

SKM150GB17E4G



SEMITRANS® 3

IGBT4 Modules

SKM150GB17E4G

Features

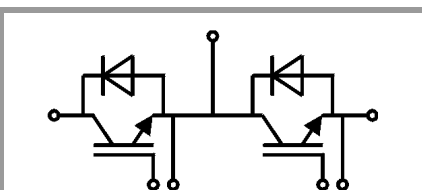
- IGBT4 = 4. generation medium fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. Generation CAL-Diode
- Insulated copper baseplate using DBC Technology (Direct Copper Bonding)
- With integrated Gate resistor
- For switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders
- Wind power
- Public transport

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max.
- Recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results valid for $T_j = 150^\circ\text{C}$



GB

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
IGBT			
V_{CES}	$T_j = 25^\circ\text{C}$	1700	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	242
		$T_c = 80^\circ\text{C}$	187
I_{Cnom}		150	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	450	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 1000\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1700\text{ V}$	$T_j = 150^\circ\text{C}$	10
			μs
T_j		-40 ... 175	$^\circ\text{C}$
Inverse diode			
V_{RRM}	$T_j = 25^\circ\text{C}$	1700	V
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	163
		$T_c = 80^\circ\text{C}$	121
I_{Fnom}		150	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	300	A
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^\circ$, $T_j = 25^\circ\text{C}$	918	A
T_j		-40 ... 175	$^\circ\text{C}$
Module			
$I_{t(RMS)}$		500	A
T_{stg}		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.90	2.21	V
		$T_j = 150^\circ\text{C}$	2.35	2.60	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	0.80	0.90	V
		$T_j = 150^\circ\text{C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	7.3	8.7	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	11	12	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 6\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$, $V_{CE} = 1700\text{ V}$, $T_j = 25^\circ\text{C}$			2.0	mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	13.6		nF
C_{oes}		$f = 1\text{ MHz}$	0.53		nF
C_{res}		$f = 1\text{ MHz}$	0.44		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		1200		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		4.3		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$ $I_C = 150\text{ A}$	$T_j = 150^\circ\text{C}$	205		ns
t_r	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	23.5		ns
E_{on}	$R_{Gon} = 1\ \Omega$	$T_j = 150^\circ\text{C}$	39		mJ
$t_{d(off)}$	$R_{Goff} = 1\ \Omega$	$T_j = 150^\circ\text{C}$	550		ns
t_f		$T_j = 150^\circ\text{C}$	150		ns
E_{off}		$T_j = 150^\circ\text{C}$	59		mJ
$R_{th(j-c)}$	per IGBT			0.161	K/W
$R_{th(c-s)}$	per IGBT ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)		0.064		K/W



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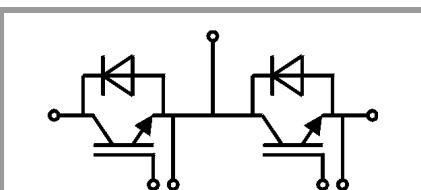
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Remarks

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- Recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results valid for $T_j = 150^\circ\text{C}$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.00	2.40	V
		$T_j = 150^\circ\text{C}$		2.14	2.56	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.32	1.56	V
		$T_j = 150^\circ\text{C}$		1.08	1.22	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		4.5	5.6	m Ω
		$T_j = 150^\circ\text{C}$		7.1	9.0	m Ω
I_{RRM}	$I_F = 150\text{ A}$	$T_j = 150^\circ\text{C}$		185		A
Q_{rr}	$V_{GE} = \pm 15\text{ V}$ $V_{CC} = 1200\text{ V}$	$T_j = 150^\circ\text{C}$		49		μC
E_{rr}		$T_j = 150^\circ\text{C}$		33		mJ
$R_{th(j-c)}$	per diode				0.356	K/W
$R_{th(c-s)}$	per diode ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)			0.072		K/W
Module						
L_{CE}				15		nH
R_{CC+EE}	measured per switch	$T_c = 25^\circ\text{C}$		0.55		m Ω
		$T_c = 125^\circ\text{C}$		0.85		m Ω
$R_{th(c-s)1}$	calculated without thermal coupling ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)			0.017		K/W
	$R_{th(c-s)2}$ including thermal coupling, Ts underneath module ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)			0.027		K/W
M_s	to heat sink M6		3		5	Nm
M_t			2.5		5	Nm
	to terminals M6					
w					325	g



GB

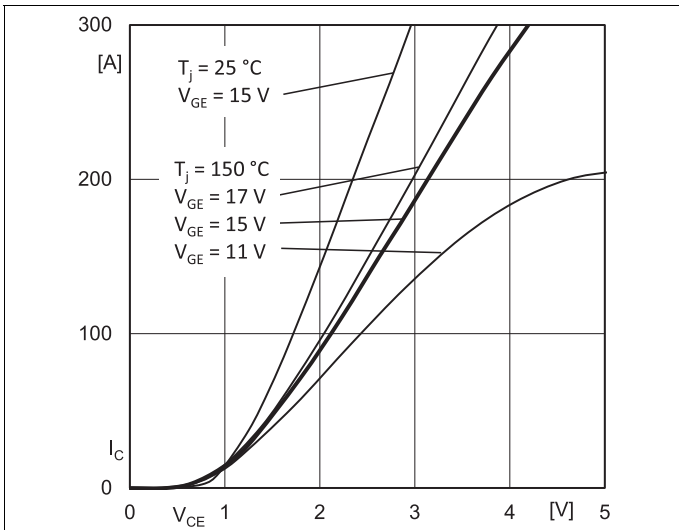


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

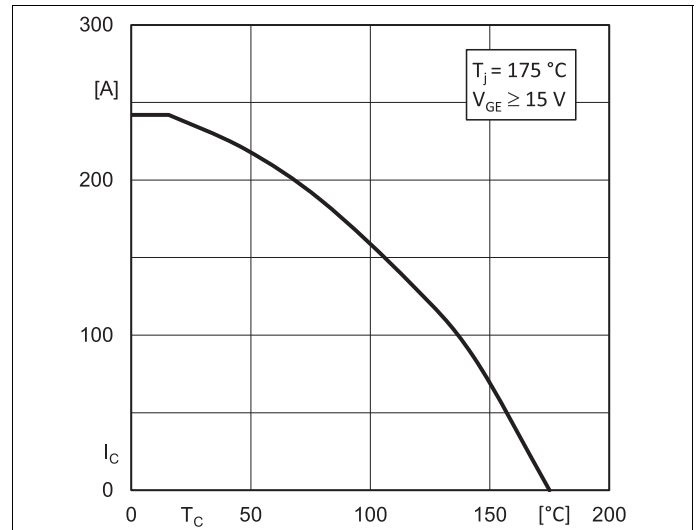


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

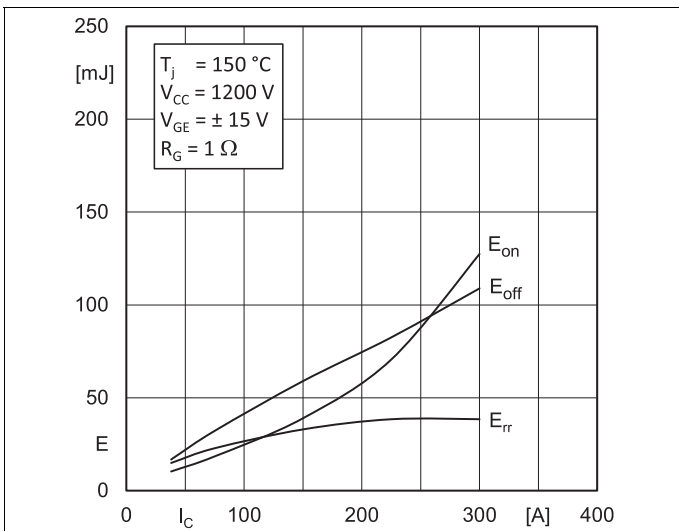


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

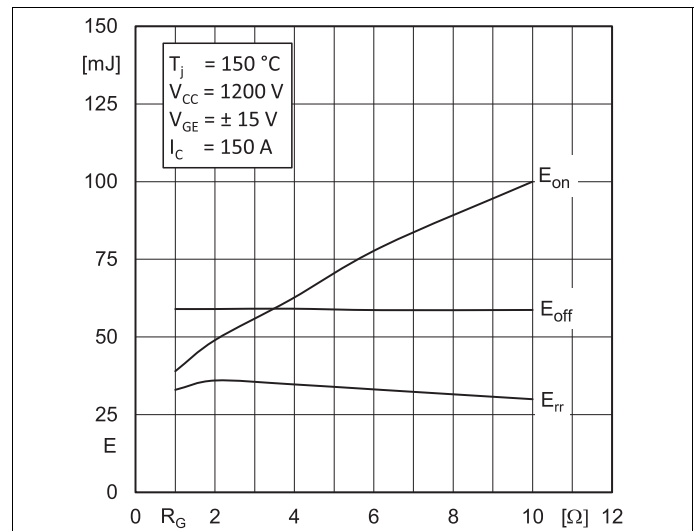


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

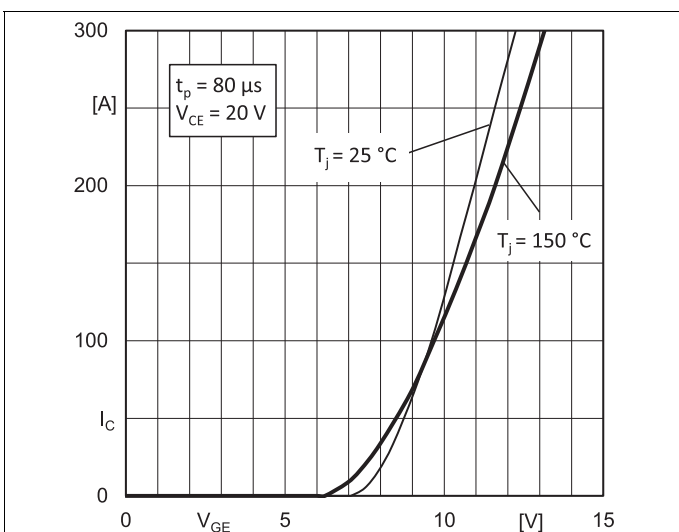


Fig. 5: Typ. transfer characteristic

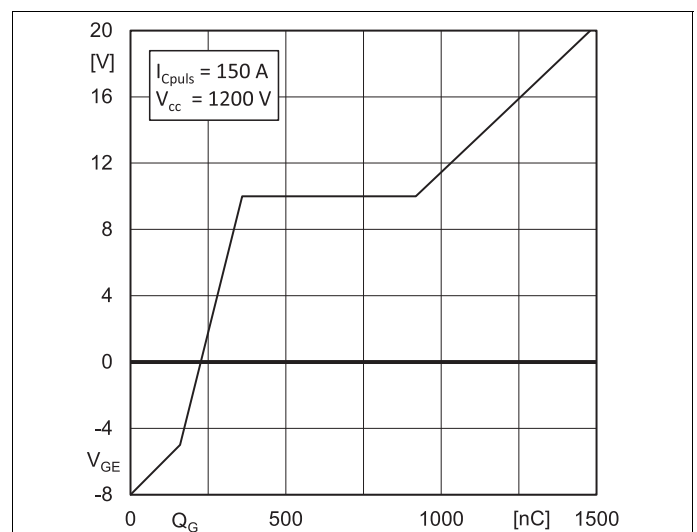


Fig. 6: Typ. gate charge characteristic

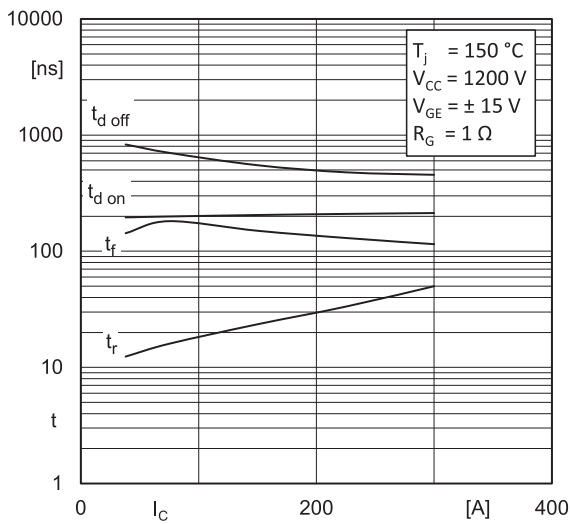


Fig. 7: Typ. switching times vs. I_C

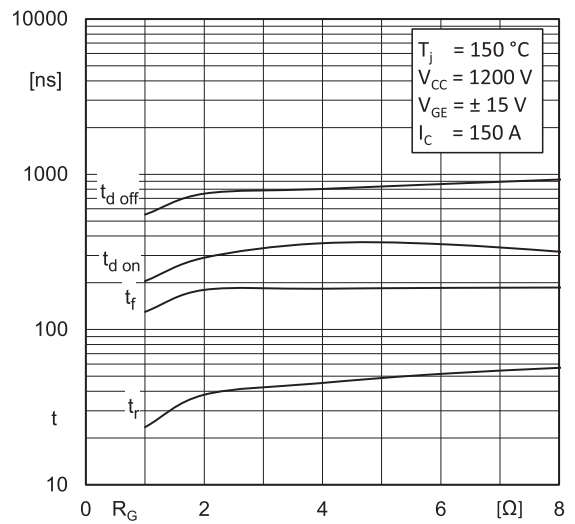


Fig. 8: Typ. switching times vs. gate resistor R_G

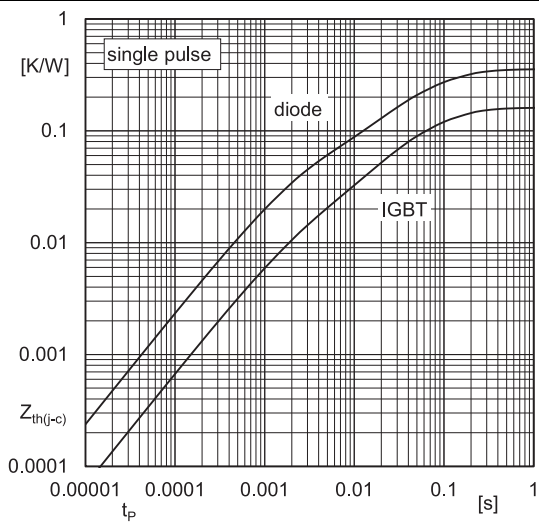


Fig. 9: Transient thermal impedance

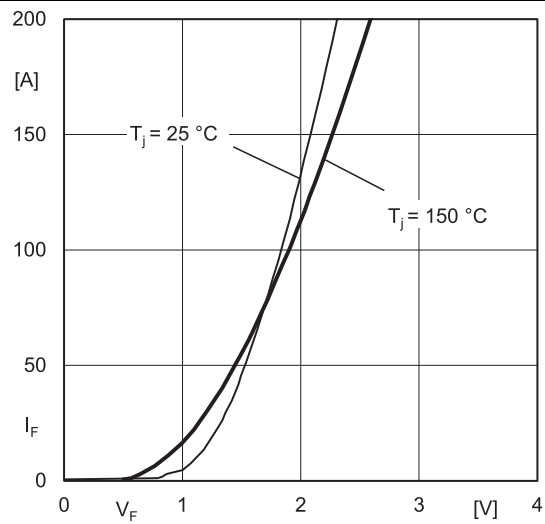
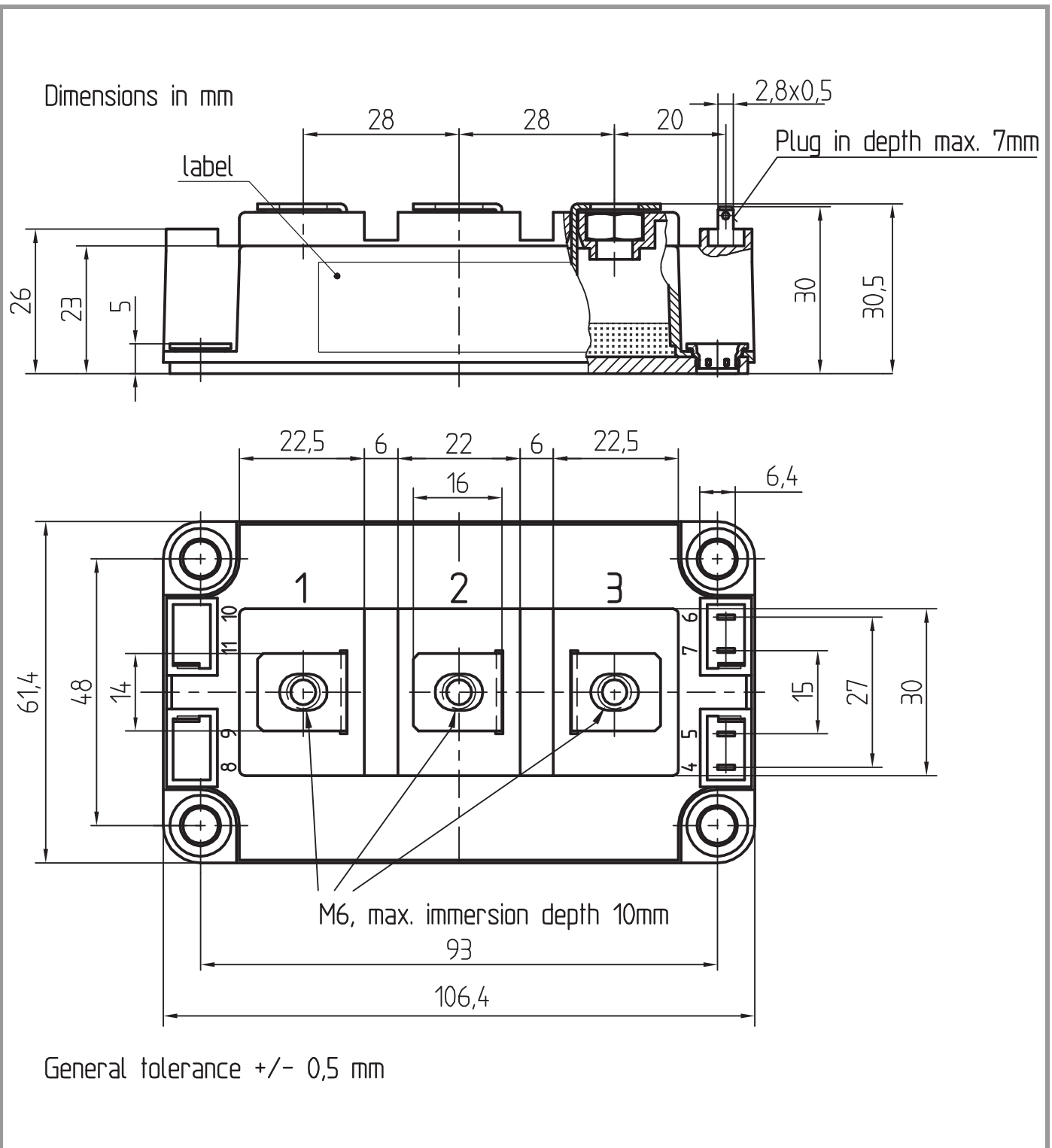
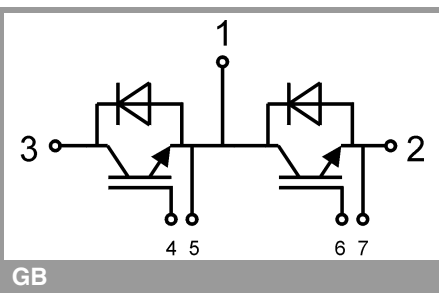


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC+EE'}$

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

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