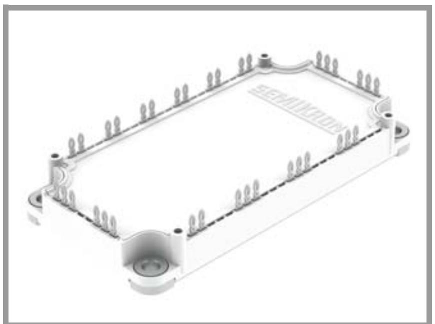
SEMiX206GD12T4p



SEMiX® 6p

Trench IGBT Modules

SEMiX206GD12T4p

Features*

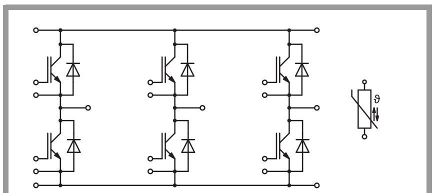
- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

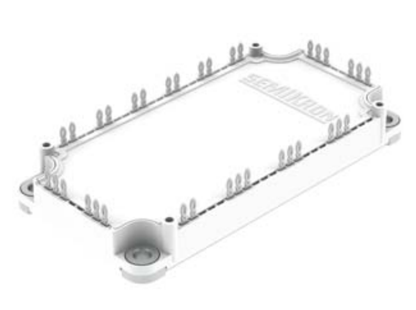
- Case temperature limited to T_C=125°C max.
- V_{isol} between temperature sensor and power section is only 2500V
- Product reliability results valid for $T_j \leq$ 150°C (recommended T_{jop}= -40 ... 150°C)



GD

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	314	A
		T_c = 80 °C	242	A
I_{Cnom}			200	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		600	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 20 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	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_{Fnom}			200	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1180	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	per connector pin		50	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50Hz, 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		1.80	2.15	V
		T_j = 150 °C		2.10	2.40	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		5.0	6.3	mΩ
		T_j = 150 °C		7.0	8.0	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 7.4 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				2.7	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		14.0		nF
C_{oes}		f = 1 MHz		0.77		nF
C_{res}		f = 1 MHz		0.50		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1150		nC
R_{Gint}	T_j = 25 °C			3.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 200 A V_{GE} = +15/-15 V $R_{G\,on}$ = 1.1 Ω $R_{G\,off}$ = 1.1 Ω di/dt$_{on}$ = 4600 A/µs di/dt$_{off}$ = 2000 A/µs dv/dt = 3800 V/µs L_s = 25 nH	T_j = 150 °C		141		ns
t_r		T_j = 150 °C		41		ns
E_{on}		T_j = 150 °C		19		mJ
$t_{d(off)}$		T_j = 150 °C		395		ns
t_f		T_j = 150 °C		82		ns
E_{off}		T_j = 150 °C		20		mJ
$R_{th(j-c)}$	per IGBT				0.14	K/W
$R_{th(c-s)}$	per IGBT (λ_{grease}=0.81 W/(m*K))			0.04		K/W



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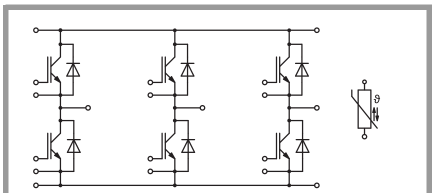


GD

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	2.74	V
V_{F0}	chiplevel	T_j = 25 °C		1.33	1.53	V
		T_j = 150 °C		1.03	1.13	V
r_F	chiplevel	T_j = 25 °C		4.4	5.3	mΩ
		T_j = 150 °C		6.4	8.0	mΩ
I_{RRM}	I_F = 200 A di/dt$_{off}$ = 5700 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		298		A
Q_{rr}		T_j = 150 °C		36		µC
E_{rr}		T_j = 150 °C		14.5		mJ
$R_{th(j-c)}$	per diode				0.245	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(m*K))			0.05		K/W
Module						
L_{CE}				18		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		1		mΩ
		T_C = 125 °C		1.4		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.004		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.006		K/W
M_s	to heat sink (M5)		3		6	Nm
M_t				-		Nm
				-		Nm
w				300		g
Temperature Sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ)			493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			3550 ±2%		K

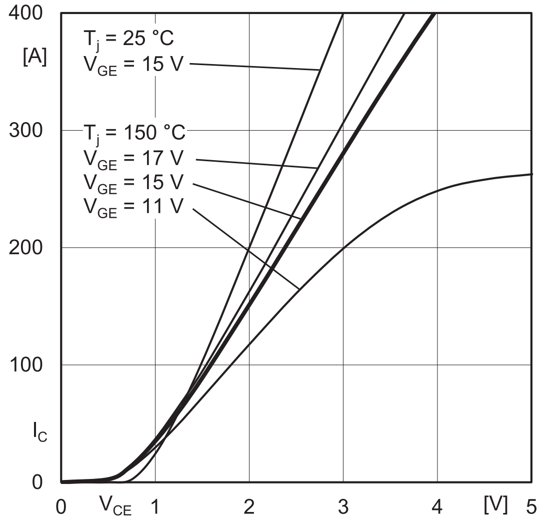


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

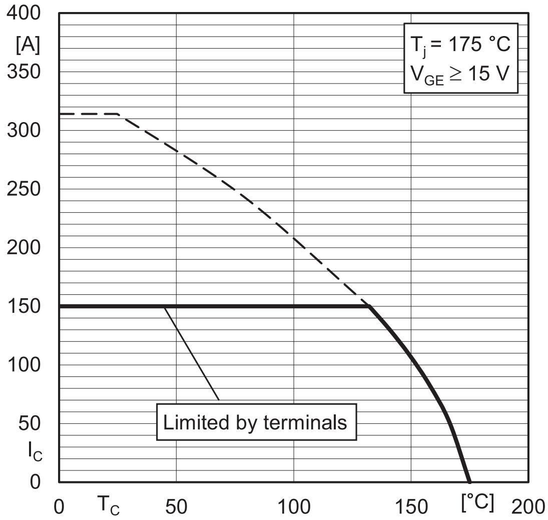


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

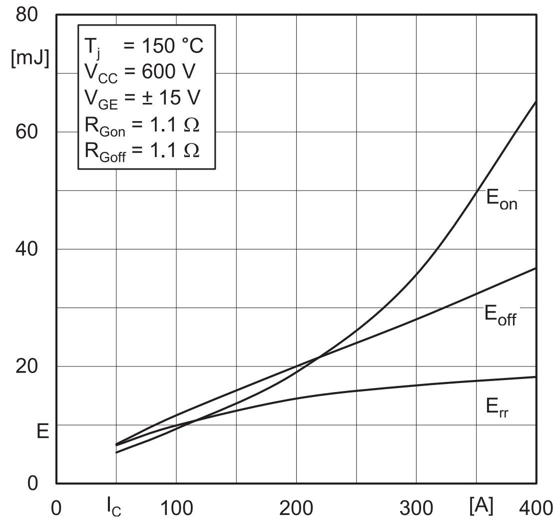


Fig. 3: Typ. turn-on /-off energy = f (I_C)

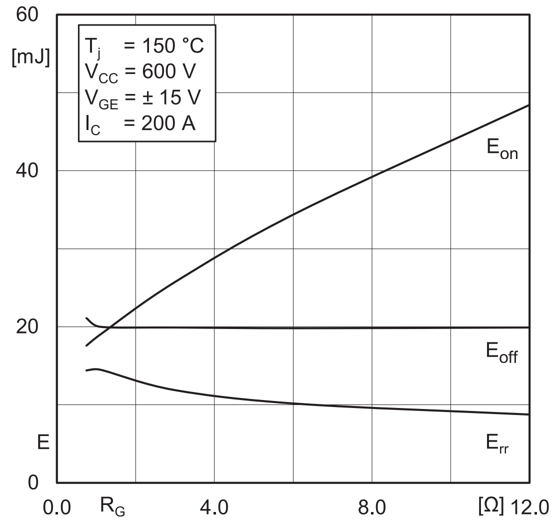


Fig. 4: Typ. turn-on /-off energy = f (R_G)

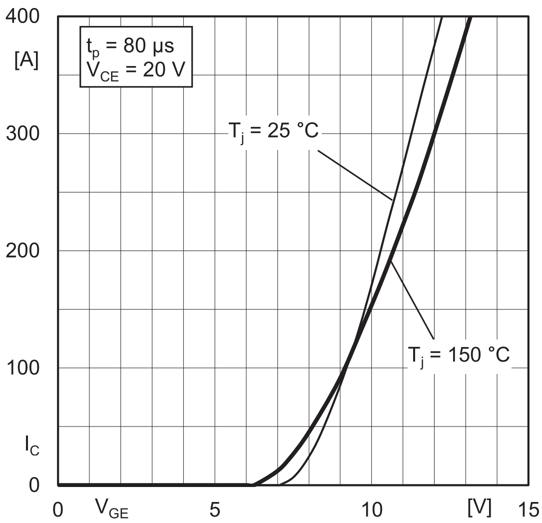


Fig. 5: Typ. transfer characteristic

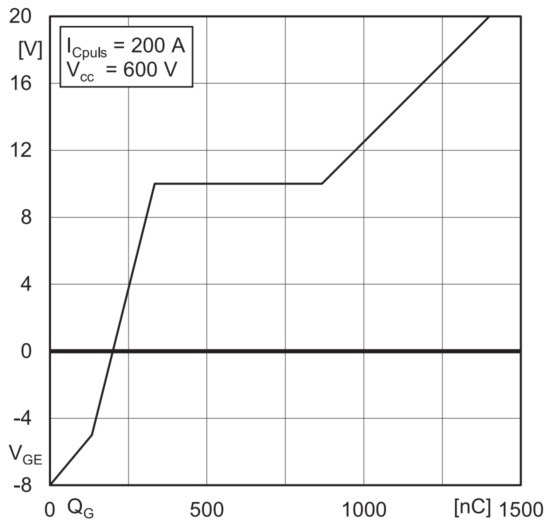


Fig. 6: Typ. gate charge characteristic

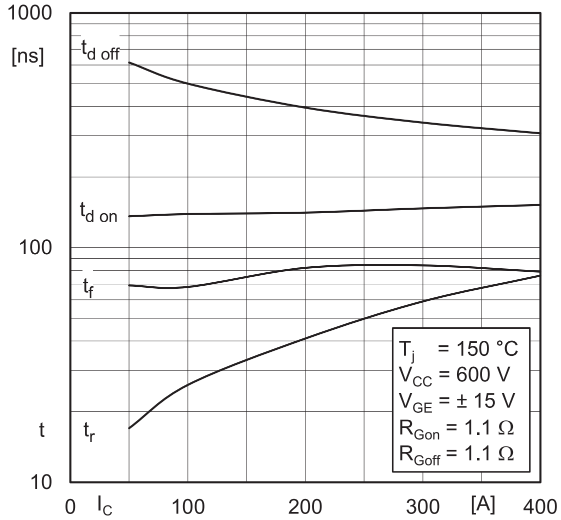


Fig. 7: Typ. switching times vs. I_C

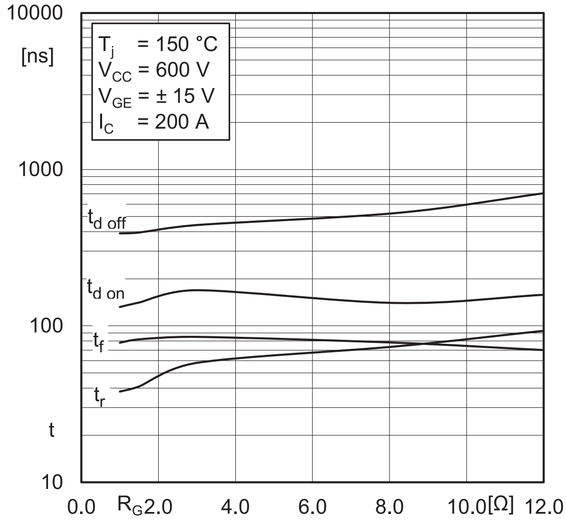


Fig. 8: Typ. switching times vs. gate resistor R_G

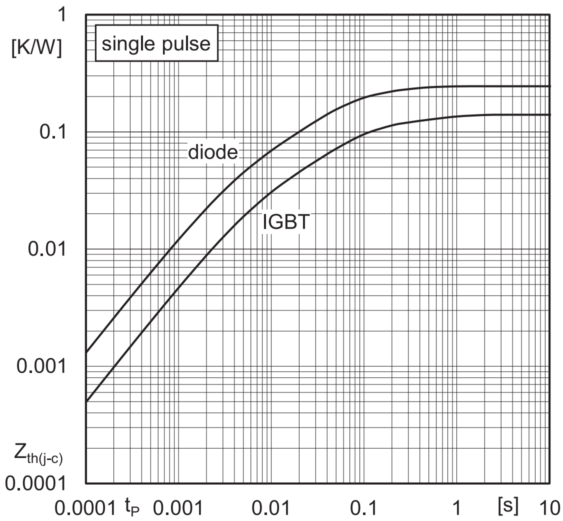


Fig. 9: Transient thermal impedance

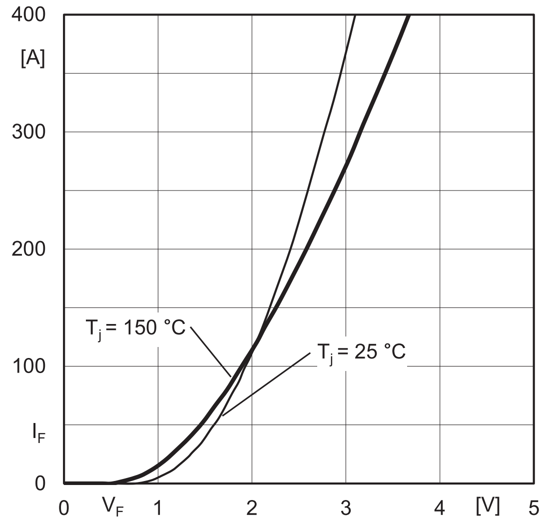


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

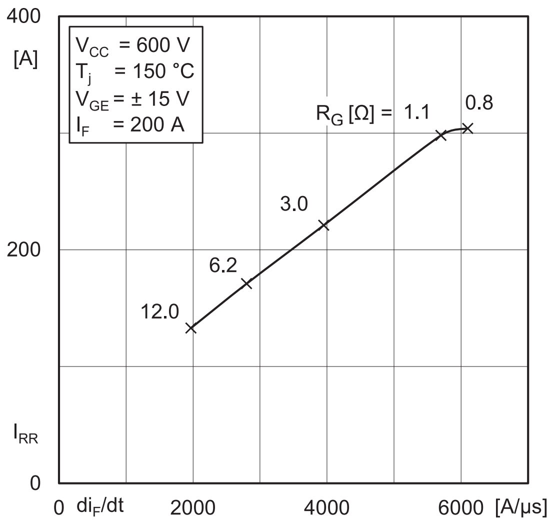


Fig. 11: Typ. CAL diode peak reverse recovery current

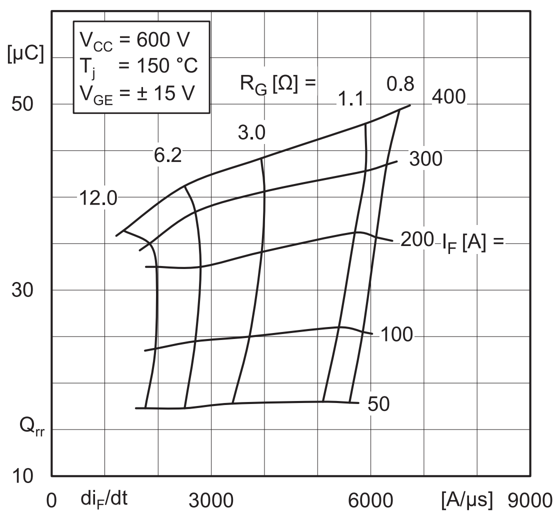
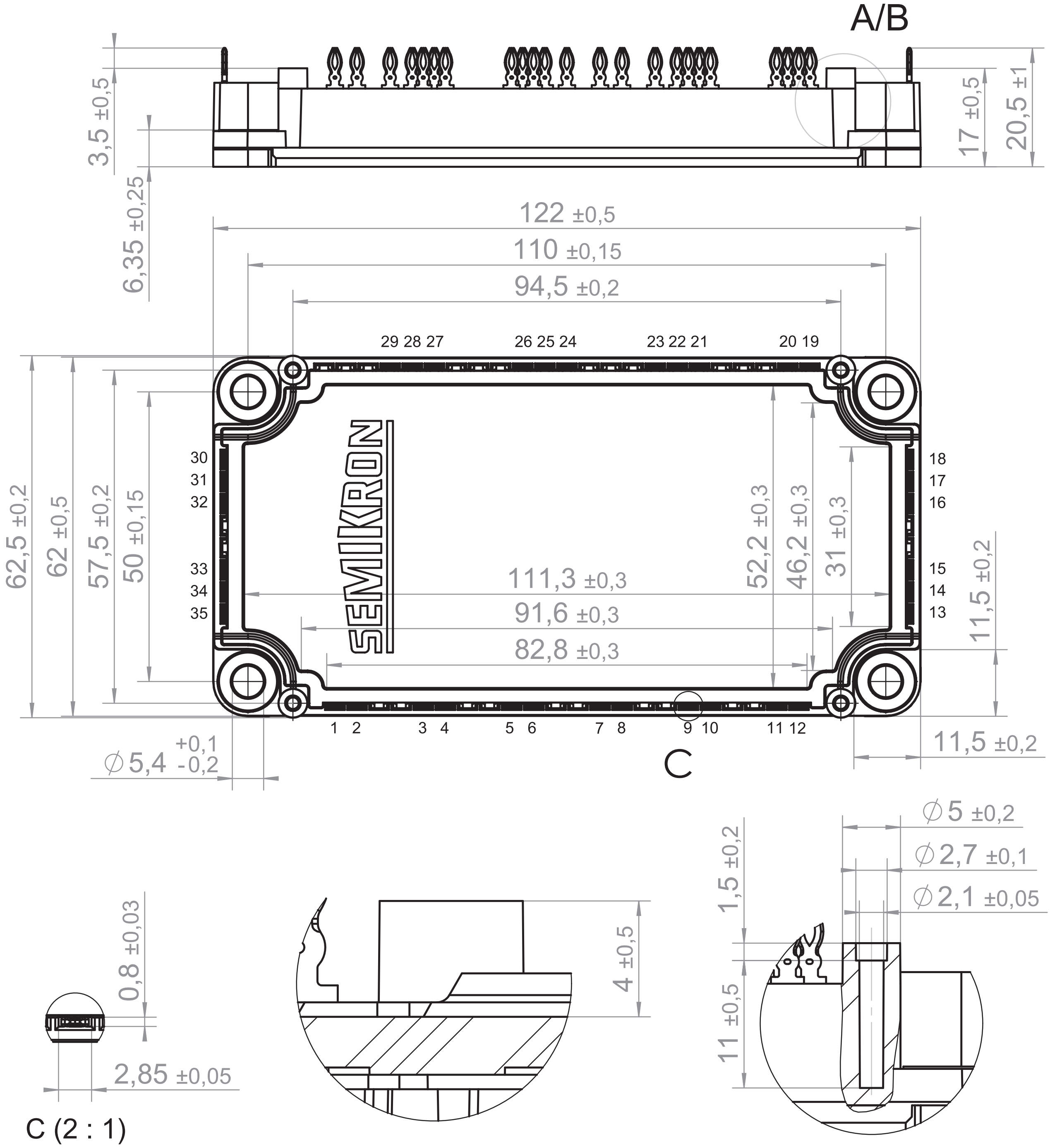


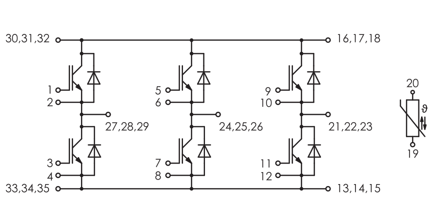
Fig. 12: Typ. CAL diode recovery charge



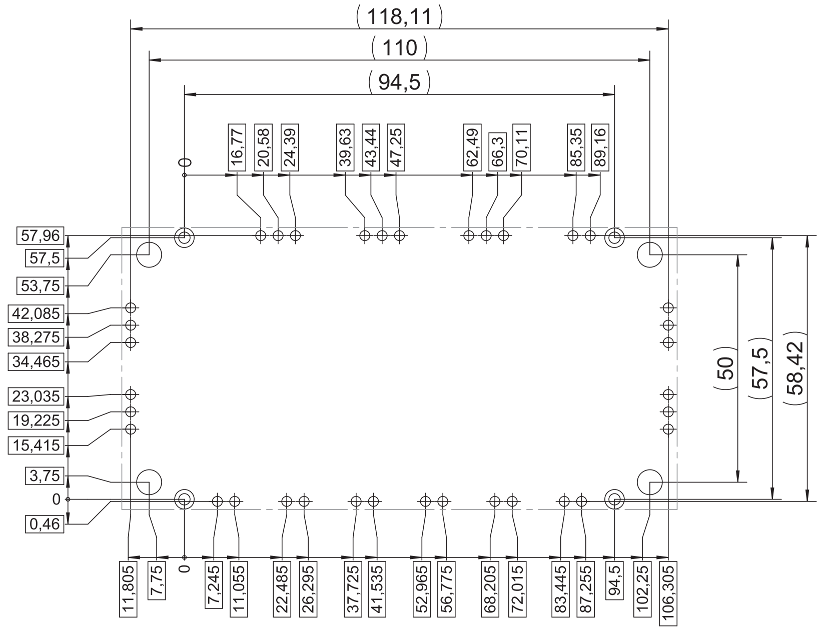
C (2 : 1)

B (5 : 1)
Cross-sectional plane in the middle of the module

A (2 : 1)
Cut-out shows section through the center of the PCB-dome



pinout



- Tolerance for PCB holes ⌖ ⌀ 0,1
- Diameter of plated holes ø 2,14 mm - 2,29 mm
- Diameter of drill ø 2,35 mm

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

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