SKM400GB126D



SEMITRANS® 3

Trench IGBT Modules

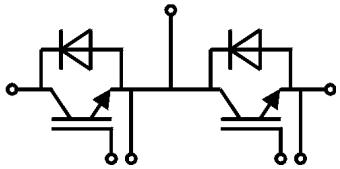
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Features

- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C
- UL recognized, file no. E63532

Typical Applications*

- **AC inverter drives**
- **UPS**
- **Electronic welders**



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_c = 25 °C	470	A
		T_c = 80 °C	327	A
I_{Cnom}			300	A
I_{CRM}	I_{CRM} = 2xI_{Cnom}		600	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 600 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 125 °C	10	µs
T_j			-40 ... 150	°C
Inverse diode				
I_F	T_j = 150 °C	T_c = 25 °C	352	A
		T_c = 80 °C	240	A
I_{Fnom}			300	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		2844	A
T_j			-40 ... 150	°C
Module				
$I_{t(RMS)}$			500	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT						
$V_{CE(sat)}$	I_C = 300 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.69	2.10	V
		T_j = 125 °C		2.01	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		1	1.2	V
		T_j = 125 °C		0.9	1.1	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		2.3	3	mΩ
		T_j = 125 °C		3.7	4.5	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 12 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C			4	mA
		T_j = 125 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		21.4		nF
C_{oes}		f = 1 MHz		1.12		nF
C_{res}		f = 1 MHz		0.97		nF
Q_G	V_{GE} = - 8 V...+ 20 V			2800		nC
R_{Gint}	T_j = 25 °C			2.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 300 A V_{GE} = +15/-15 V $R_{G\ on}$ = 2 Ω $R_{G\ off}$ = 2 Ω	T_j = 125 °C		330		ns
t_r		T_j = 125 °C		50		ns
E_{on}		T_j = 125 °C		29		mJ
$t_{d(off)}$		T_j = 125 °C		650		ns
t_f		T_j = 125 °C		110		ns
E_{off}		T_j = 125 °C		48		mJ
$R_{th(j-c)}$	per IGBT				0.08	K/W

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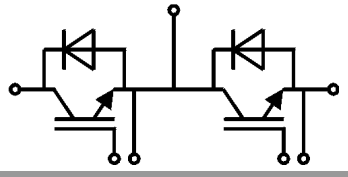
Features

- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
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Typical Applications*

- **AC inverter drives**
- **UPS**
- **Electronic welders**

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 300 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.60	1.80	V
		T_j = 125 °C		1.60	1.80	V
V_{F0}	chiplevel	T_j = 25 °C		1	1.1	V
		T_j = 125 °C		0.8	0.9	V
r_F	chiplevel	T_j = 25 °C		2.00	2.3	mΩ
		T_j = 125 °C		2.7	3	mΩ
I_{RRM}	I_F = 300 A di/dt_{off} = 6300 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		390		A
Q_{rr}		T_j = 125 °C		77		µC
E_{rr}		T_j = 125 °C		27		mJ
$R_{th(j-c)}$	per diode				0.18	K/W
Module						
L_{CE}				15		nH
$R_{CC'+EE'}$	terminal-chip	T_C = 25 °C		0.35		mΩ
		T_C = 125 °C		0.5		mΩ
$R_{th(c-s)}$	per module			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
						Nm
w					325	g



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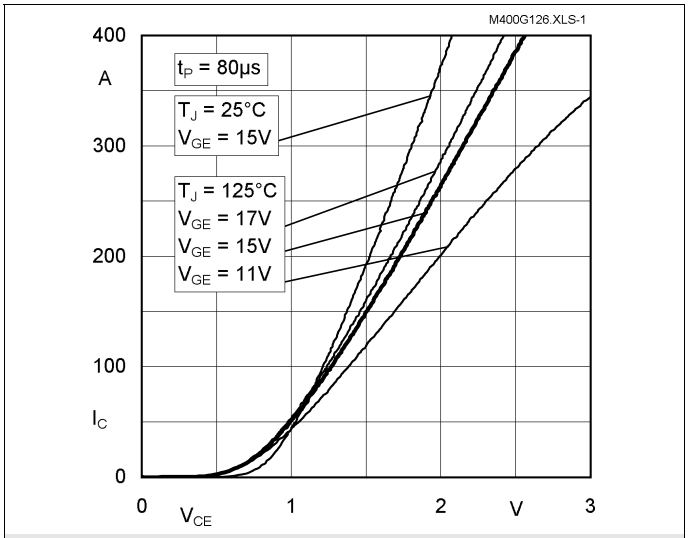


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

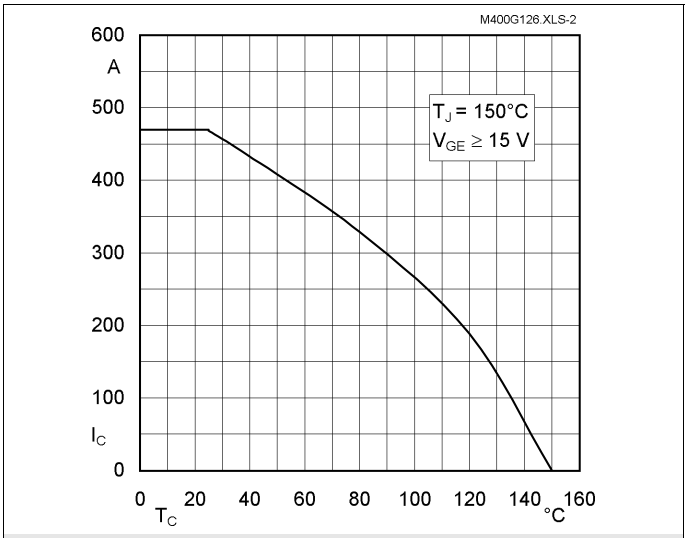


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

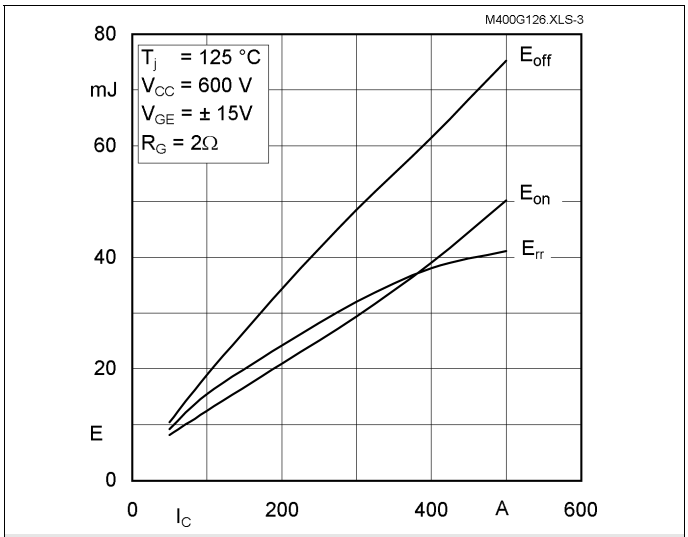


Fig. 3: Typ. turn-on /-off energy = f (I_C)

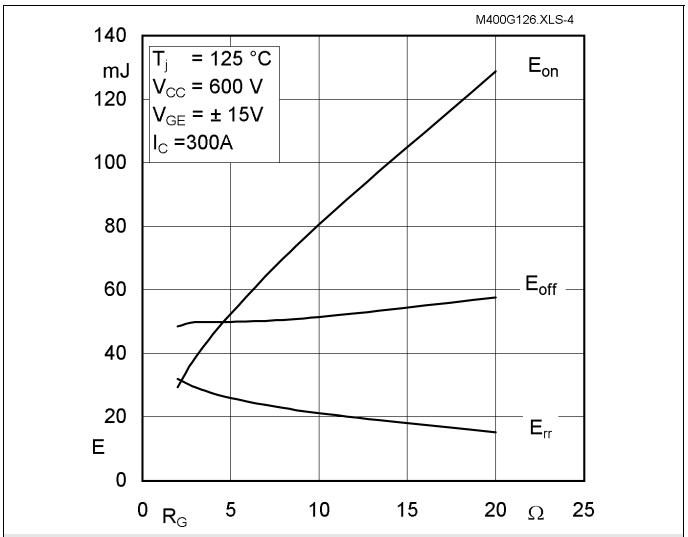


Fig. 4: Typ. turn-on /-off energy = f (R_G)

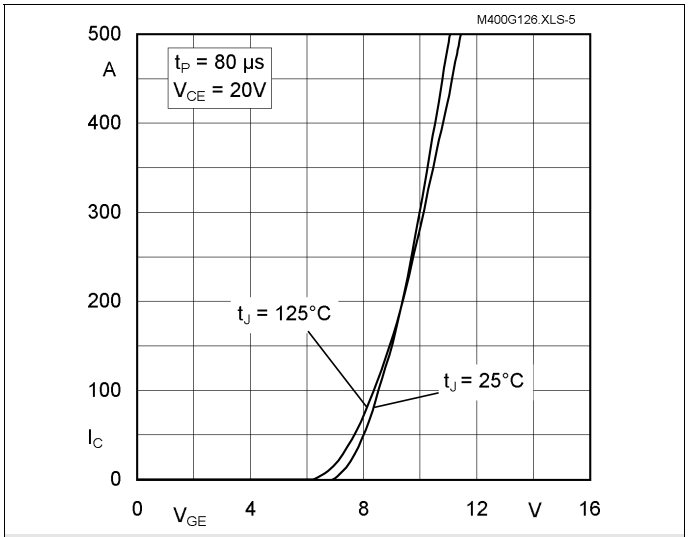


Fig. 5: Typ. transfer characteristic

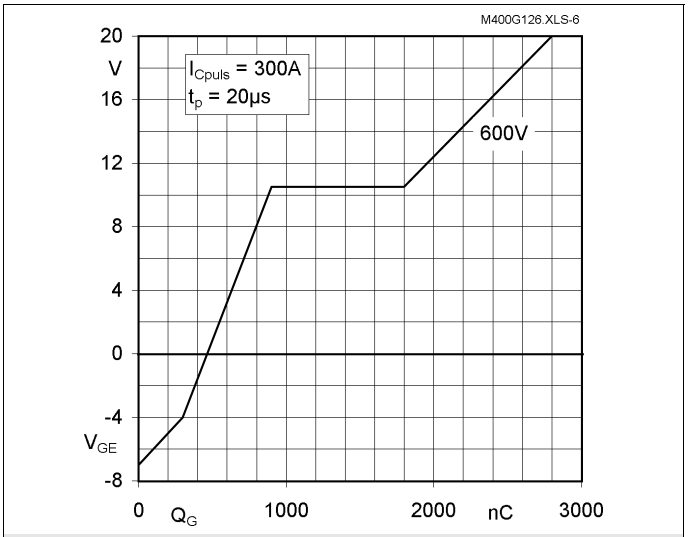


Fig. 6: Typ. gate charge characteristic

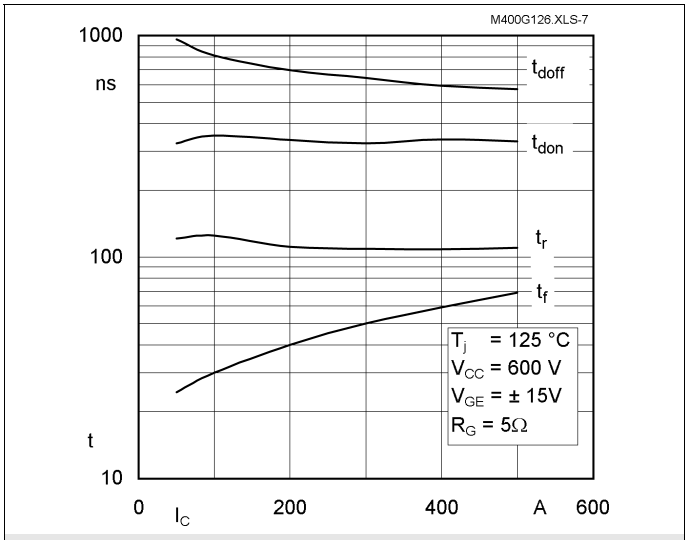


Fig. 7: Typ. switching times vs. I_C

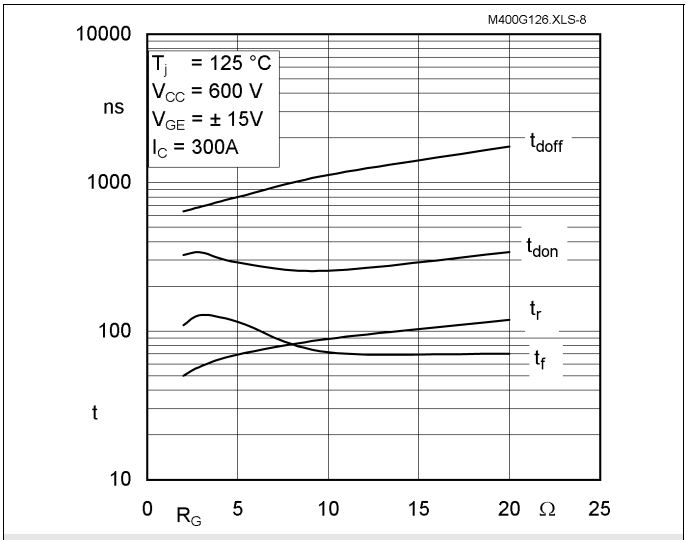


Fig. 8: Typ. switching times vs. gate resistor R_G

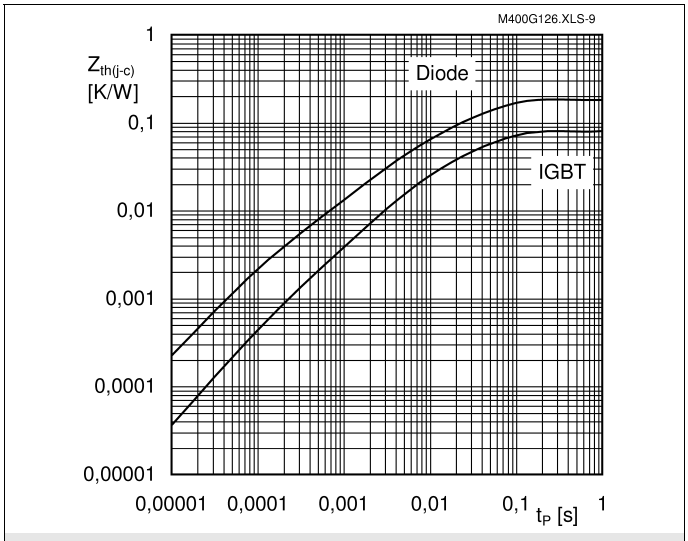


Fig. 9: Transient thermal impedance

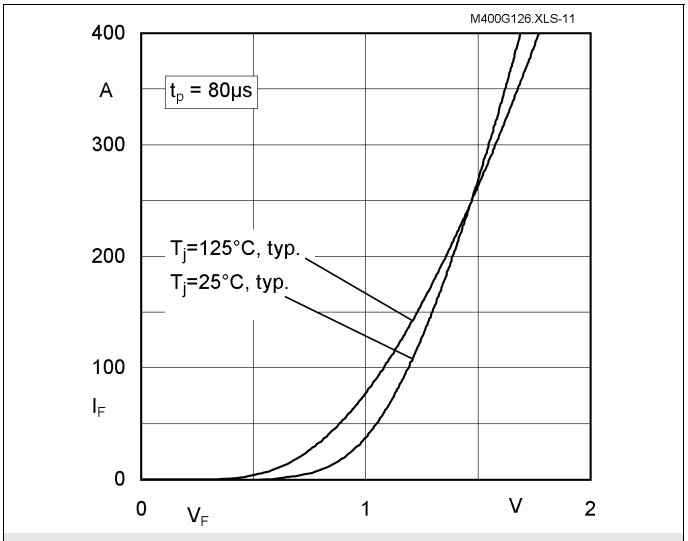


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

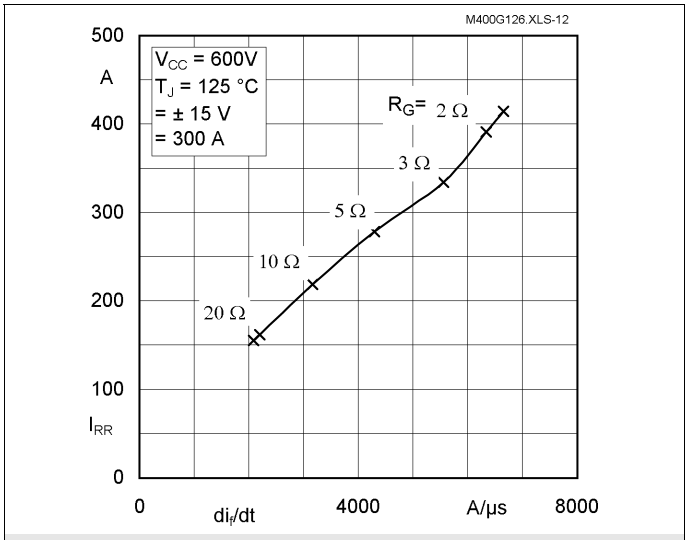


Fig. 11: Typ. CAL diode peak reverse recovery current

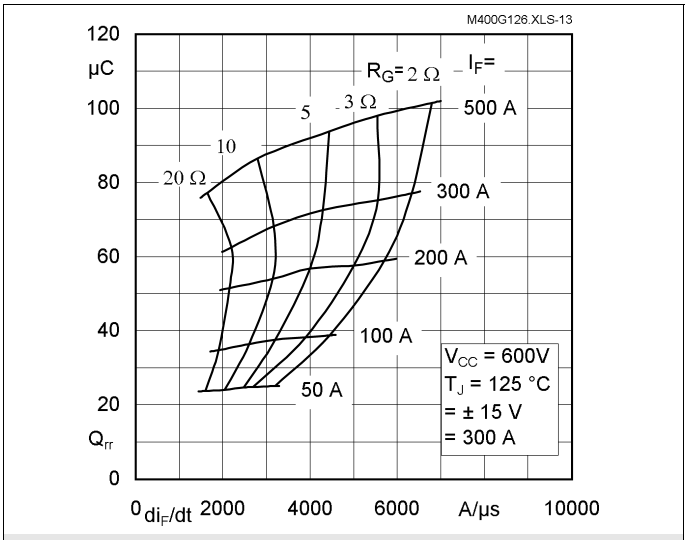
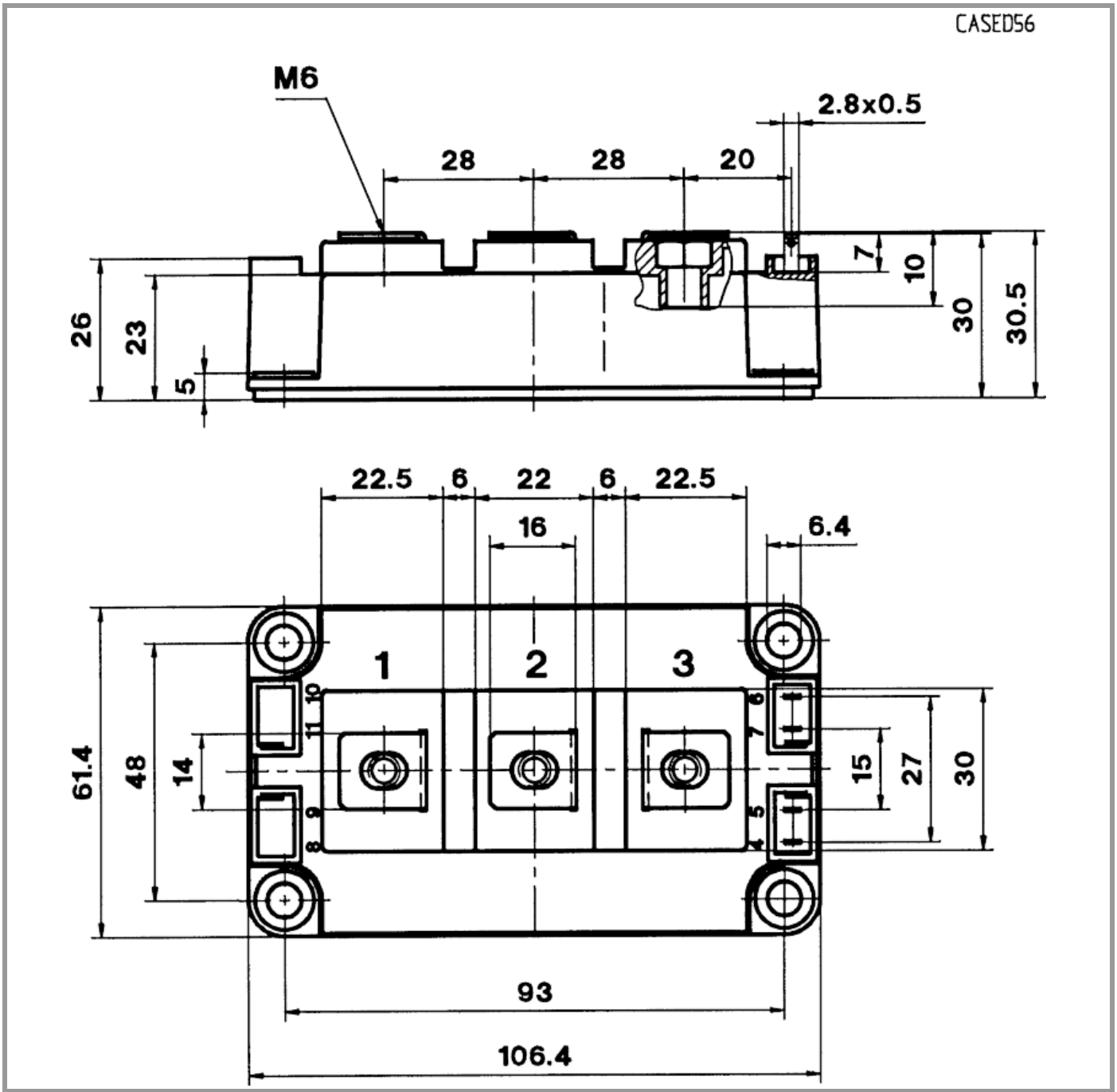
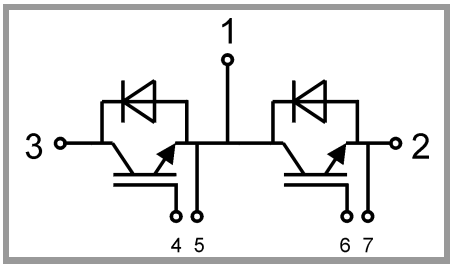


Fig. 12: Typ. CAL diode peak reverse recovery charge

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.