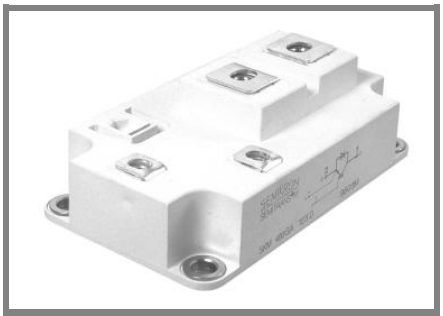
SKM 600GA125D



SEMITRANS® 4

Ultra Fast IGBT Modules

SKM 600GA125D

Features

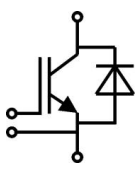
- NPT-IGBT with positive temperature coeffecient of V_{CEsat}
- Short circuit self limiting to 6 x I_c
- Corresponds to standards: IEC 60721-3-3 (humidity) class 3K3/IEC 68T.1 climate 40/125/56

Typical Applications

- Resonant inverters upto 100 kHz
- Inductive heating
- Electronic welders at f_{SW} >20 kHz

Remarks

- $I_{DC} \leq$ 500A limited by terminals
- Take care of over-voltage caused by stray inductances.



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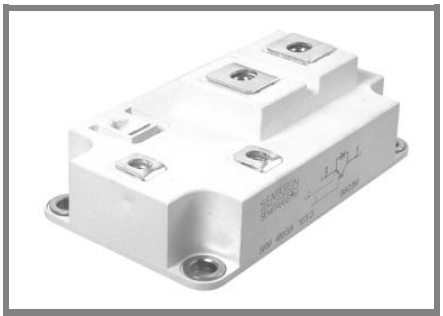
Absolute Maximum Ratings			T_c = 25 °C, unless otherwise specified	
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	580	A
		T_{case} = 80 °C	400	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		800	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; V_{CES} < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	500	A
		T_{case} = 80 °C	350	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		800	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	3600	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			- 40 ... + 150 (125)	°C
T_{stg}			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 = 16 mA		4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,15	0,45	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		4,5	5,3	mΩ
		T_j = 125°C		6		mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		3,3	3,85	V
		T_j = 125°C$_{chiplev.}$		4		V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		36		nF
C_{oes}				3,8		nF
C_{res}				3,5		nF
Q_G	V_{GE} = -8V - +20V			4400		nC
R_{Gint}	T_j = °C			1,25		Ω
$t_{d(on)}$	R_{Gon} = 2,5 Ω	V_{CC} = 600V		80		ns
t_r		I_C= 400A		70		ns
E_{on}		T_j = 125 °C		30		mJ
$t_{d(off)}$	R_{Goff} = 2,5 Ω	V_{GE} = ± 15V		570		ns
t_f				60		ns
E_{off}						mJ
$R_{th(j-c)}$	per IGBT				0,041	K/W

SKM 600GA125D



SEMITRANS® 4

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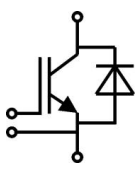

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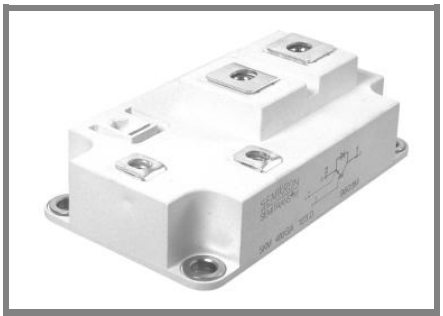
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 400 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
		T_j = 125 °C				V
r_F		T_j = 25 °C		2,3	3,3	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_F = 400 A	T_j = 125 °C		460		A
Q_{rr}				65		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
$R_{th(j-c)D}$	per diode				0,09	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= °C		0,18		mΩ
$R_{th(c-s)}$	per module				0,038	K/W
M_s	to heat sink		3		5	Nm
M_t	to terminals		2,5 (1,1)		5 (2)	Nm
w					330	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.

SKM 600GA125D



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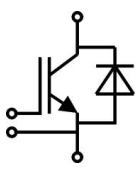

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	29	mk/W
R_i	i = 2	9	mk/W
R_i	i = 3	2,6	mk/W
R_i	i = 4	0,4	mk/W
tau_i	i = 1	0,1043	s
tau_i	i = 2	0,009	s
tau_i	i = 3	0,001	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	62	mk/W
R_i	i = 2	23	mk/W
R_i	i = 3	4,2	mk/W
R_i	i = 4	0,8	mk/W
tau_i	i = 1	0,0566	s
tau_i	i = 2	0,0166	s
tau_i	i = 3	0,0015	s
tau_i	i = 4	0,0002	s

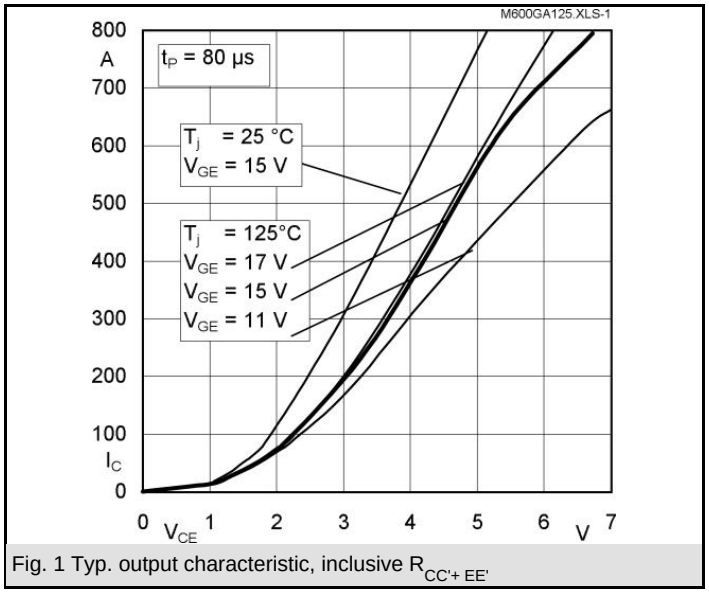


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

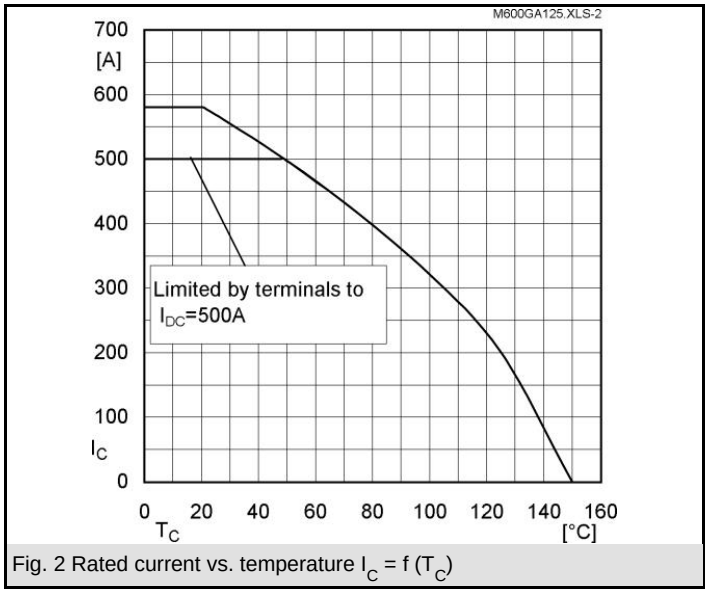


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

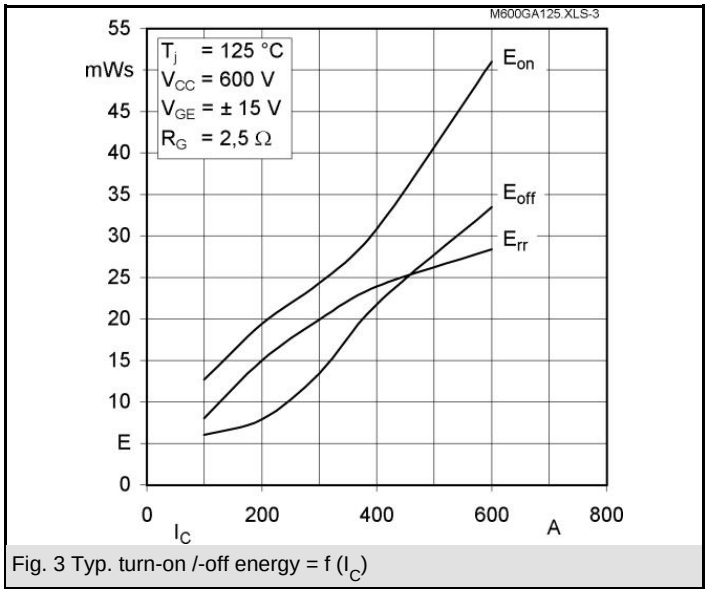


Fig. 3 Typ. turn-on /-off energy = f (I_C)

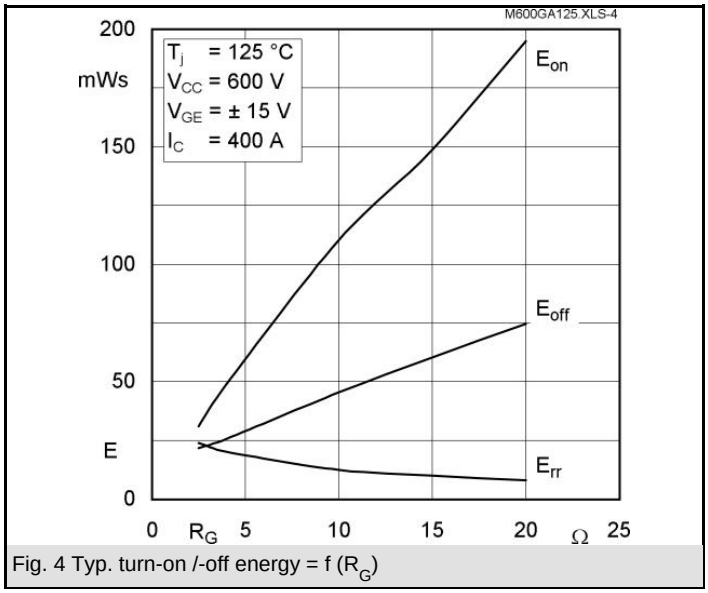


Fig. 4 Typ. turn-on /-off energy = f (R_G)

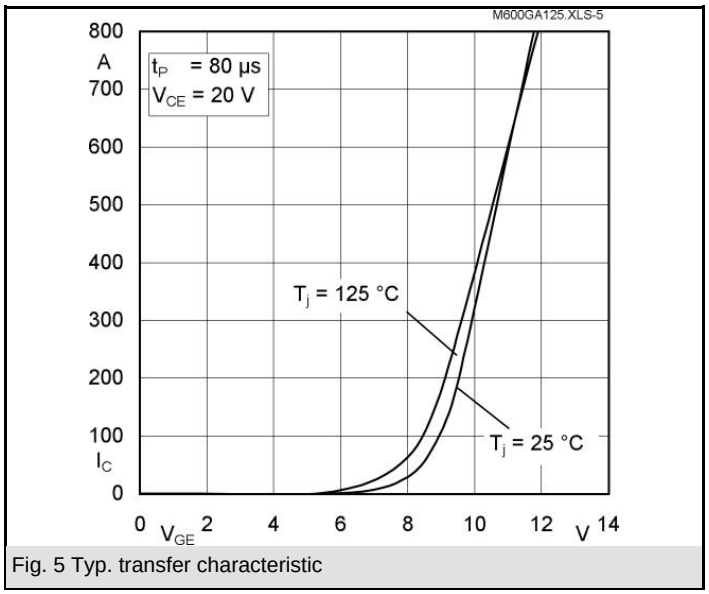


Fig. 5 Typ. transfer characteristic

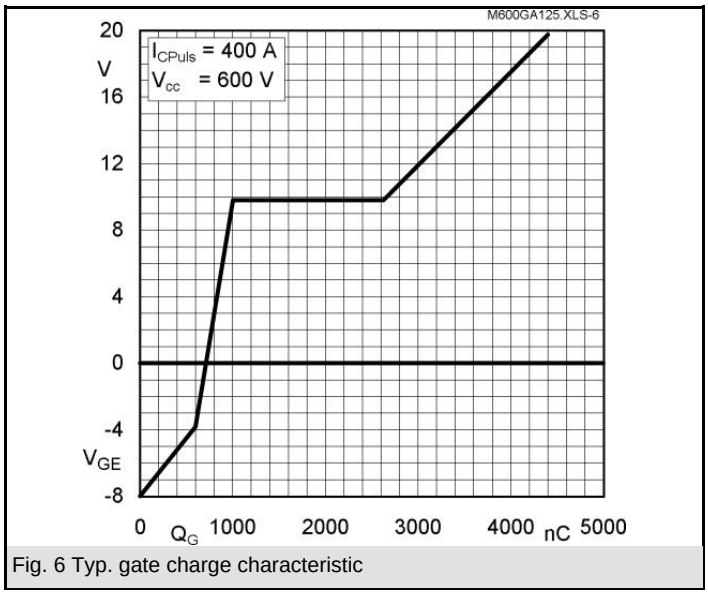


Fig. 6 Typ. gate charge characteristic

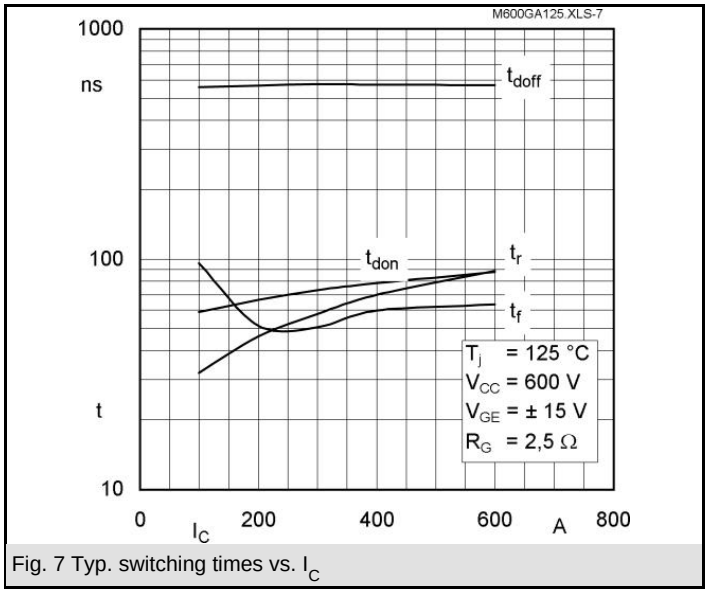


Fig. 7 Typ. switching times vs. I_C

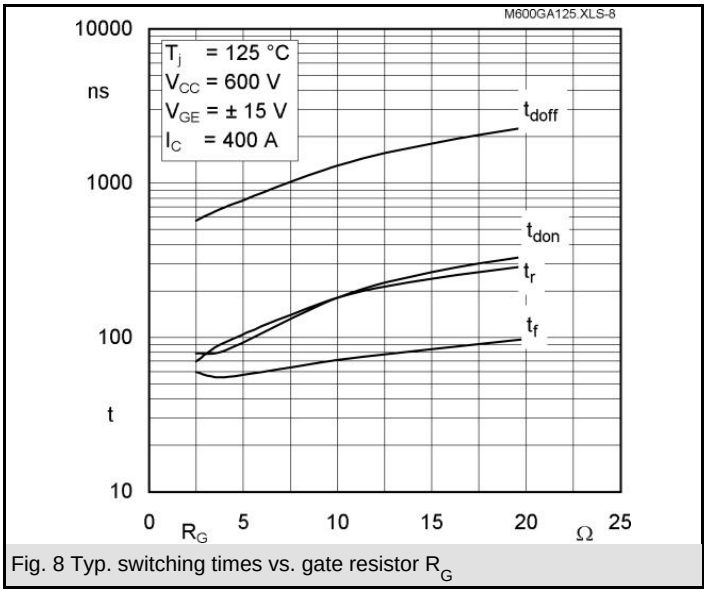


Fig. 8 Typ. switching times vs. gate resistor R_G

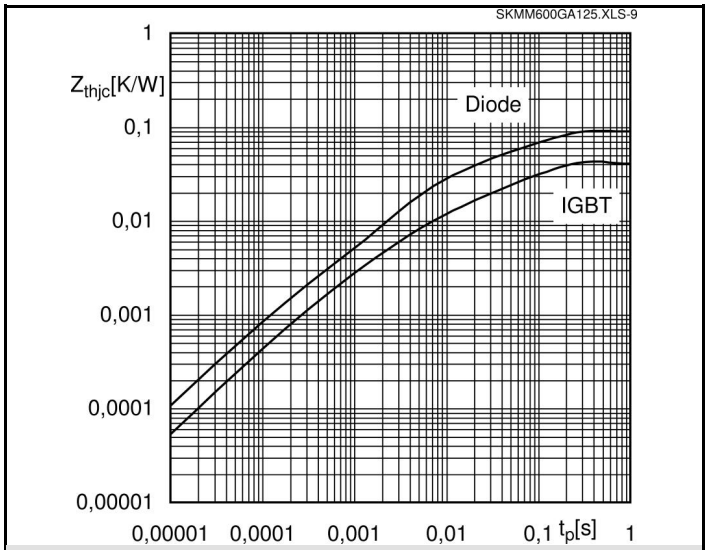


Fig. 9 Transient thermal impedance

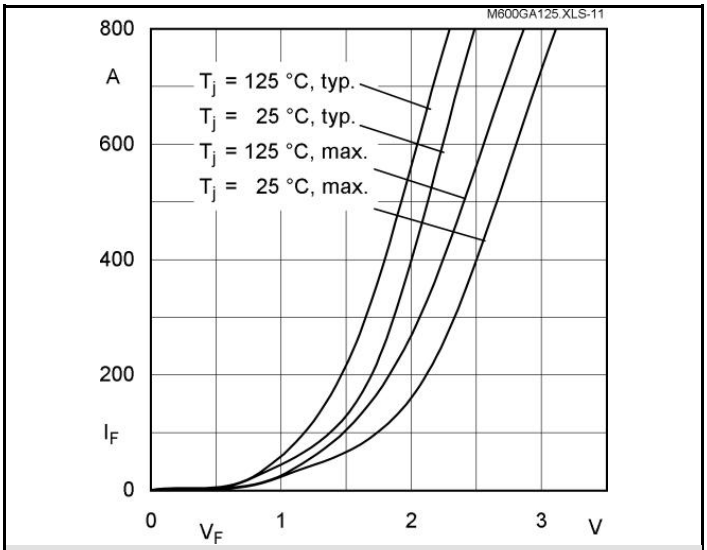


Fig. 10 CAL diode forward characteristic

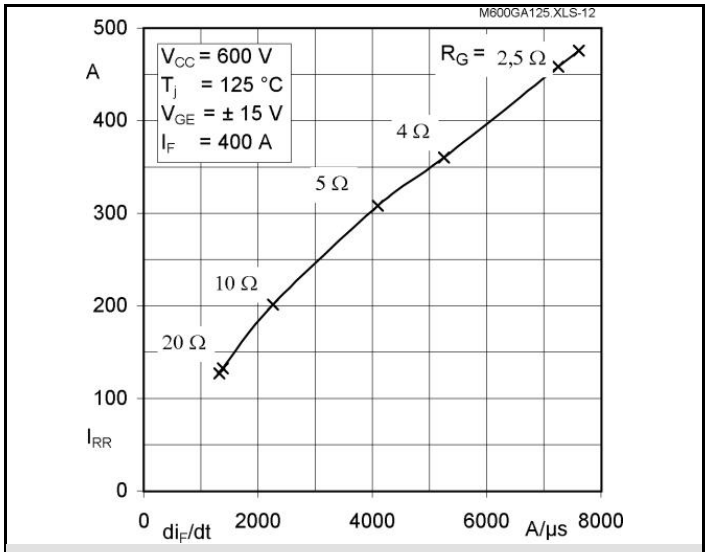


Fig. 11 Typ. CAL diode peak reverse recovery current

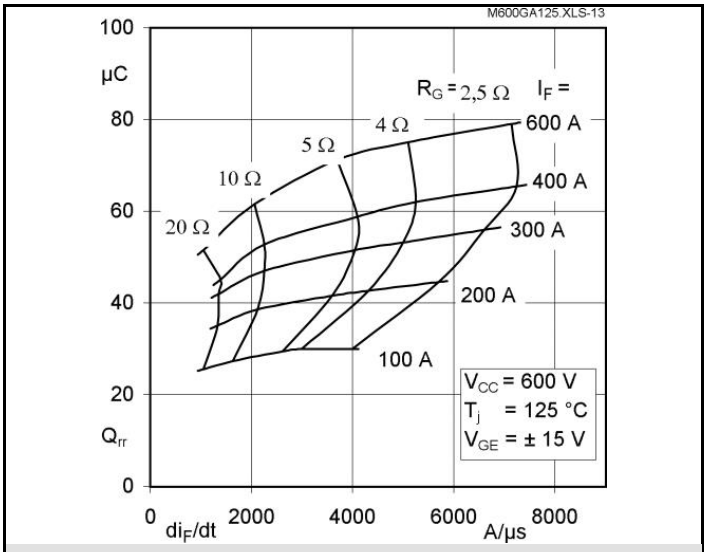
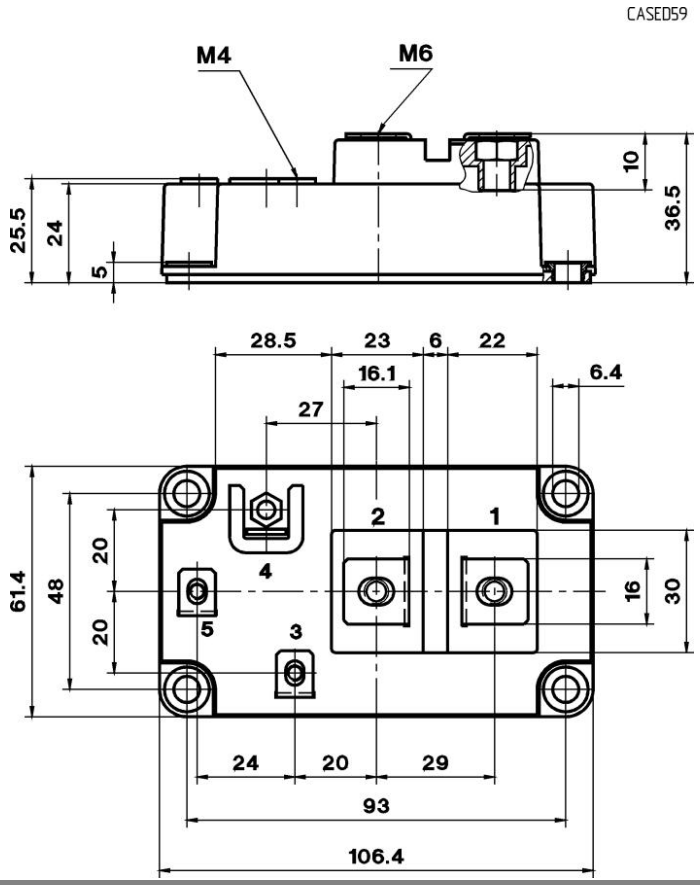


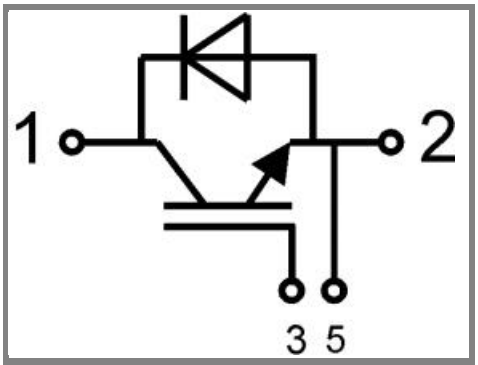
Fig. 12 Typ. CAL diode peak reverse recovery charge

SKM 600GA125D

UL Recognized File 63 532



Case D 59



Case D59 GA

