SKM200GB12M7



SEMITRANS® 2

IGBT M7 Modules

SKM200GB12M7

Features*

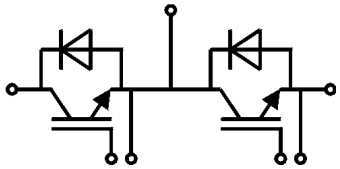
- $V_{CE(sat)}$ with positive temperature coefficient
- High overload capability
- Low loss high density IGBT´s
- Fast & soft switching inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Insulated copper baseplate using DBC Technology (Direct Bonded Copper)
- UL recognized, file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic welders

Remarks

- Max. case temperature limited to T_C = T_S = 125 °C
- Product reliability results are valid for T_j = 150 °C (recommended $T_{j,op}$ = -40...+150 °C)
- For storage and case temperature with TIM see document: "Technical Explanations Thermal Interface Materials"



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	282	A
		T_c = 80 °C	214	A
I_{Cnom}			200	A
I_{CRM}			400	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	8	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	217	A
		T_c = 80 °C	163	A
I_{FRM}			400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1180	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			200	A
T_{stg}	module without TIM		-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		1.55	1.88	V
		T_j = 150 °C		1.81		V
V_{CE0}	chiplevel	T_j = 25 °C		0.85	1.02	V
		T_j = 150 °C		0.75		V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		3.5	4.3	mΩ
		T_j = 150 °C		5.3		mΩ
$V_{GE(th)}$	V_{CE} = 10 V, I_C = 20 mA		5.4	6	6.6	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				2.0	mA
C_{ies}	V_{CE} = 10 V V_{GE} = 0 V	f = 1 MHz		37.0		nF
C_{oes}		f = 1 MHz		1.20		nF
C_{res}		f = 1 MHz		0.42		nF
Q_G	V_{GE} = -8V ... + 15V			1780		nC
R_{Gint}	T_j = 25 °C			2.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 200 A V_{GE} = +15/-15 V $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt$_{on}$ = 2000 A/µs di/dt$_{off}$ = 2100 A/µs dv/dt = 5700 V/µs L_s = 25 nH	T_j = 150 °C		248		ns
t_r		T_j = 150 °C		67		ns
E_{on}		T_j = 150 °C		32		mJ
$t_{d(off)}$		T_j = 150 °C		317		ns
t_f		T_j = 150 °C		77		ns
E_{off}		T_j = 150 °C		21.5		mJ
$R_{th(j-c)}$	per IGBT				0.195	K/W
$R_{th(c-s)}$	per IGBT, P12 (reference)			0.059		K/W
$R_{th(c-s)}$	per IGBT, HP-PCM			0.034		K/W



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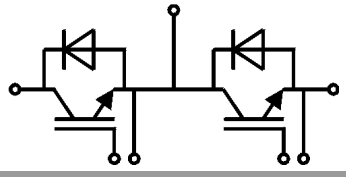
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.21	2.59	V
		T_j = 150 °C		2.31		V
V_{F0}	chiplevel	T_j = 25 °C		1.33	1.53	V
		T_j = 150 °C		1.03		V
r_F	chiplevel	T_j = 25 °C		4.4	5.3	mΩ
		T_j = 150 °C		6.4		mΩ
I_{RRM}	I_F = 200 A di/dt_{off} = 1950 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		95		A
Q_{rr}		T_j = 150 °C		30		µC
E_{rr}		T_j = 150 °C		11		mJ
$R_{th(j-c)}$	per diode				0.245	K/W
$R_{th(c-s)}$	per diode, P12 (reference)			0.065		K/W
$R_{th(c-s)}$	per diode, HP-PCM			0.039		K/W
Module						
L_{CE}				30		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		0.55		mΩ
		T_C = 125 °C		0.77		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling			0.0155		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, P12 (reference)			0.0253		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, HP-PCM			0.0149		K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M5	2.5		5	Nm
				-		Nm
w					160	g



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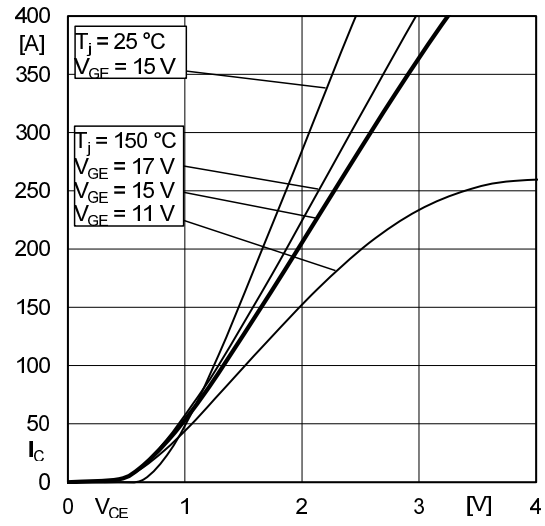

Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

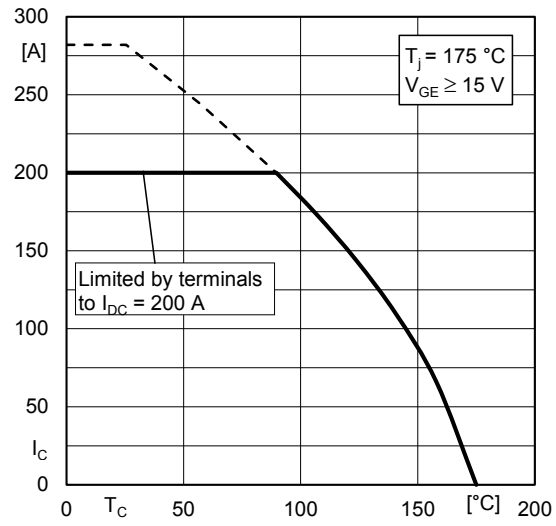

Fig. 2: Rated current vs. temperature $I_c = f(T_c)$

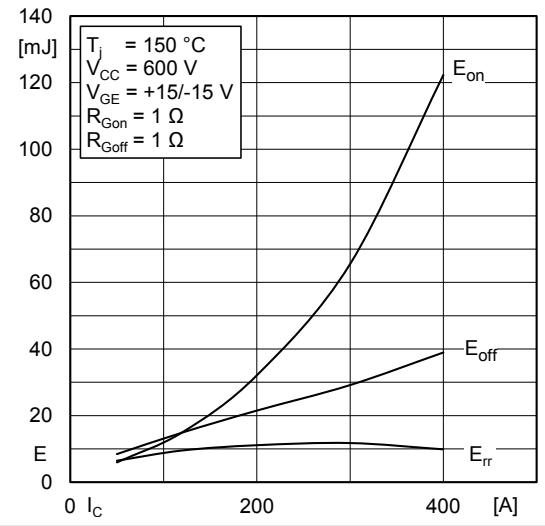

Fig. 3: Typ. turn-on /-off energy = f (I_C)

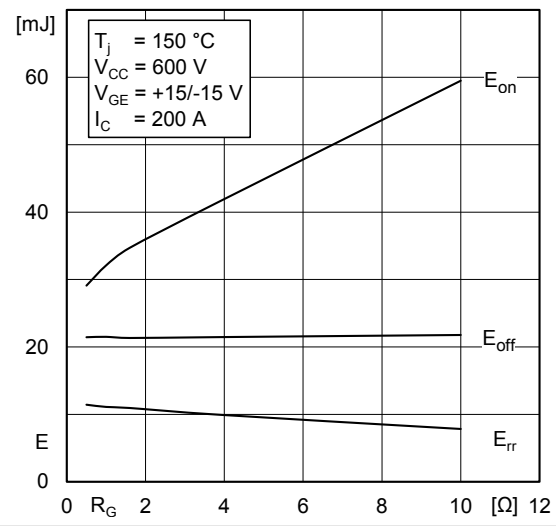

Fig. 4: Typ. turn-on /-off energy = f (R_G)

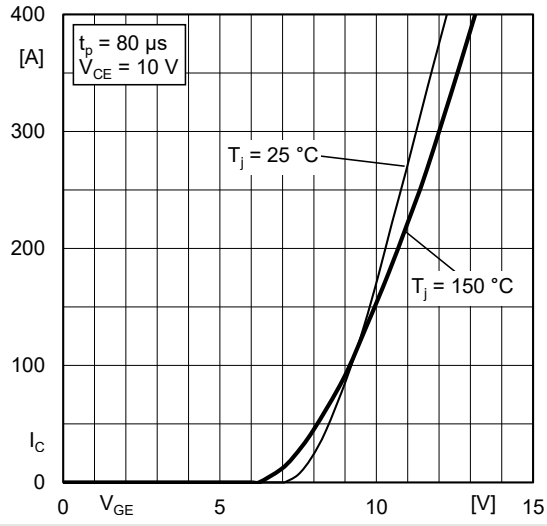

Fig. 5: Typ. transfer characteristic

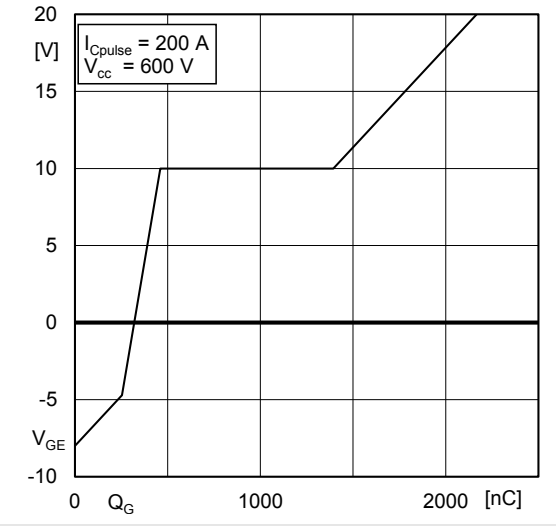

Fig. 6: Typ. gate charge characteristic

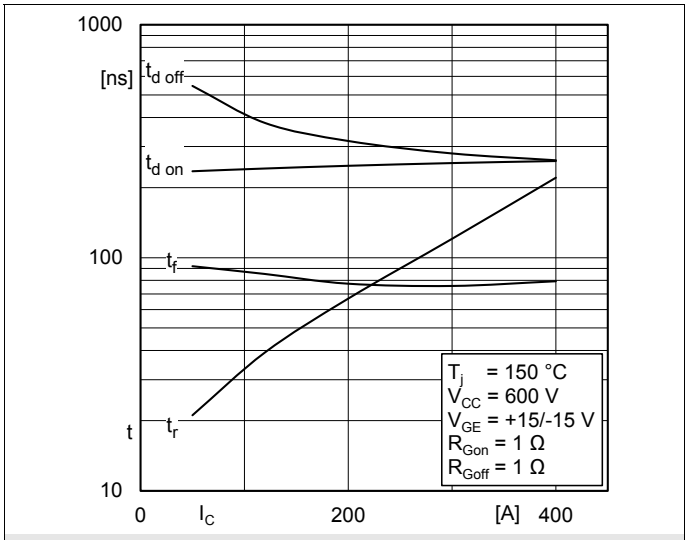

Fig. 7: Typ. switching times vs. I_C

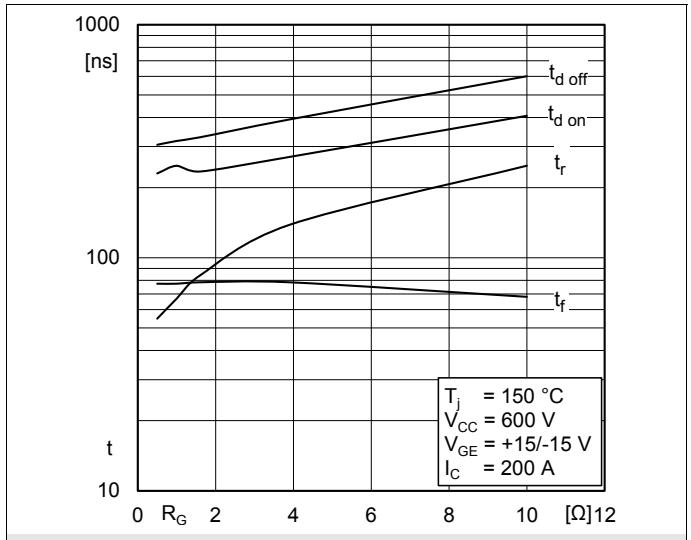

Fig. 8: Typ. switching times vs. gate resistor R_G

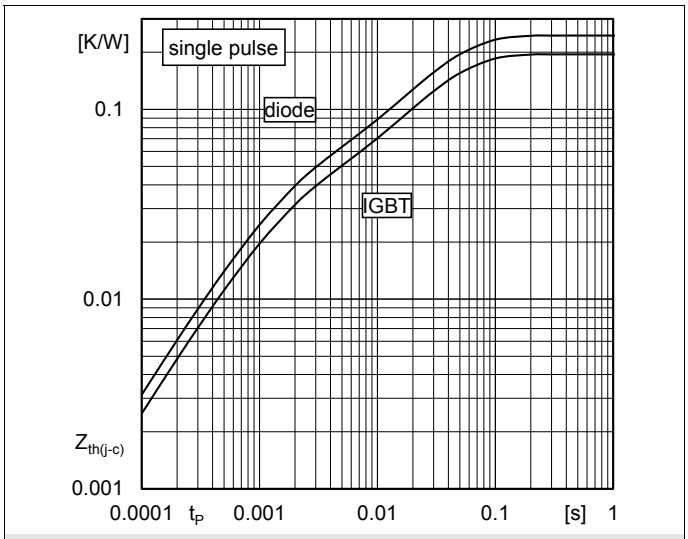

Fig. 9: Transient thermal impedance

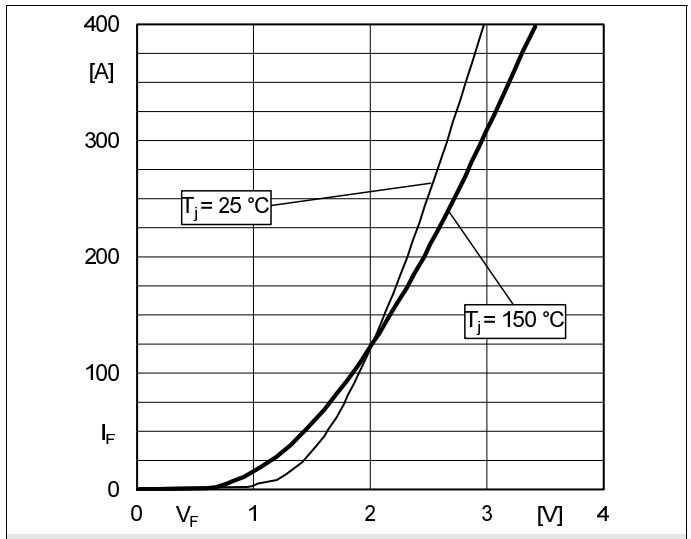

Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

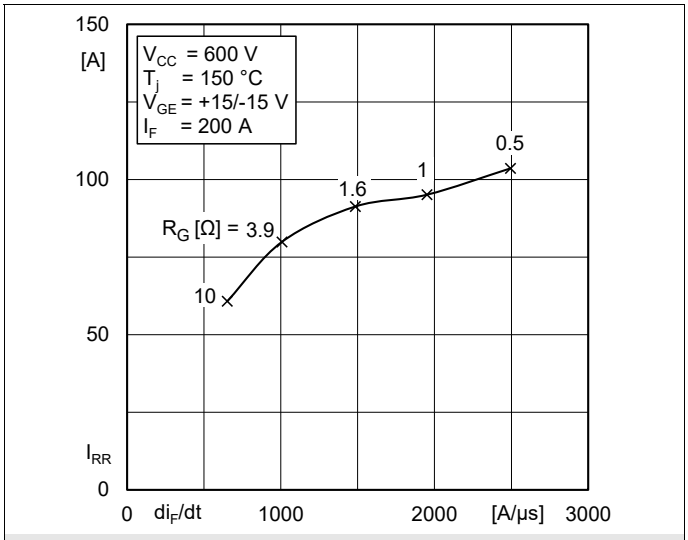

Fig. 11: Typ. CAL diode peak reverse recovery current

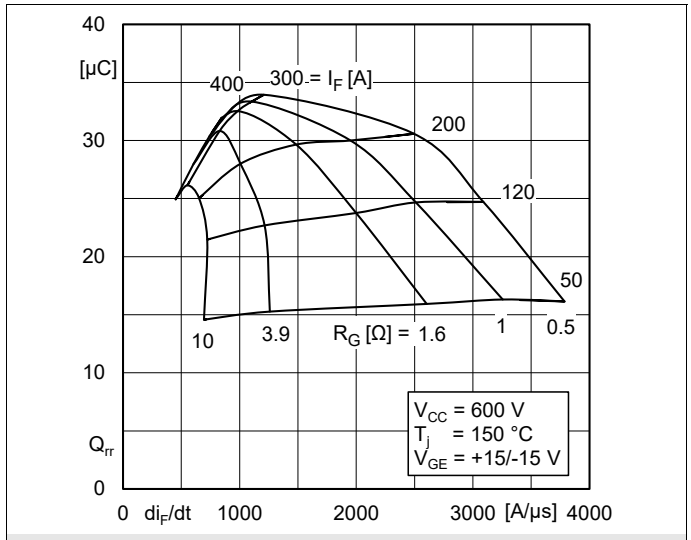

Fig. 12: Typ. CAL diode peak reverse recovery charge

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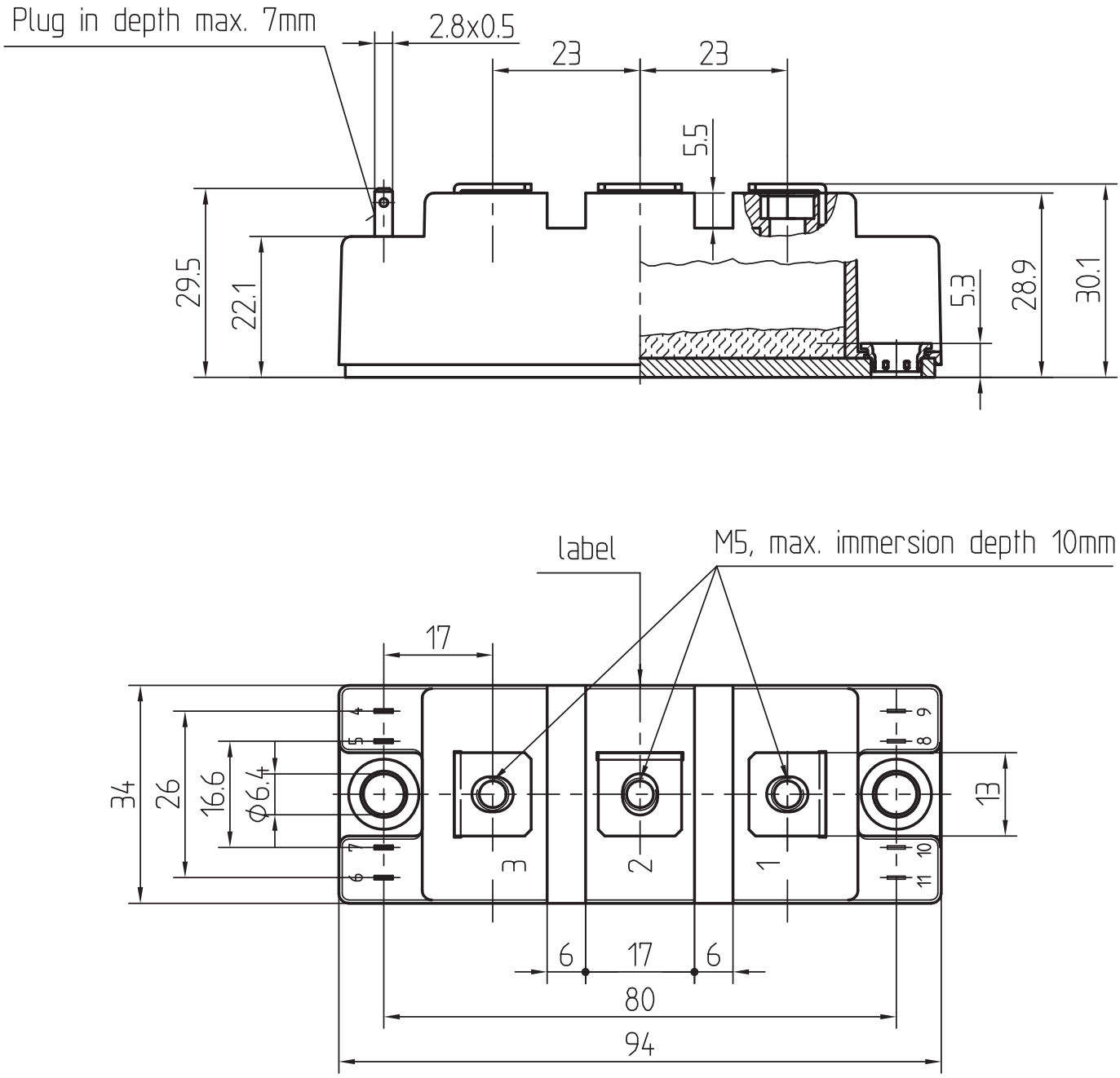
Dimensions in mm



General tolerance +/- 0.5 mm

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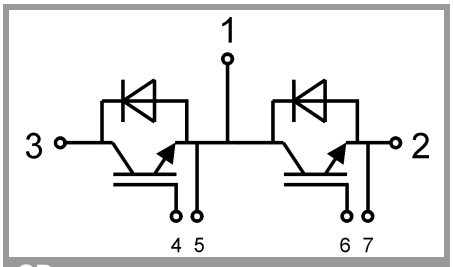

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IMPORTANT INFORMATION AND WARNINGS

This is an electrostatic discharge sensitive device (ESDS) according to international standard IEC 61340.

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