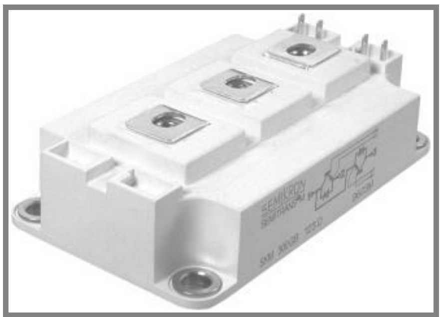
SKM 400GB126D ...



SEMITRANS® 3

Trench IGBT Module

SKM 400GB126D

SKM 400GAL126D

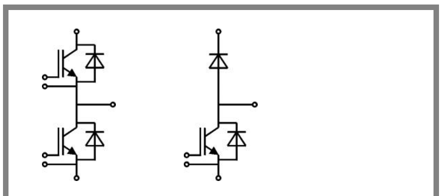
Preliminary Data

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

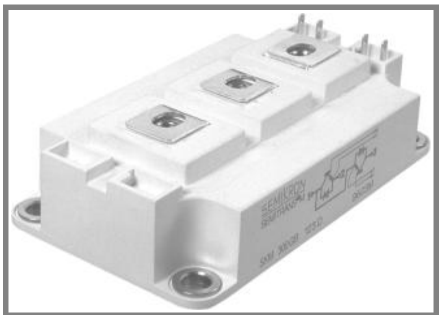
- AC inverter drives
- UPS
- Electronic welders



GB GAL

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	470	A
		T_{case} = 80 °C	330	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		600	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; V_{GE} ≤ 20 V; VCES < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	400	A
		T_{case} = 80 °C	270	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	2200	A
Freewheeling Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	400	A
		T_{case} = 80 °C	270	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	2200	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 = 12 mA		5	5,8	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	1,2	V
		T_j = 125 °C		0,9		V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		2,3	3,2	mΩ
		T_j = 125°C		3,7		mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		1,7	2,15	V
		T_j = 125°C$_{chiplev.}$		2		V
C_{ies}				23,1		nF
C_{oes}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		1,9		nF
C_{res}				1,2		nF
Q_G	V_{GE} = -8V ... +20V			2800		nC
R_{Gint}	T_j = °C			2,5		Ω
$t_{d(on)}$				330		ns
t_r	R_{Gon} = 2 Ω	V_{CC} = 600V		50		ns
E_{on}		I_{Cnom}= 300A		29		mJ
$t_{d(off)}$	R_{Goff} = 2 Ω	T_j = 125 °C		650		ns
t_f		V_{GE} = ±15V		110		ns
E_{off}				48		mJ
$R_{th(j-c)}$	per IGBT				0,08	K/W



SEMITRANS® 3

Trench IGBT Module

SKM 400GB126D

SKM 400GAL126D

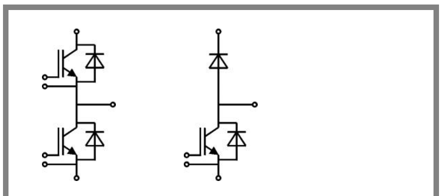
Preliminary Data

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
- UPS
- Electronic welders

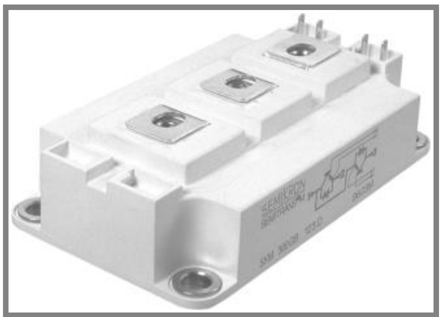


GB GAL

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		1,6	1,8	V
		T_j = 125 °$C_{chiplev.}$		1,6	1,8	V
V_{F0}		T_j = 25 °C		1	1,1	V
		T_j = 125 °C		0,8	0,9	V
r_F		T_j = 25 °C		2	2,3	mΩ
		T_j = 125 °C		2,7	3	mΩ
I_{RRM}	I_{Fnom} = 300 A	T_j = 125 °C		390		A
Q_{rr}	di/dt = 6300 A/µs			77		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			27		mJ
$R_{th(j-c)D}$	per diode				0,18	K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		1,6	1,8	V
		T_j = 125 °$C_{chiplev.}$		1,6	1,8	V
V_{F0}		T_j = 25 °C		1	1,1	V
		T_j = 125 °C		0,8	0,9	V
r_F		T_j = 25 °C		2	2,3	V
		T_j = 125 °C		2,7	3	V
I_{RRM}	I_{Fnom} = 300 A	T_j = 125 °C		390		A
Q_{rr}	di/dt = 6300 A/µs			77		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			27		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.



SEMITRANS® 3

Trench IGBT Module

SKM 400GB126D

SKM 400GAL126D

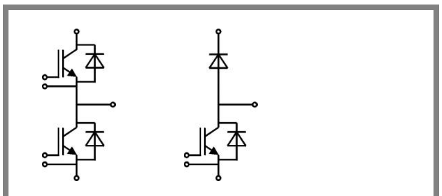
Preliminary Data

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
- UPS
- Electronic welders



GB GAL

Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	55	mk/W
R_i	i = 2	21	mk/W
R_i	i = 3	3,6	mk/W
R_i	i = 4	0,4	mk/W
tau_i	i = 1	0,0393	s
tau_i	i = 2	0,0171	s
tau_i	i = 3	0,002	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	120	mk/W
R_i	i = 2	48	mk/W
R_i	i = 3	10	mk/W
R_i	i = 4	2	mk/W
tau_i	i = 1	0,0262	s
tau_i	i = 2	0,0417	s
tau_i	i = 3	0,0012	s
tau_i	i = 4	0,001	s

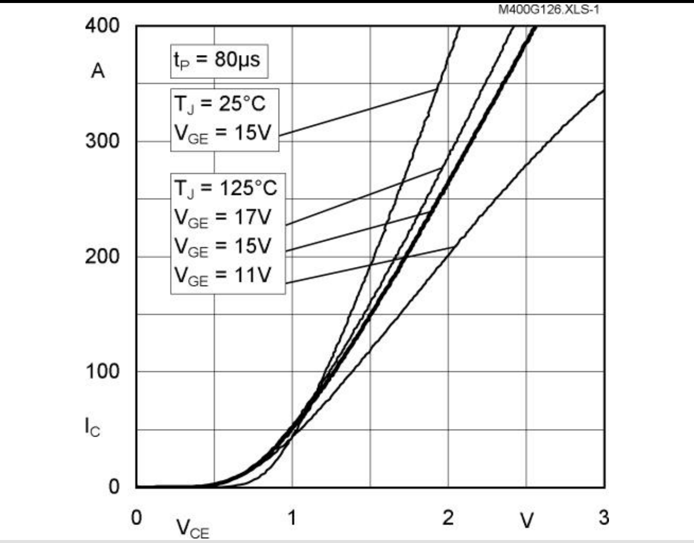


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

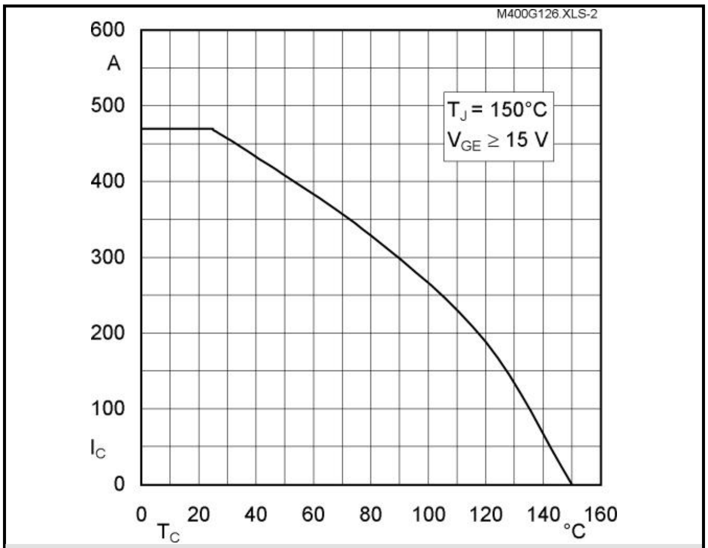


Fig. 2 Rated current vs. temperature I_C = f (T_C)

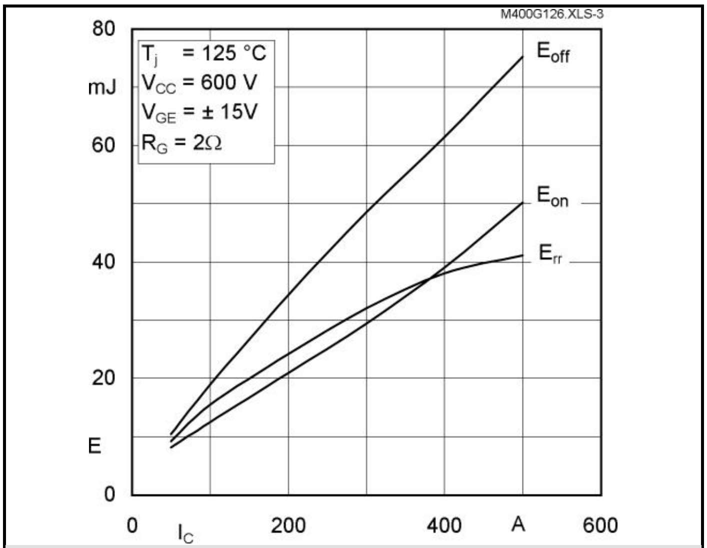


Fig. 3 Typ. turn-on /-off energy = f (I_C)

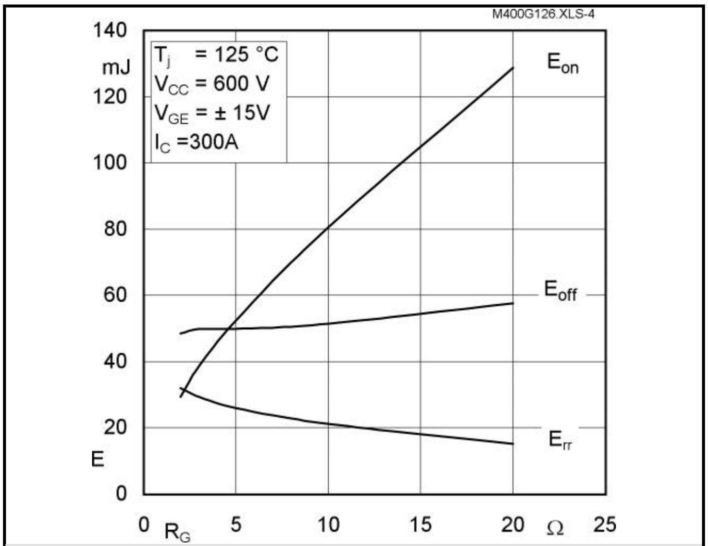


Fig. 4 Typ. turn-on /-off energy = f (R_G)

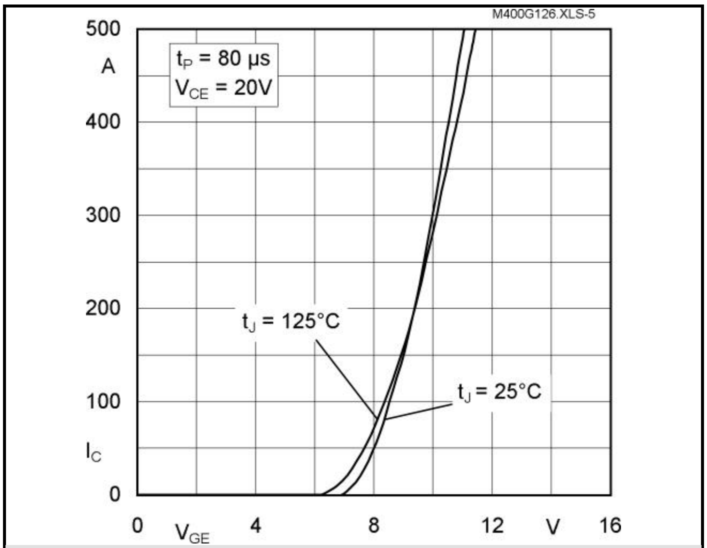


Fig. 5 Typ. transfer characteristic

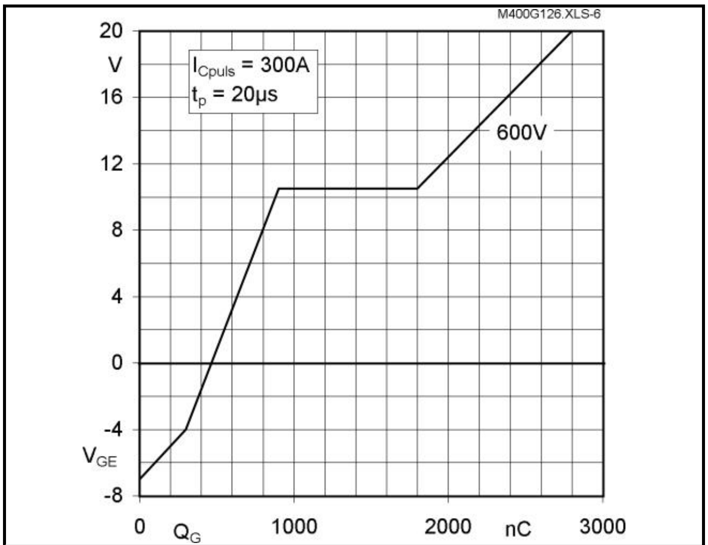


Fig. 6 Typ. gate charge characteristic

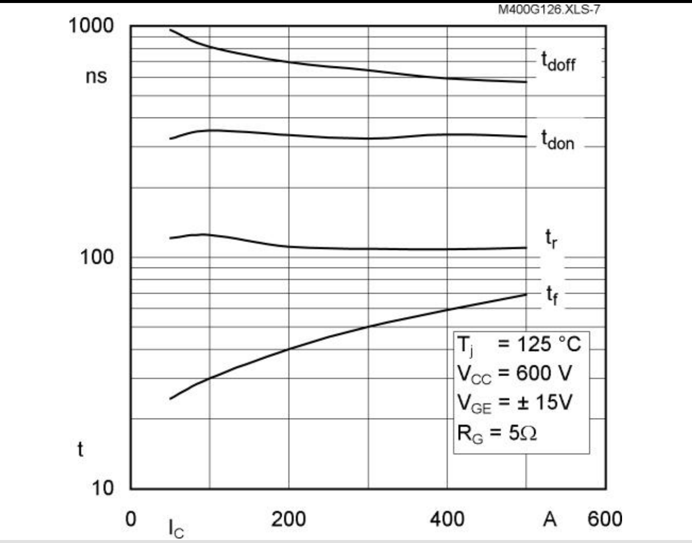


Fig. 7 Typ. switching times vs. I_C

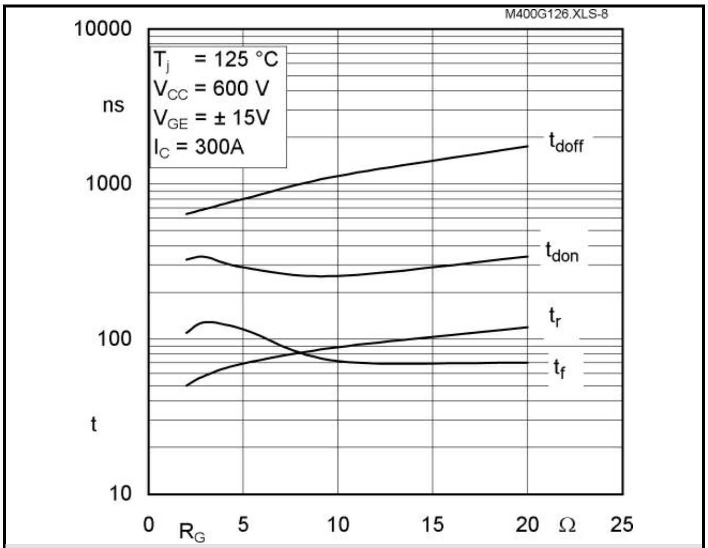


Fig. 8 Typ. switching times vs. gate resistor R_G

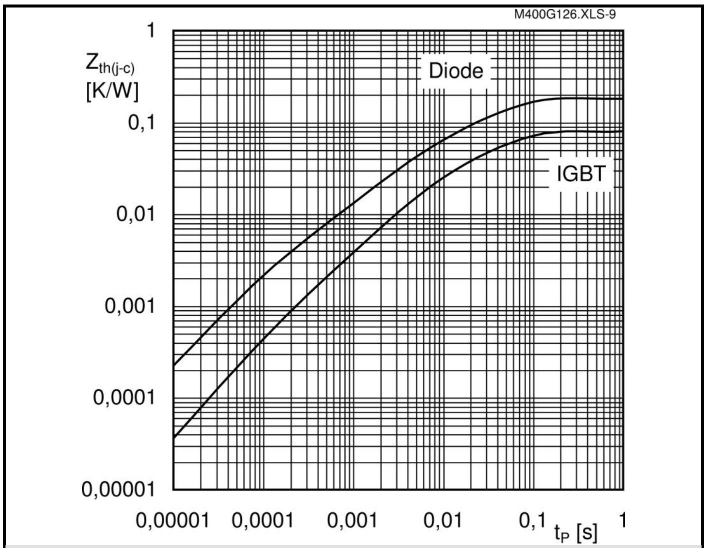


Fig. 9 Transient thermal impedance

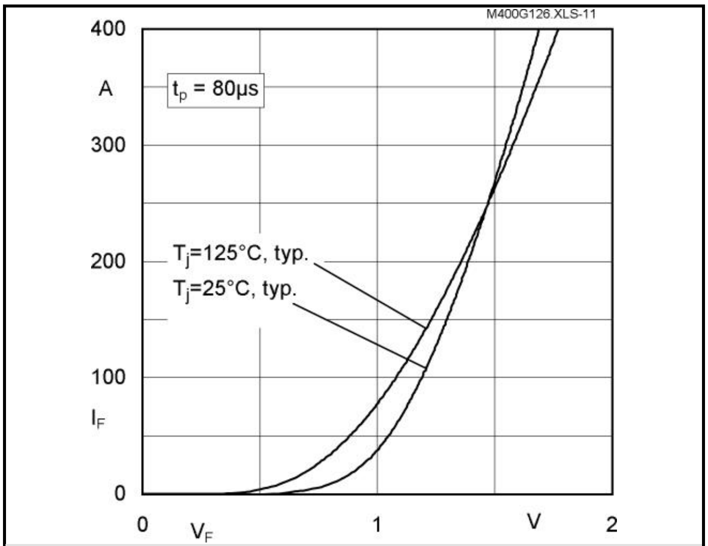


Fig. 10 CAL diode forward characteristic

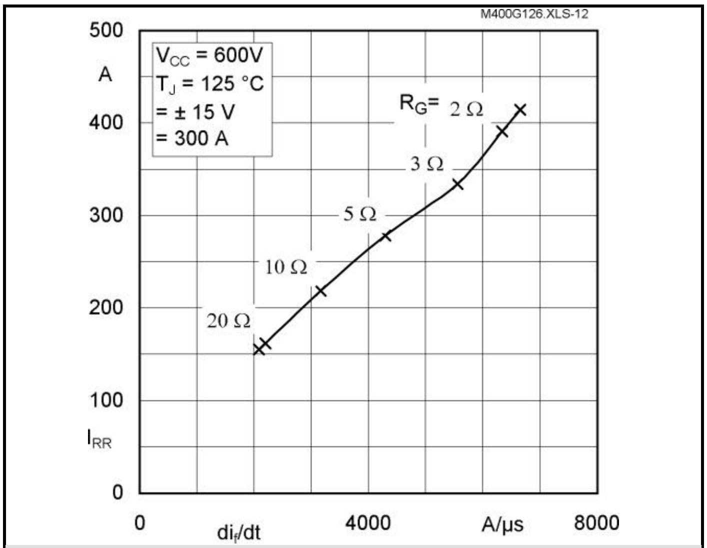


Fig. 11 Typ. CAL diode peak reverse recovery current

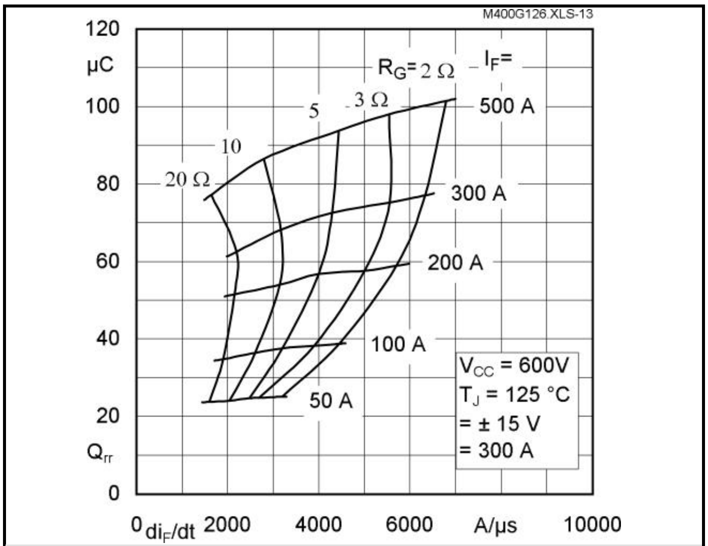
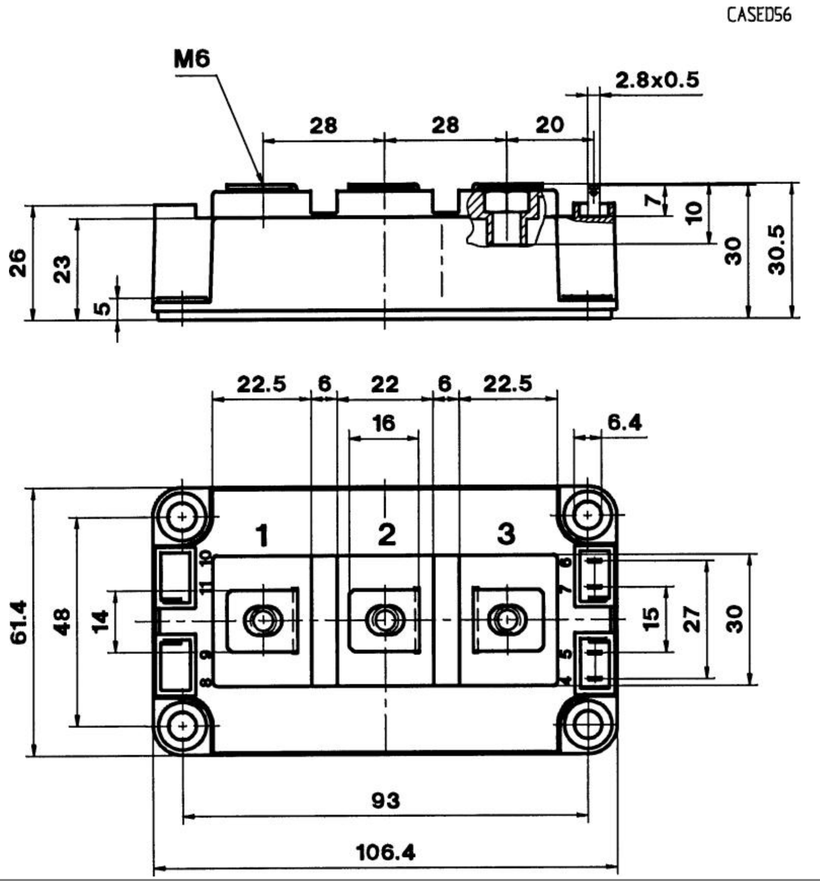
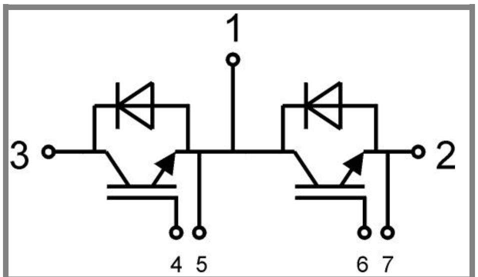


Fig. 12 Typ. CAL diode peak reverse recovery charge

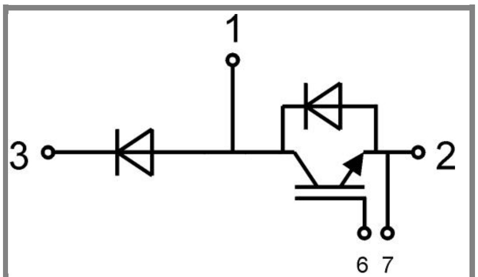
UL Recognized File 63 532



Case D 56



GB Case D 56



GAL Case D 57 (➞ D 56)

