SKM200GAL17E4



SEMITRANS® 3

IGBT4 Modules

SKM200GAL17E4

Features

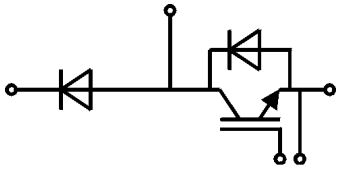
- IGBT4 = 4. generation medium fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. Generation CAL-Diode
- Insulated copper baseplate using DBC Technology (Direct Copper Bonding)
- With integrated Gate resistor
- For switching frequenzies up to 8kHz
- UL recognized, file no. E63532

Typical Applications*

- DC/DC – converter
- Brake chopper
- Switched reluctance motor

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°C



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 175 °C	T_c = 25 °C	321	A
		T_c = 80 °C	248	A
I_{Cnom}			200	A
I_{CRM}	I_{CRM} = 3xI_{Cnom}		600	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 1000 V V_{GE} ≤ 15 V V_{CES} ≤ 1700 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
I_F	T_j = 175 °C	T_c = 25 °C	213	A
		T_c = 80 °C	157	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		1170	A
T_j			-40 ... 175	°C
Freewheeling diode				
I_F	T_j = 175 °C	T_c = 25 °C	213	A
		T_c = 80 °C	157	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		1170	A
T_j			-40 ... 175	°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 = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.90	2.20	V
		T_j = 150 °C		2.30	2.60	V
V_{CE0}	chiplevel	T_j = 25 °C		0.8	0.9	V
		T_j = 150 °C		0.7	0.8	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		5.50	6.50	mΩ
		T_j = 150 °C		8.00	9.00	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 8 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1700 V	T_j = 25 °C			2.7	mA
		T_j = 150 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		18		nF
C_{oes}		f = 1 MHz		0.68		nF
C_{res}		f = 1 MHz		0.58		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1600		nC
R_{Gint}	T_j = 25 °C			3.8		Ω



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Typical Applications*

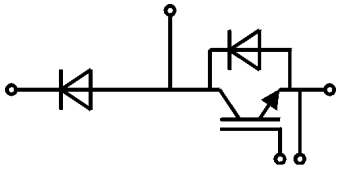
- DC/DC – converter
- Brake chopper
- Switched reluctance motor

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°C

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	V_{CC} = 1200 V	T_j = 150 °C		259		ns
t_r	I_C = 200 A	T_j = 150 °C		35		ns
E_{on}	V_{GE} = +15/-15 V	T_j = 150 °C		69		mJ
$t_{d(off)}$	$R_{G\ on}$ = 2 Ω	T_j = 150 °C		712		ns
t_f	$R_{G\ off}$ = 2 Ω	T_j = 150 °C		149		ns
E_{off}	di/dt_{on} = 6830 A/µs di/dt_{off} = 1120 A/µs du/dt = 5250 V/µs	T_j = 150 °C		79		mJ
$R_{th(j-c)}$	per IGBT				0.122	K/W
Inverse diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.00	2.40	V
		T_j = 150 °C		2.15	2.57	V
V_{F0}	chiplevel	T_j = 25 °C		1.32	1.56	V
		T_j = 150 °C		1.08	1.22	V
r_F	chiplevel	T_j = 25 °C		3.4	4.2	mΩ
		T_j = 150 °C		5.4	6.8	mΩ
I_{RRM}	I_F = 200 A di/dt_{off} = 5910 A/µs V_{GE} = ±15 V V_{CC} = 1200 V	T_j = 150 °C		272		A
Q_{rr}		T_j = 150 °C		63		µC
E_{rr}		T_j = 150 °C		45		mJ
$R_{th(j-c)}$	per diode				0.276	K/W
Freewheeling diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.00	2.40	V
		T_j = 150 °C		2.15	2.57	V
V_{F0}	chiplevel	T_j = 25 °C		1.32	1.56	V
		T_j = 150 °C		1.08	1.22	V
r_F	chiplevel	T_j = 25 °C		3.4	4.2	mΩ
		T_j = 150 °C		5.4	6.8	mΩ
I_{RRM}	I_F = 200 A di/dt_{off} = 5910 A/µs V_{GE} = ±15 V V_{CC} = 1200 V	T_j = 150 °C		272		A
Q_{rr}		T_j = 150 °C		63		µC
E_{rr}		T_j = 150 °C		45		mJ
$R_{th(j-c)}$	per Diode				0.276	K/W
Module						
L_{CE}				15		nH
$R_{CC'+EE'}$	terminal-chip	T_C = 25 °C		0.55		mΩ
		T_C = 125 °C		0.85		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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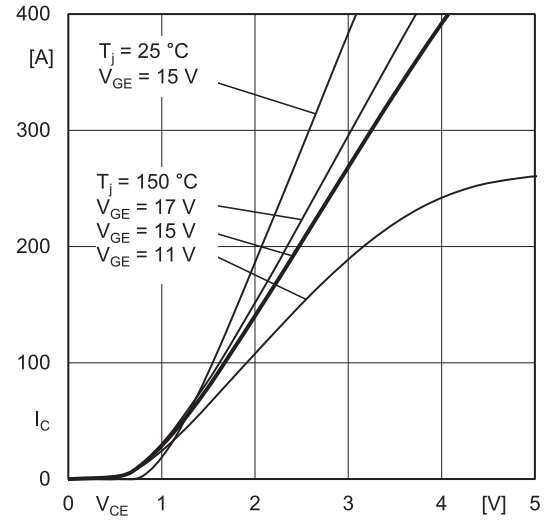


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

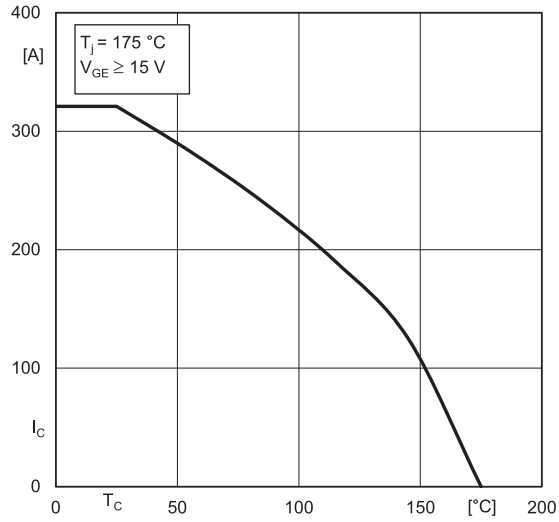


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

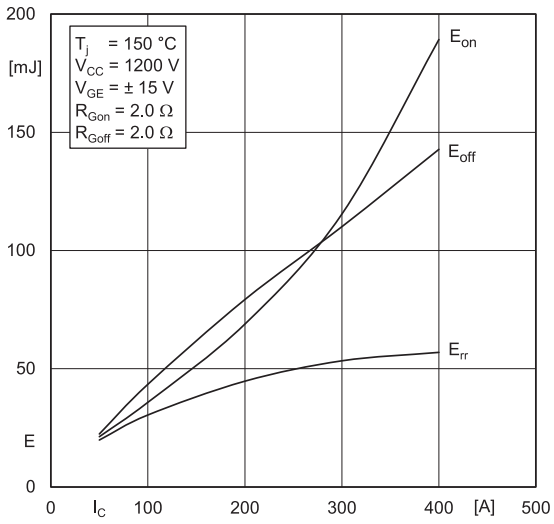


Fig. 3: Typ. turn-on /-off energy = f (I_C)

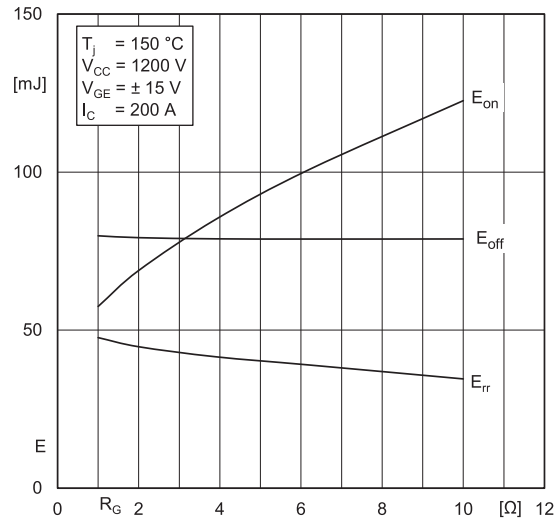


Fig. 4: Typ. turn-on /-off energy = f (R_G)

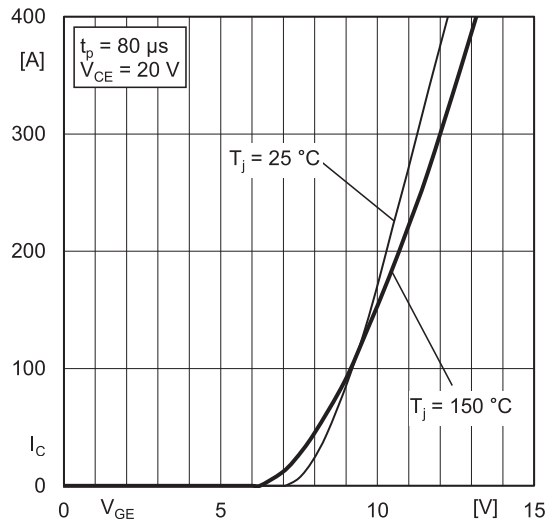


Fig. 5: Typ. transfer characteristic

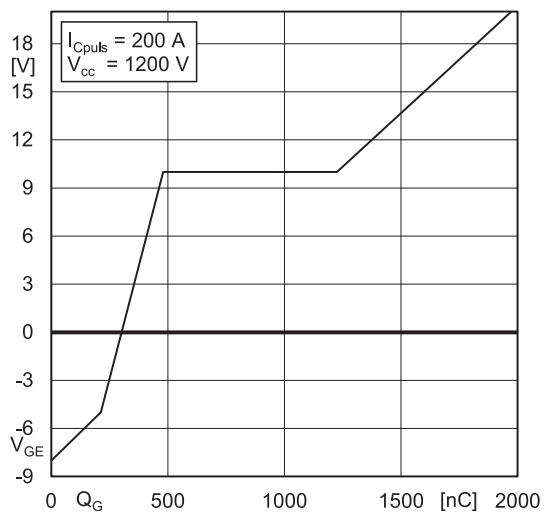


Fig. 6: Typ. gate charge characteristic

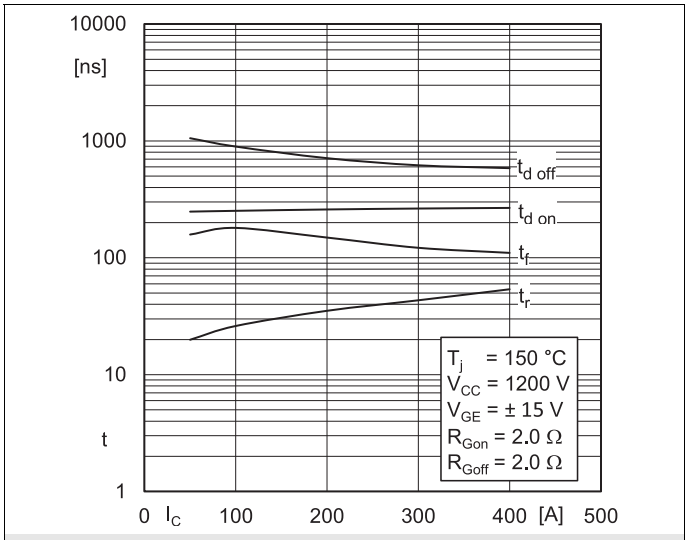


Fig. 7: Typ. switching times vs. I_C

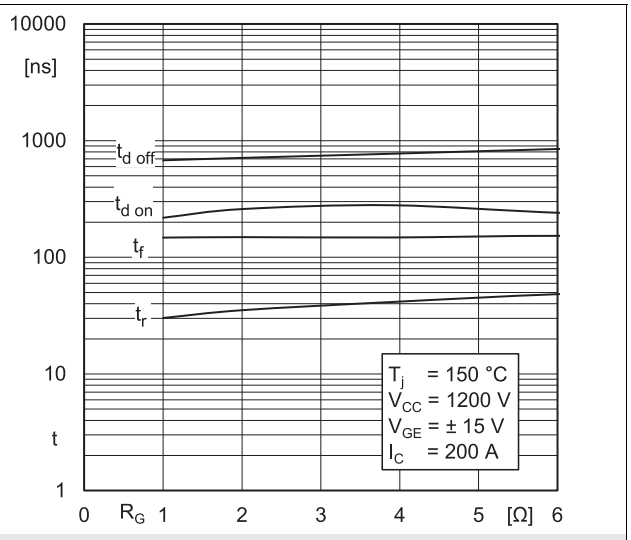


Fig. 8: Typ. switching times vs. gate resistor R_G

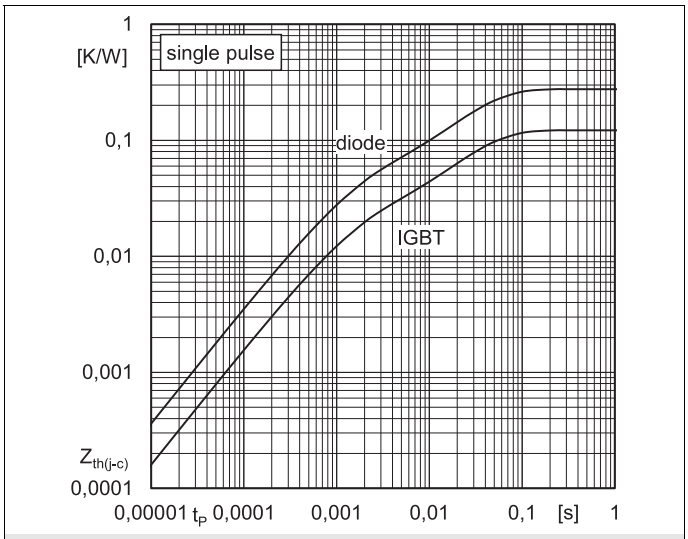


Fig. 9: Transient thermal impedance

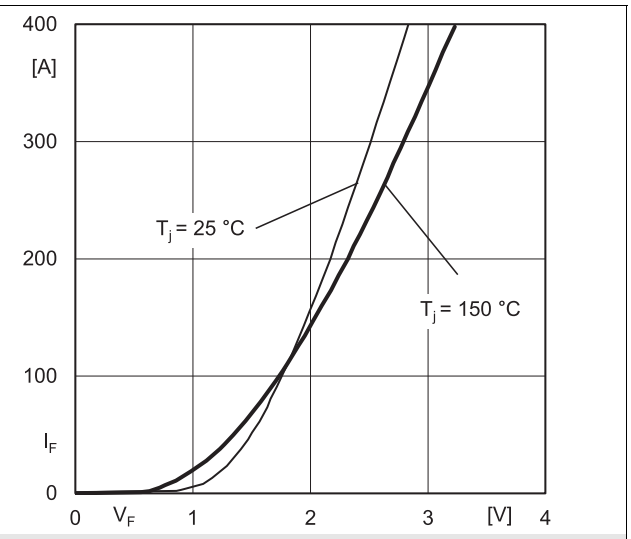


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

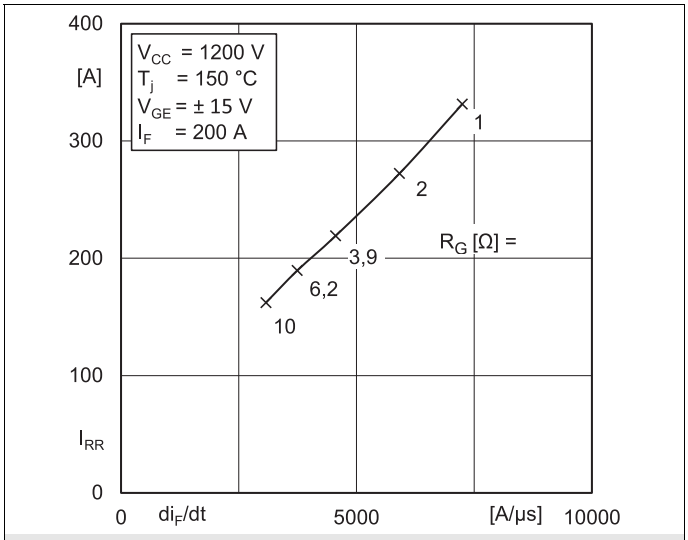


Fig. 11: CAL diode peak reverse recovery current

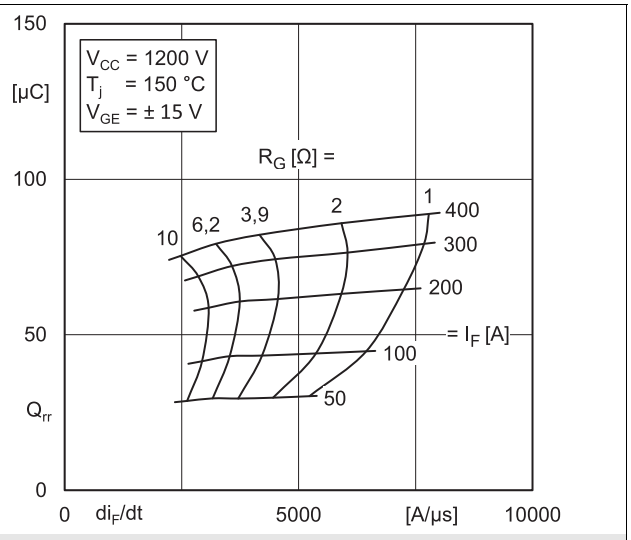
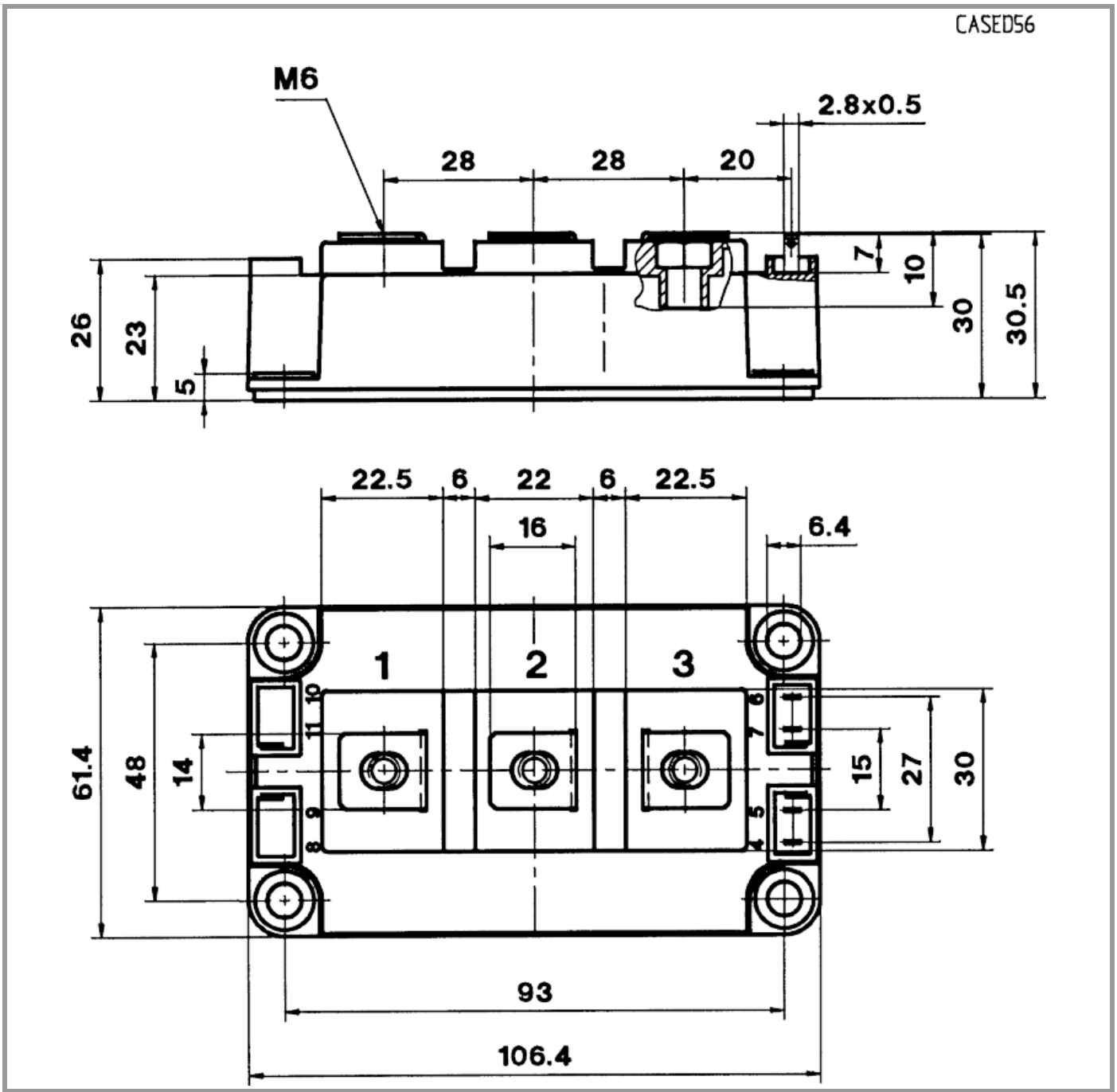
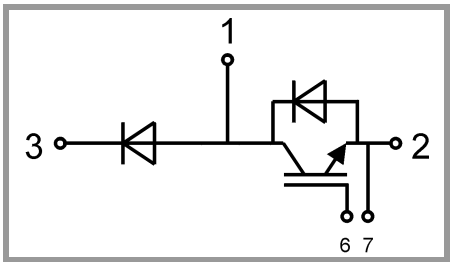


Fig. 12: Typ. CAL diode peak reverse recovery charge

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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.