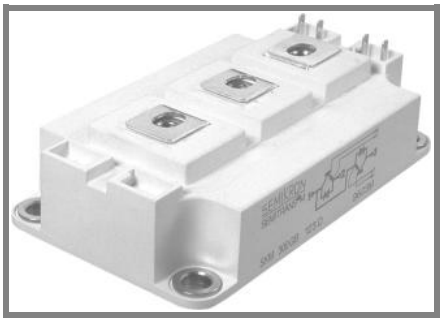
SKM 300GB125D



SEMITRANS® 3

Ultra Fast IGBT Module

SKM 300GB125D

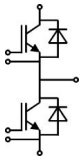
Preliminary Data

Features

- NPT - Non punch-through IGBT
- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (10 mm) and creepage distances (20 mm)

Typical Applications

- Switched mode power supplies at f_{sw} > 20 kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- UPS Uninterruptable power supplies at f_{sw} > 20 kHz
- Electronic welders at f_{sw} > 20 kHz



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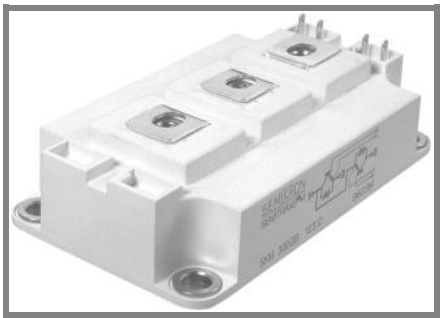
Absolute Maximum Ratings	T_c = 25 °C, unless otherwise specified			
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	300	A
		T_{case} = 80 °C	210	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		400	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; V_{CES} < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	260	A
		T_{case} = 80 °C	180	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		400	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	1800	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 = 8 mA		4,5	5,5	6,5	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		1,5	1,75	V
		T_j = 125 °C		1,7		V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		9	10,5	mΩ
		T_j = 125°C		11,5		mΩ
$V_{CE(sat)}$	I_{Cnom} = 200 A, V_{GE} = 15 V	T_j = °$C_{chiplev.}$		3,3	3,85	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		18	24	nF
C_{oes}				2,5	3,2	nF
C_{res}				1	1,3	nF
Q_G	V_{GE} = 0V - +20V			2000		nC
R_{Gint}	T_j = °C			2,5		Ω
$t_{d(on)}$	R_{Gon} = 3 Ω	V_{CC} = 600V		130		ns
t_r				40		ns
E_{on}		I_{Cnom}= 200A		16		mJ
$t_{d(off)}$	R_{Goff} = 3 Ω	T_j = 125 °C		460		ns
t_f		V_{GE} = ± 15V		30		ns
E_{off}						mJ
$R_{th(j-c)}$	per IGBT				0,075	K/W

SKM 300GB125D



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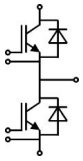

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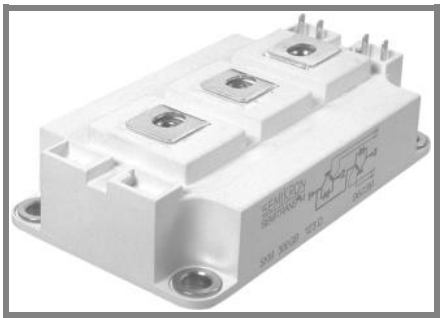
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 200 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
		T_j = 125 °C				V
r_F		T_j = 25 °C		4,5	6,5	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_{Fnom} = 200 A	T_j = 125 °C		340		A
Q_{rr}	di/dt = 8000 A/µs			46		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
$R_{th(j-c)D}$	per diode				0,18	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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SKM 300GB125D

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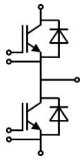

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	53	mk/W
R_i	i = 2	18,5	mk/W
R_i	i = 3	3,1	mk/W
R_i	i = 4	4	mk/W
tau_i	i = 1	0,04	s
tau_i	i = 2	0,0189	s
tau_i	i = 3	0,0017	s
tau_i	i = 4	0,003	s
$Z_{th(j-c)D}$			
R_i	i = 1	115	mk/W
R_i	i = 2	52	mk/W
R_i	i = 3	11	mk/W
R_i	i = 4	2	mk/W
tau_i	i = 1	0,0366	s
tau_i	i = 2	0,0113	s
tau_i	i = 3	0,003	s
tau_i	i = 4	0,0002	s

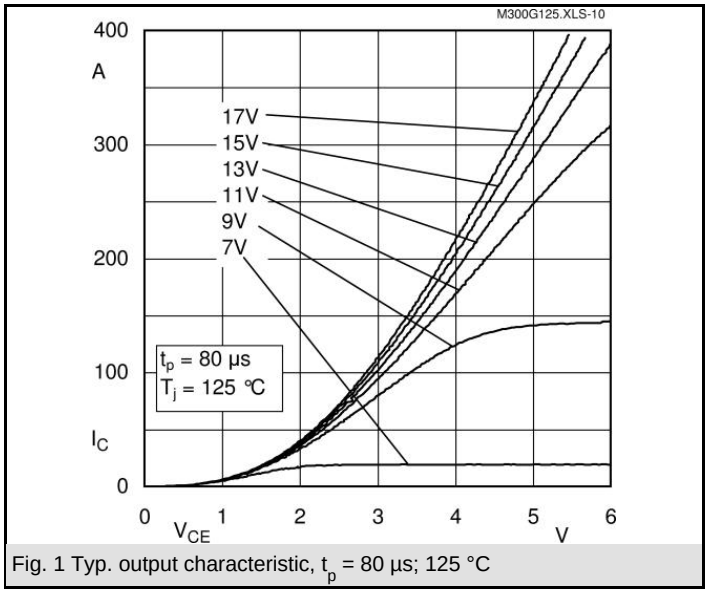

Fig. 1 Typ. output characteristic, t_p = 80 µs; 125 °C

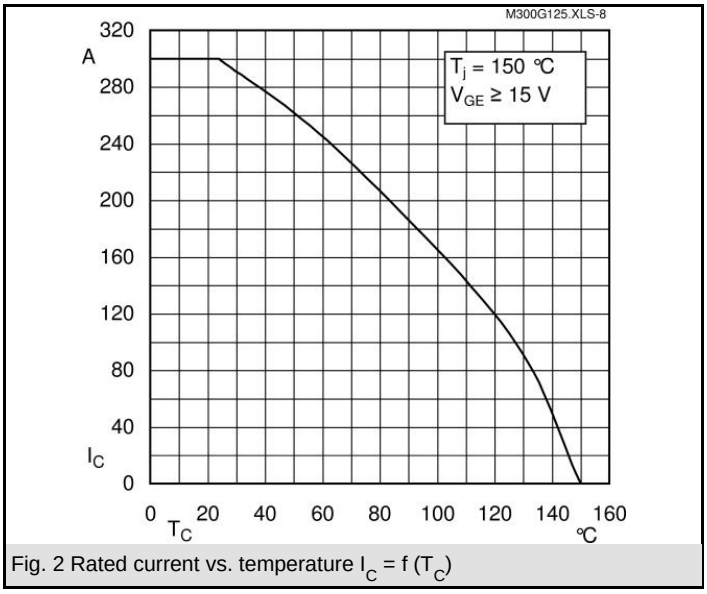

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

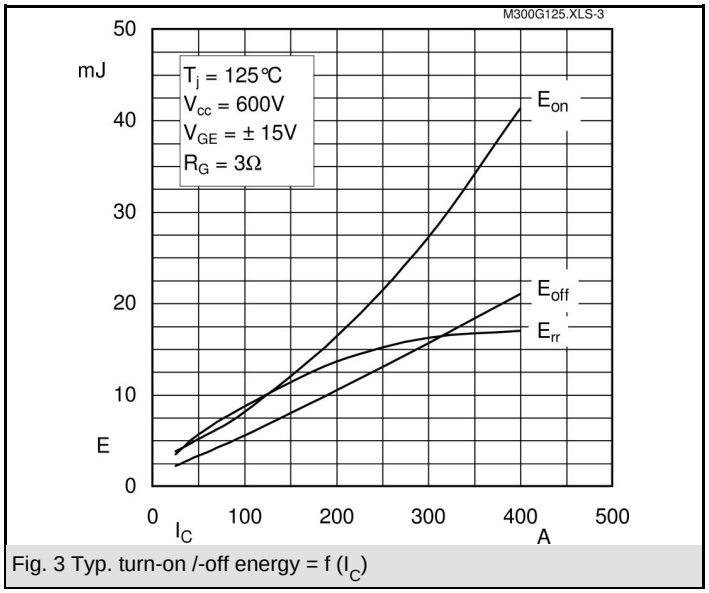

Fig. 3 Typ. turn-on /-off energy = f (I_C)

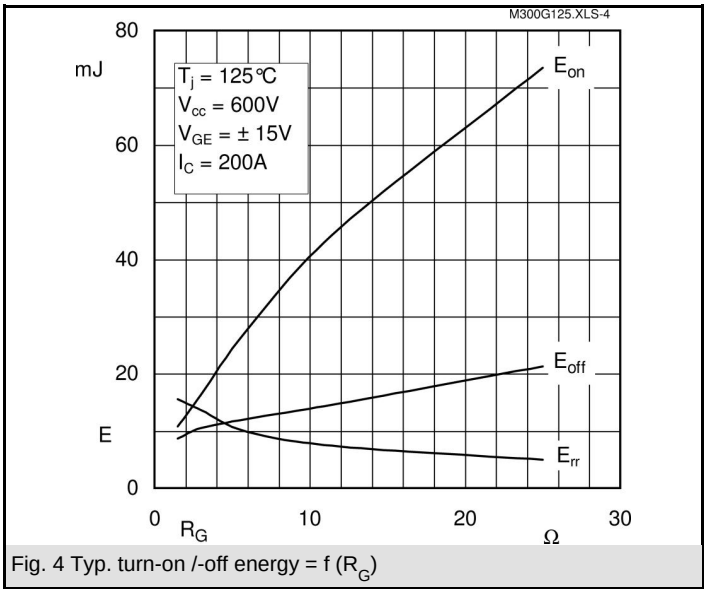

Fig. 4 Typ. turn-on /-off energy = f (R_G)

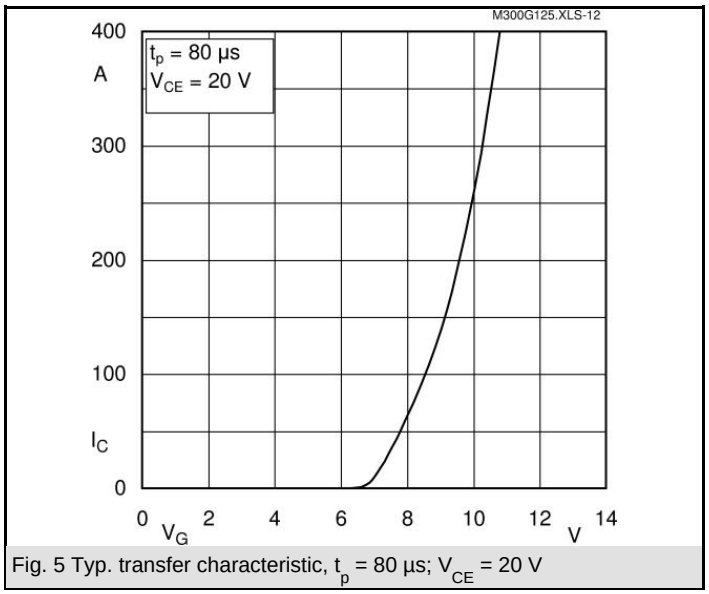

Fig. 5 Typ. transfer characteristic, t_p = 80 µs; V_{CE} = 20 V

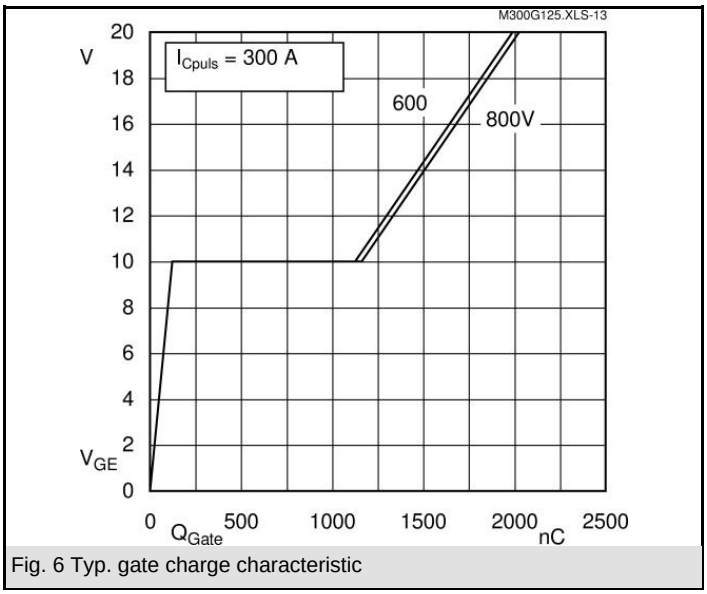

Fig. 6 Typ. gate charge characteristic

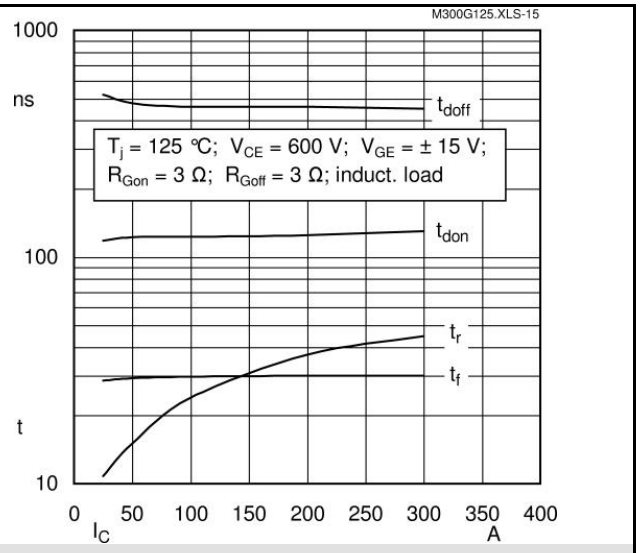

Fig. 7 Typ. switching times vs. I_C

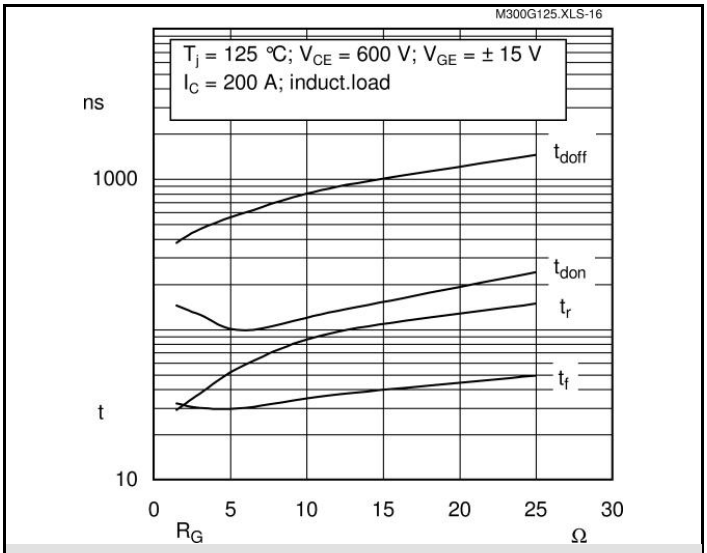

Fig. 8 Typ. switching times vs. gate resistor R_G

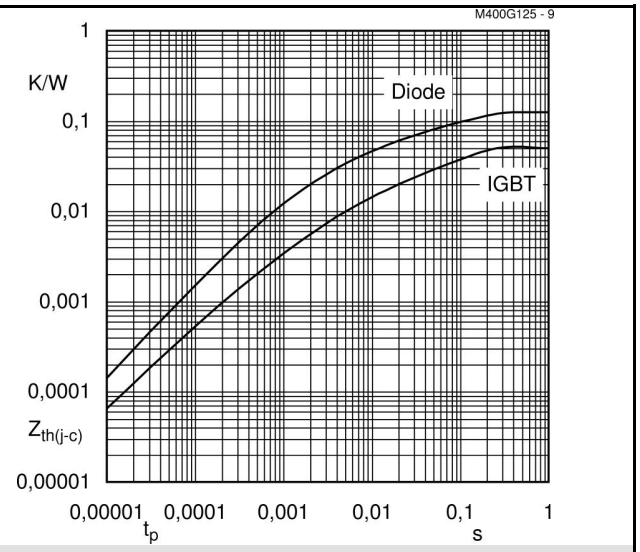

Fig. 9 Transient thermal impedance

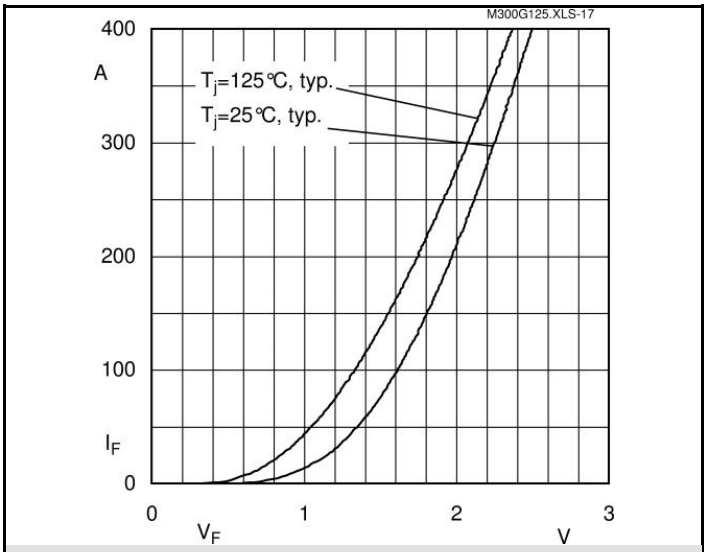

Fig. 10 CAL diode forward characteristic

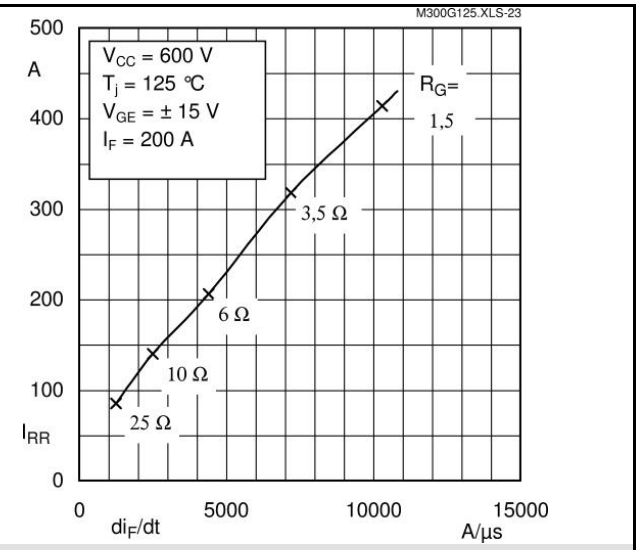

Fig. 11 Typ. CAL diode peak reverse recovery current

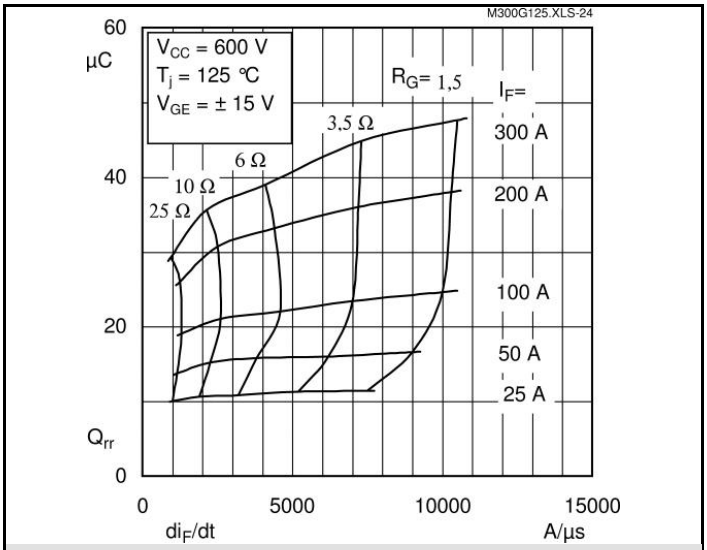

Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Recognized File 63 532

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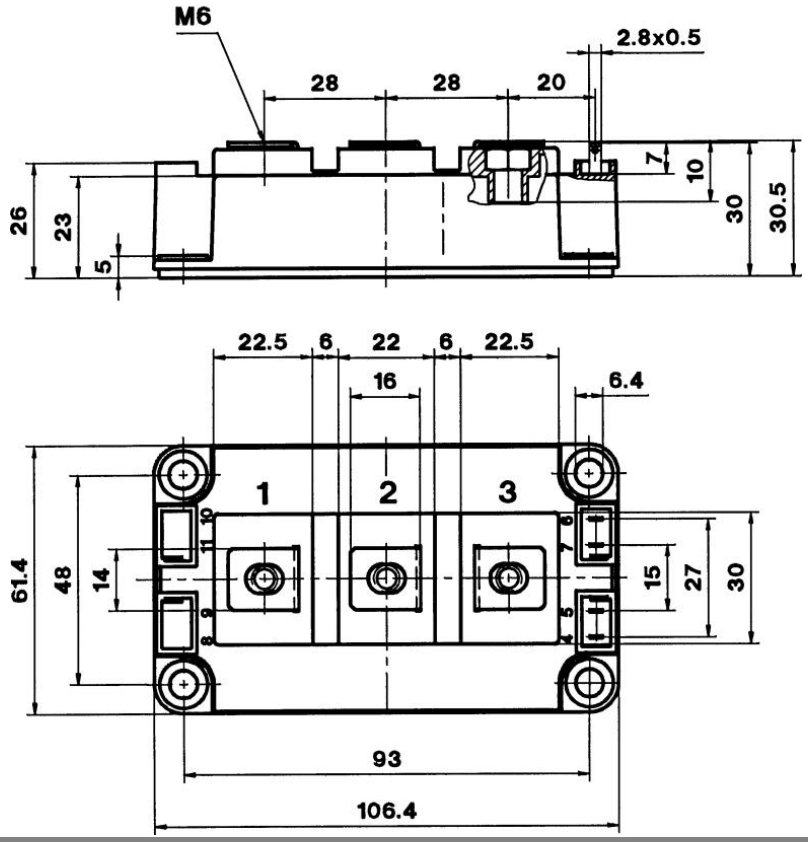
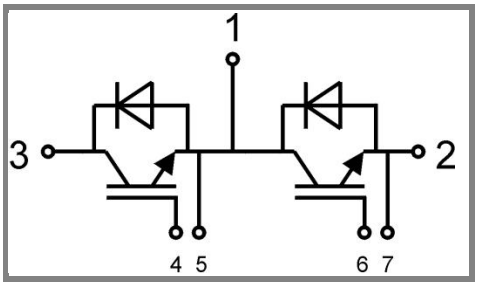


Case D 56



GB Case D 56

