G	V_{GE} = -8V...+15V			1200		nC
R_{Gint}	T_j = 25 °C			4,25		Ω
$t_{d(on)}$	R_{Gon} = 5 Ω	V_{CC} = 1200V		360		ns
t_r		I_C= 150A		45		ns
E_{on}		T_j = 125 °C		93		mJ
$t_{d(off)}$	R_{Goff} = 5 Ω	V_{GE} = ± 15V		760		ns
t_f				140		ns
E_{off}				58		mJ
$R_{th(j-c)}$	per IGBT				0,12	K/W

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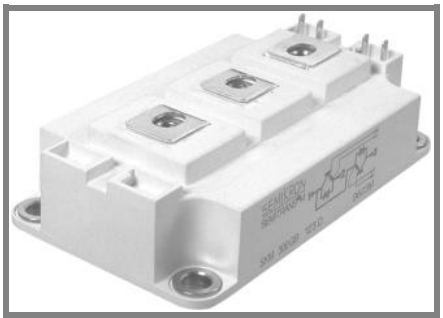

SEMITRANS® 3

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SKM 200GB176D

SKM 200GAL176D

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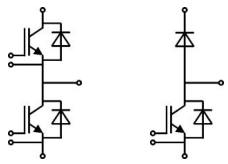
- Public transport (auxiliary syst.)



GB **GAL**

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$_{chiplev.}$		1,7	1,9	V
		T_j = 125 °C$_{chiplev.}$		1,7	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		4	4	mΩ
		T_j = 125 °C		5,3	5,3	mΩ
I_{RRM}	I_F = 150 A	T_j = 125 °C		195		A
Q_{rr}	di/dt = 3700 A/µs			52		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 1200 V			31		mJ
$R_{th(j-c)D}$	per diode				0,25	K/W
FWD						
$V_F = V_{EC}$	I_{Fnom} = 150 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		1,7	1,9	V
		T_j = 125 °C$_{chiplev.}$		1,7	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		4	4	V
		T_j = 125 °C		5,3	5,3	V
I_{RRM}	I_F = 150 A	T_j = 125 °C		195		A
Q_{rr}	di/dt = 3700 A/µs			52		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 1200 V			31		mJ
$R_{th(j-c)FD}$	per diode				0,25	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,35		mΩ
		T_{case}= 125 °C		0,5		mΩ
$R_{th(c-s)}$	per module				0,038	K/W
M_s	to heat sink M6		3		5	Nm
M_t	to terminals M6		2,5		5	Nm
w					325	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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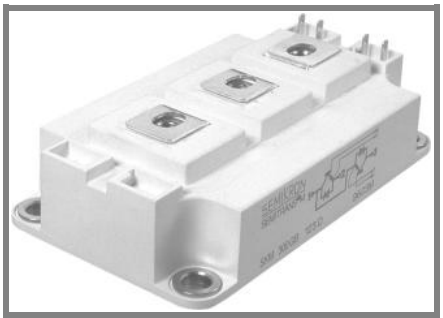

SEMITRANS® 3

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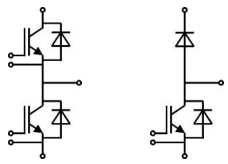

GB **GAL**

Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	80	mk/W
R_i	i = 2	30	mk/W
R_i	i = 3	8,2	mk/W
R_i	i = 4	1,8	mk/W
tau_i	i = 1	0,0753	s
tau_i	i = 2	0,01	s
tau_i	i = 3	0,0008	s
tau_i	i = 4	0,0003	s
$Z_{th(j-c)D}$			
R_i	i = 1	160	mk/W
R_i	i = 2	67	mk/W
R_i	i = 3	20	mk/W
R_i	i = 4	3	mk/W
tau_i	i = 1	0,0382	s
tau_i	i = 2	0,009	s
tau_i	i = 3	0,0009	s
tau_i	i = 4	0,005	s

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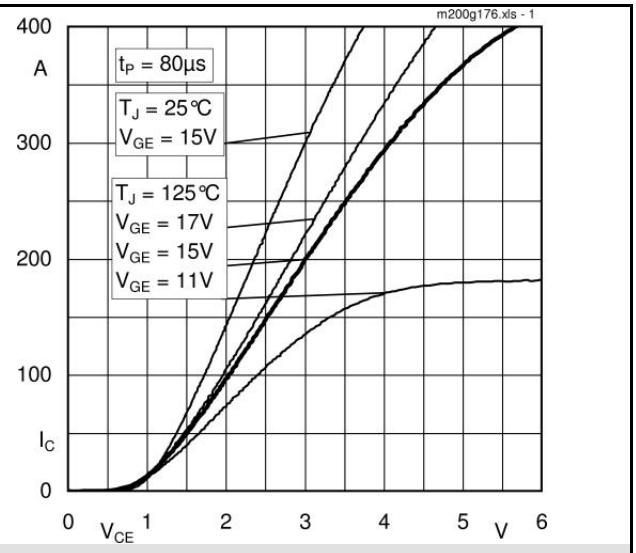

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

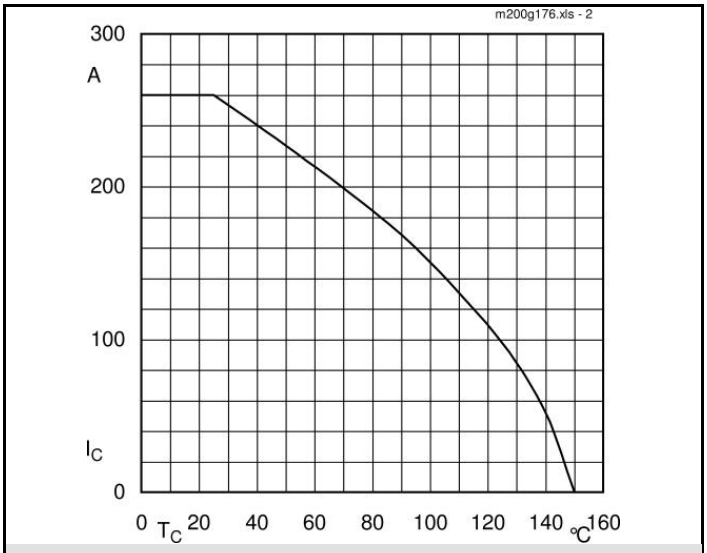

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

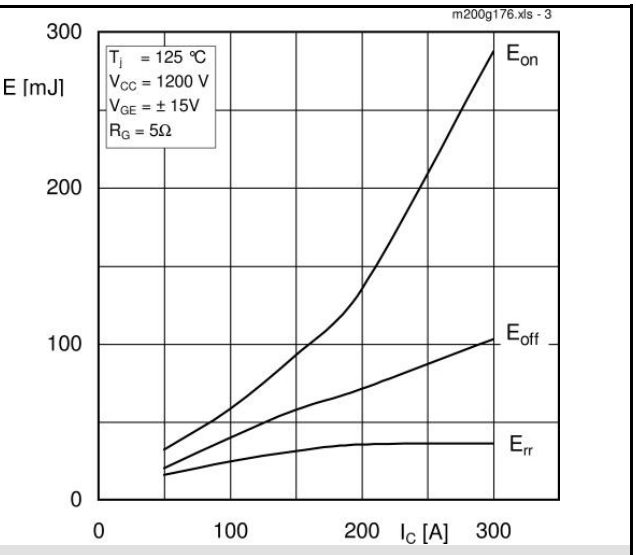

Fig. 3 Typ. turn-on /-off energy = f (I_C)

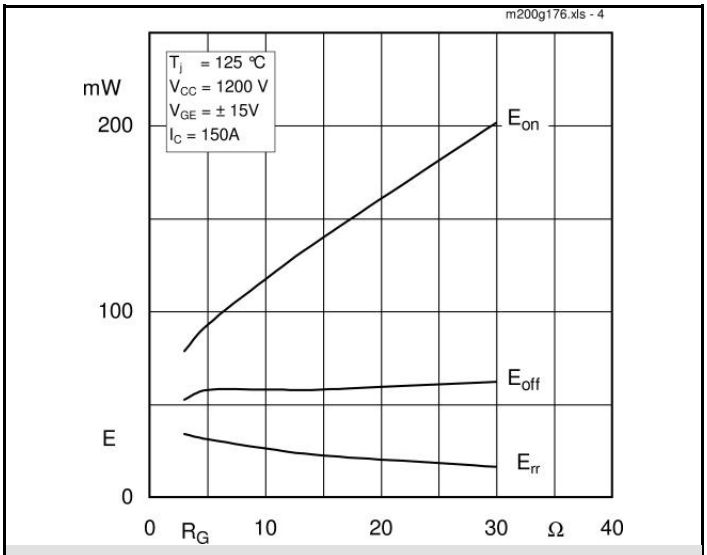

Fig. 4 Typ. turn-on /-off energy = f (R_G)

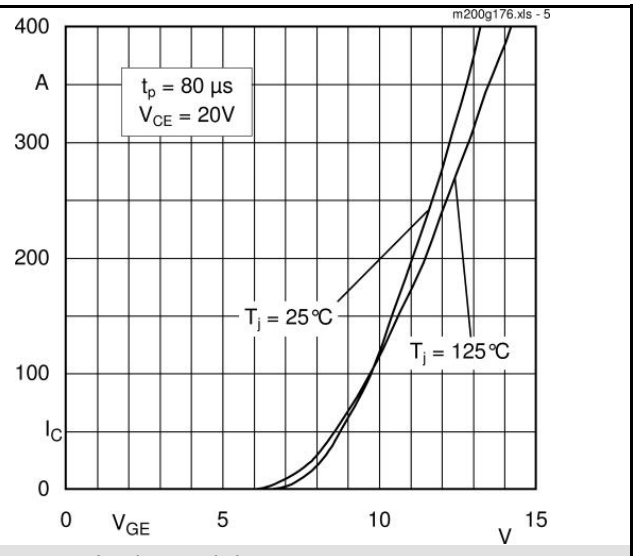

Fig. 5 Typ. transfer characteristic

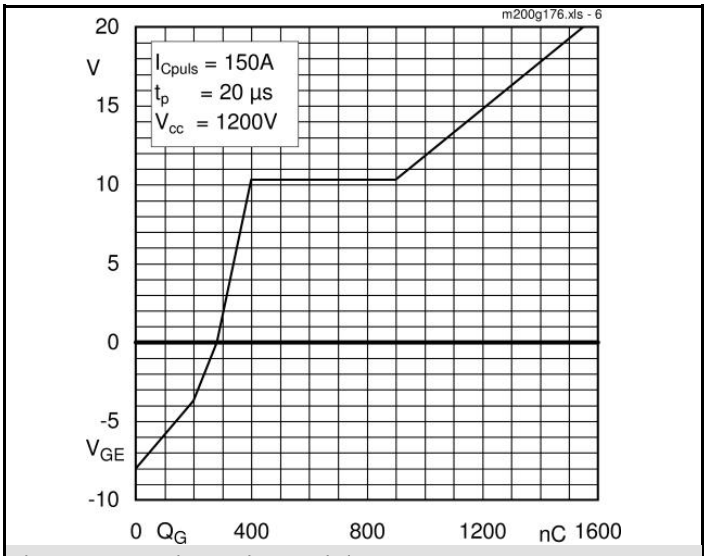

Fig. 6 Typ. gate charge characteristic

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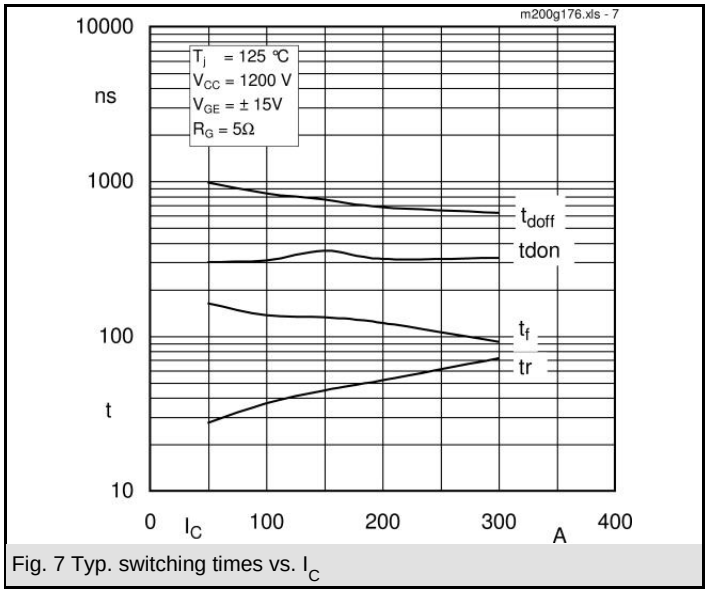

Fig. 7 Typ. switching times vs. I_C

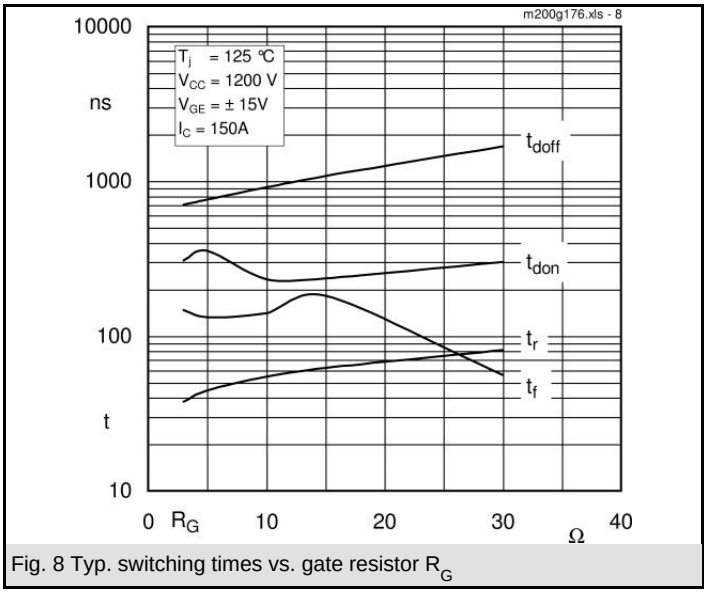

Fig. 8 Typ. switching times vs. gate resistor R_G

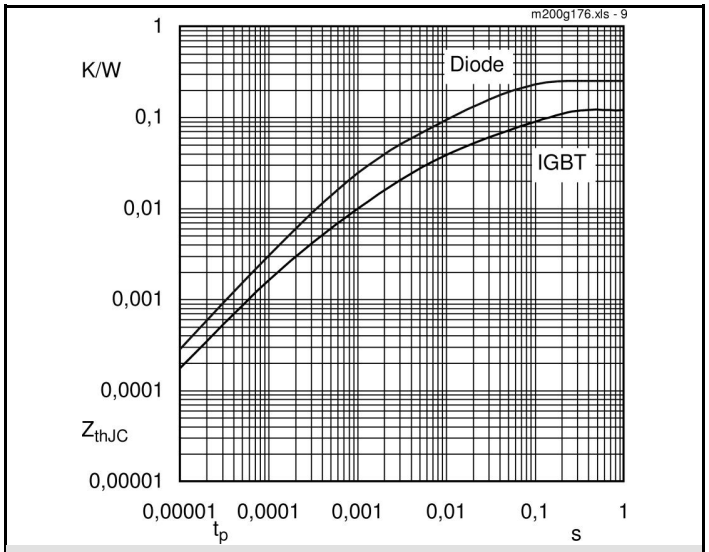

Fig. 9 Transient thermal impedance

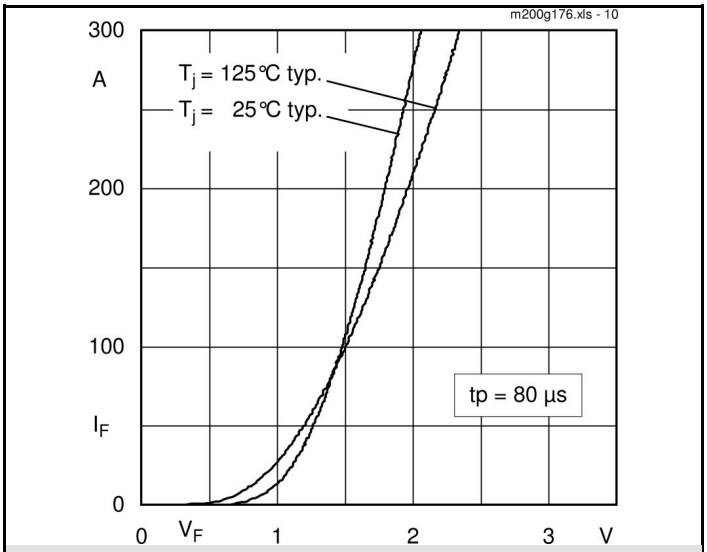

Fig. 10 Typ. CAL diode forward characteristic

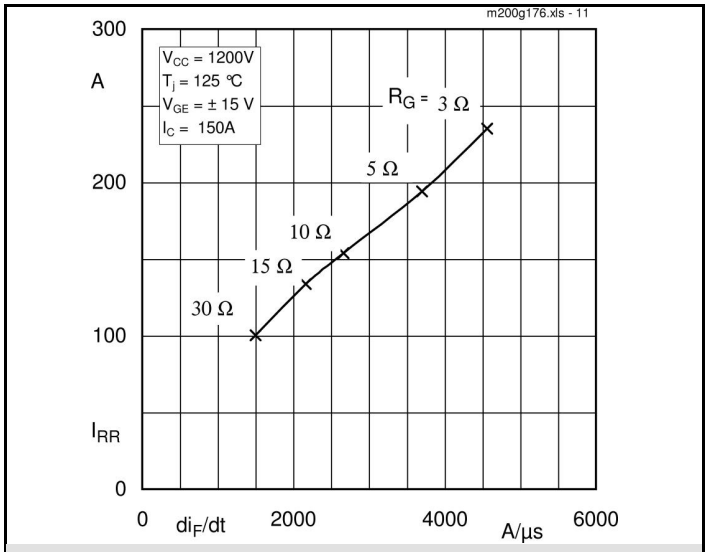

Fig. 11 Typ. CAL diode peak reverse recovery current

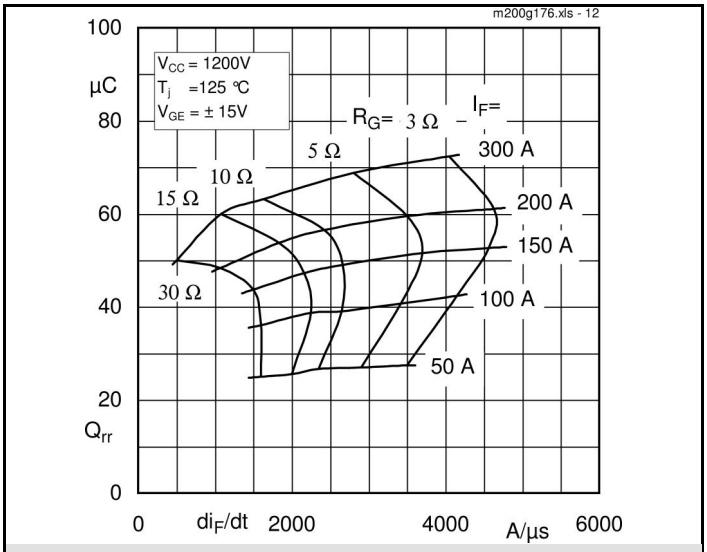

Fig. 12 Typ. CAL diode reverse recovery charge

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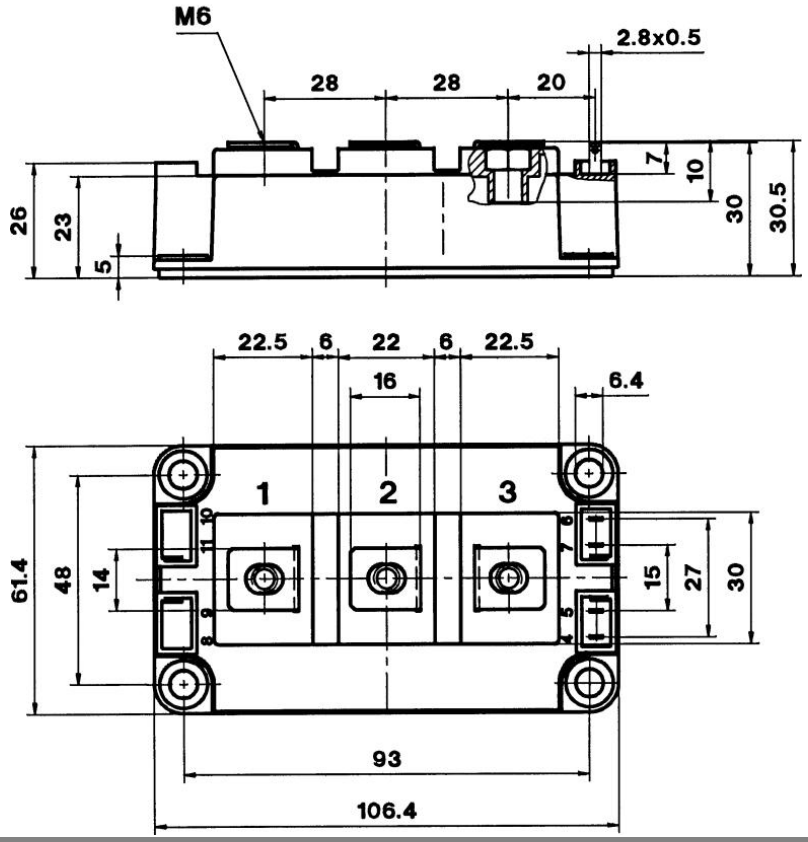
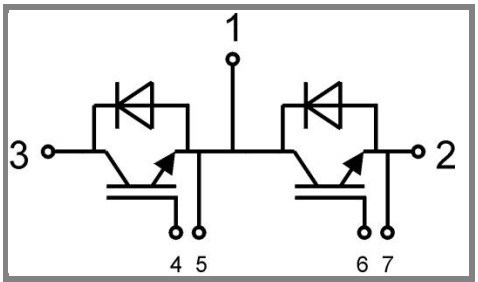


Case D 56



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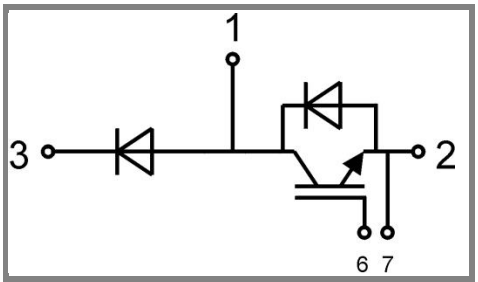

GAL Case D 57

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