SKM200GBD126D

SEMITRANS® 3

Trench IGBT Modules

SKM200GBD126D

Preliminary Data

Features

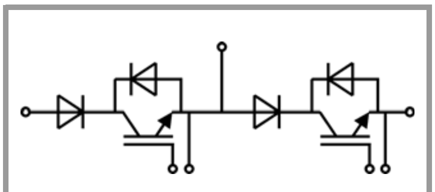
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C
- UL recognized, file no. E63532

Typical Applications*

- Current source inverter

Remarks

- The Fig.1 to Fig.9 are based on measurements of the SKM200GB126D
- The series diodes (FWD) have the data of the inverse diodes of the SKM300GB126D



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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	264	A
		T_c = 80 °C	186	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 2xI_{Cnom}		300	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 900 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	34	A
		T_c = 80 °C	23	A
I_{Fnom}			30	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		60	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		414	A
T_j			-40 ... 150	°C
Freewheeling diode				
I_F	T_j = 150 °C	T_c = 25 °C	250	A
		T_c = 80 °C	169	A
I_{Fnom}			200	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1656	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 = 150 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.71	2.10	V
		T_j = 125 °C		2.00	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		4.7	6.0	mΩ
		T_j = 125 °C		7.3	9.0	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 6 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C			2.0	mA
		T_j = 125 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		10.7		nF
C_{oes}		f = 1 MHz		0.56		nF
C_{res}		f = 1 MHz		0.48		nF
Q_G	V_{GE} = - 8 V...+ 20 V			1530		nC
R_{Gint}	T_j = 25 °C			5.0		Ω

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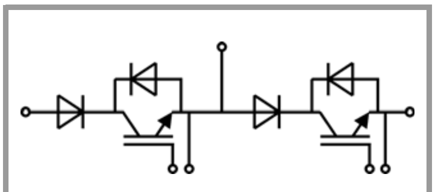
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$t_{d(on)}$	V_{CC} = 600 V	T_j = 125 °C		260		ns
t_r	I_C = 150 A	T_j = 125 °C		40		ns
E_{on}	V_{GE} = +15/-15 V	T_j = 125 °C		18		mJ
$t_{d(off)}$	$R_{G\ on}$ = 1.5 Ω	T_j = 125 °C		540		ns
t_f	$R_{G\ off}$ = 1.5 Ω	T_j = 125 °C		110		ns
E_{off}		T_j = 125 °C		24		mJ
$R_{th(j-c)}$	per IGBT				0.13	K/W
Inverse diode						
$V_F = V_{EC}$	I_F = 30 A V_{GE} = 0 V	T_j = 25 °C		2.00	2.50	V
	chiplevel	T_j = 125 °C		1.80	2.30	V
V_{F0}	chiplevel	T_j = 25 °C		1.1	1.45	V
		T_j = 125 °C		0.85	1.2	V
r_F	chiplevel	T_j = 25 °C		30	35	mΩ
		T_j = 125 °C		32	37	mΩ
I_{RRM}	I_F = 15 A	T_j = 125 °C		12		A
Q_{rr}	di/dt$_{off}$ = 150 A/µs	T_j = 125 °C		1		µC
E_{rr}	V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C				mJ
$R_{th(j-c)}$	per diode				1.5	K/W
Freewheeling diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V	T_j = 25 °C		1.60	1.80	V
	chiplevel	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		3.0	3.5	mΩ
		T_j = 125 °C		4.0	4.5	mΩ
I_{RRM}	I_F = 200 A	T_j = 125 °C		290		A
Q_{rr}	di/dt$_{off}$ = 6200 A/µs	T_j = 125 °C		44		µC
E_{rr}	V_{GE} = ±15 V V_{CC} = 600 V	T_j = 125 °C		18		mJ
$R_{th(j-c)}$	per Diode				0.25	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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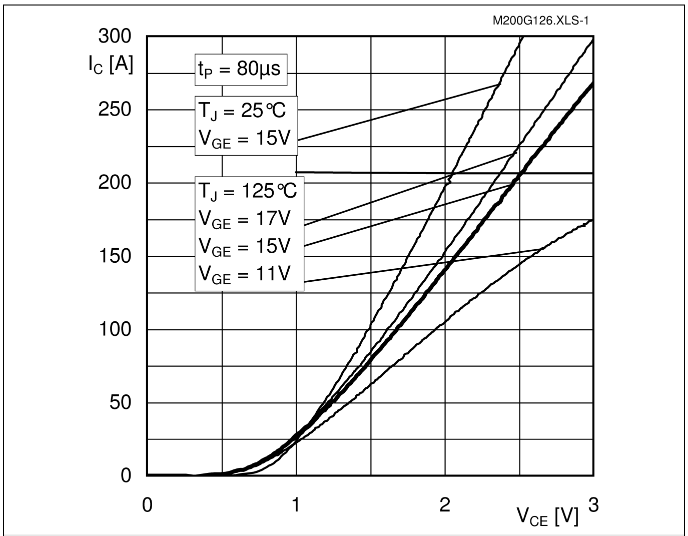


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

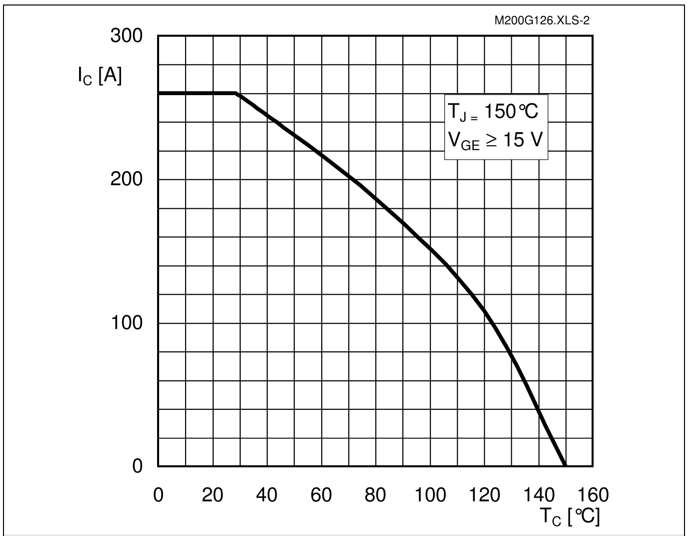


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

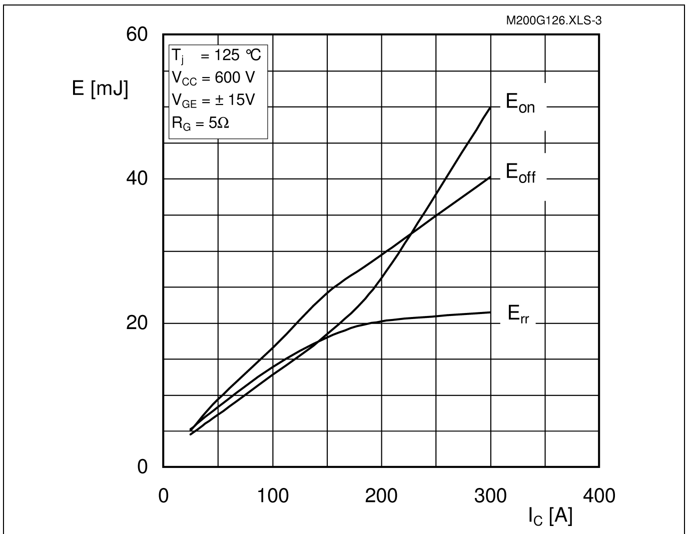


Fig. 3: Typ. turn-on /-off energy = f (I_C)

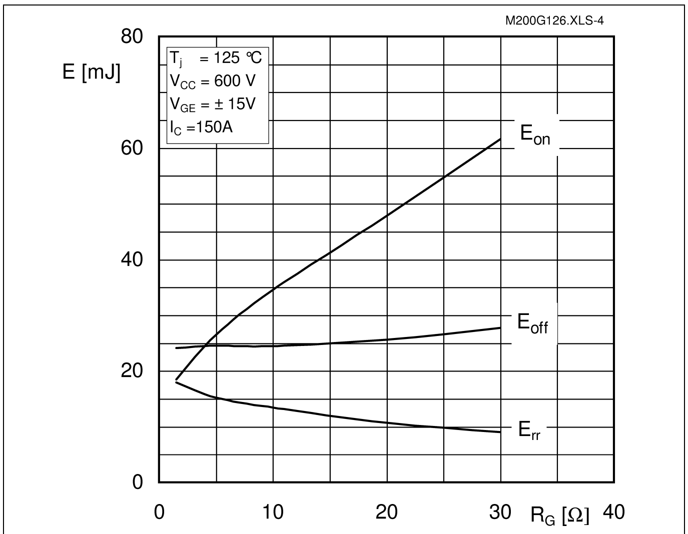


Fig. 4: Typ. turn-on /-off energy = f (R_G)

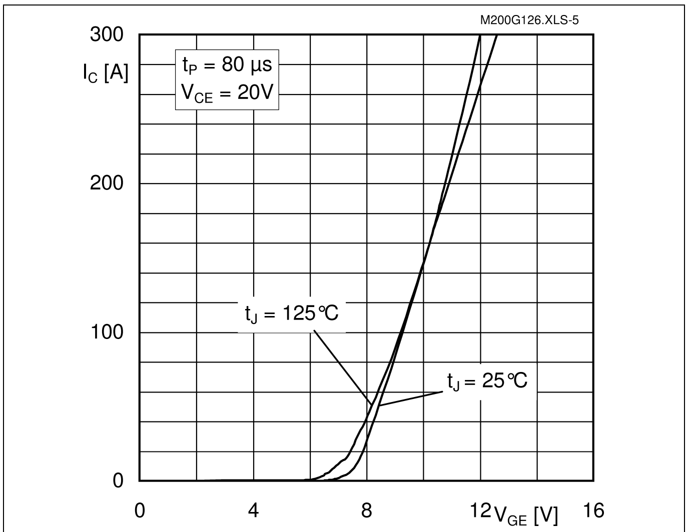


Fig. 5: Typ. transfer characteristic

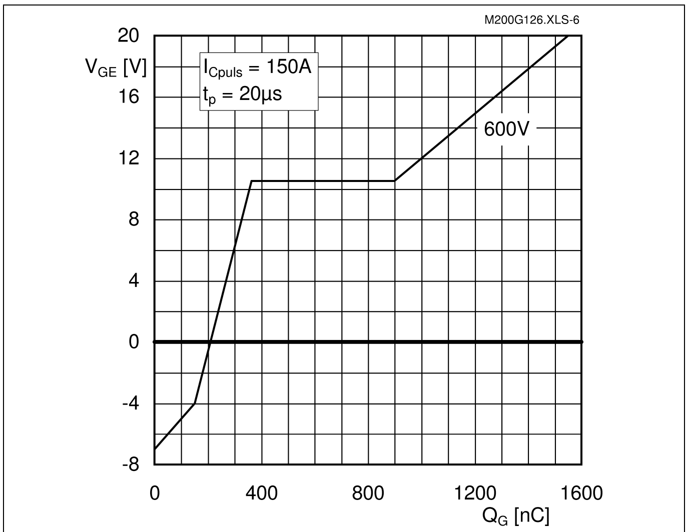


Fig. 6: Typ. gate charge characteristic

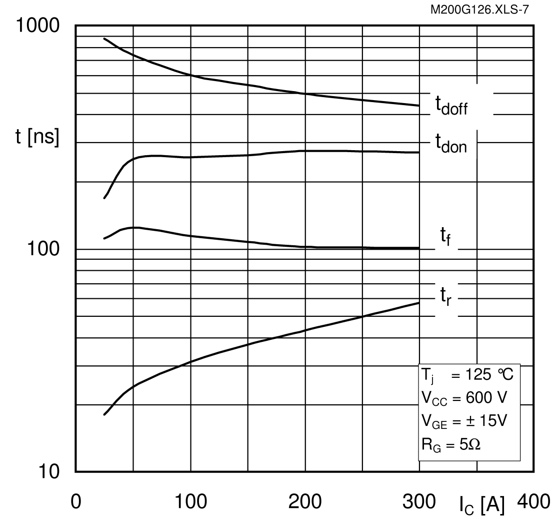


Fig. 7: Typ. switching times vs. I_C

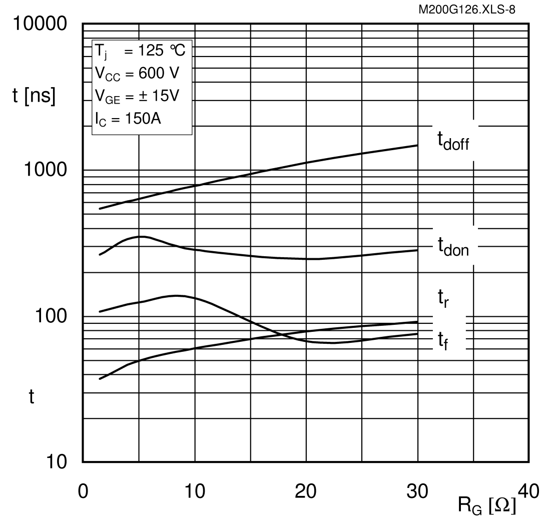


Fig. 8: Typ. switching times vs. gate resistor R_G

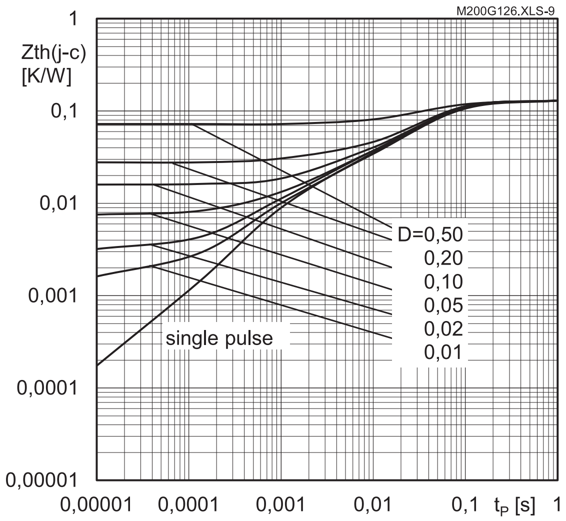


Fig. 9: Transient thermal impedance of IGBT
$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p*f$

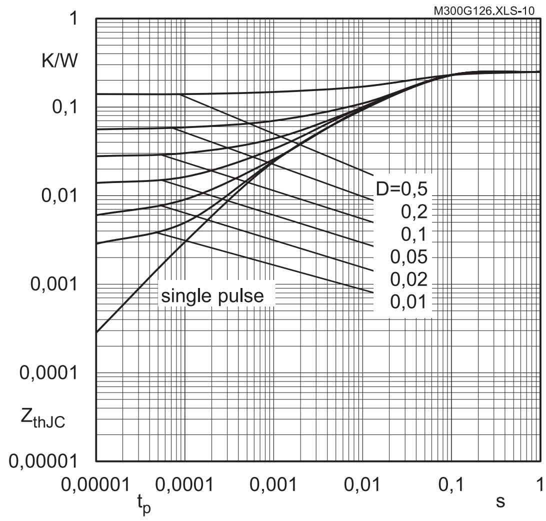


Fig. 10: Transient thermal impedance of FWD
$Z_{thp(j-c)}=f(t_p)$: $D=t_p/t_c=t_p*f$

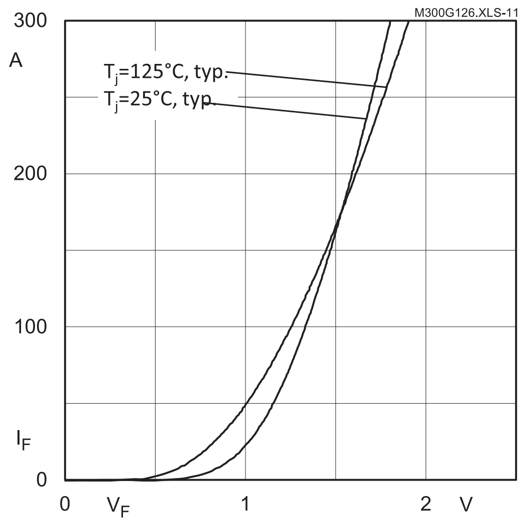


Fig. 11: CAL diode forward characteristic

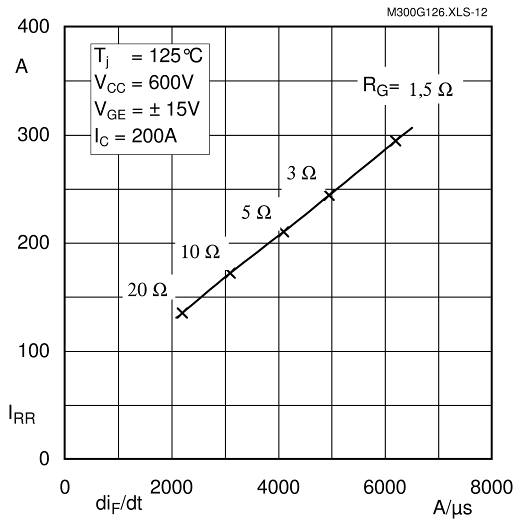
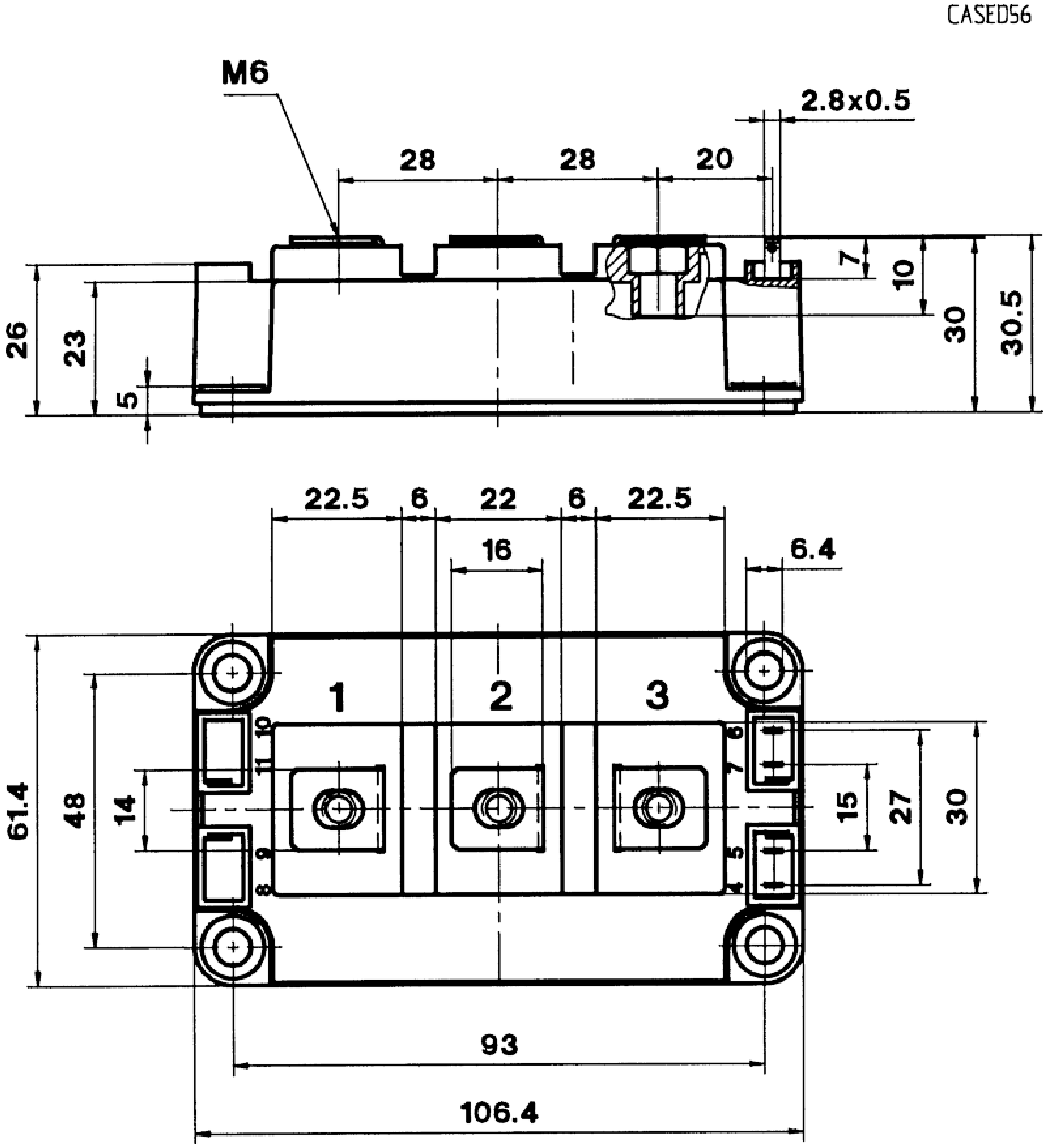


Fig. 12: Typ. CAL diode peak reverse recovery current



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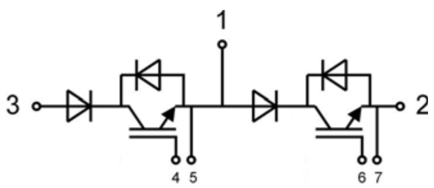

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

* 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.