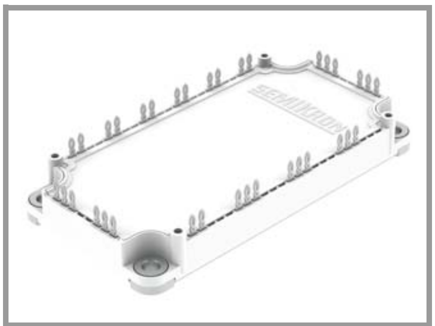


SEMiX® 6p

Trench IGBT Modules

SEMiX106GD12T4p

Features*

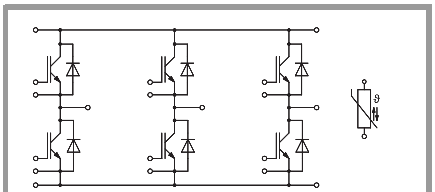
- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

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)



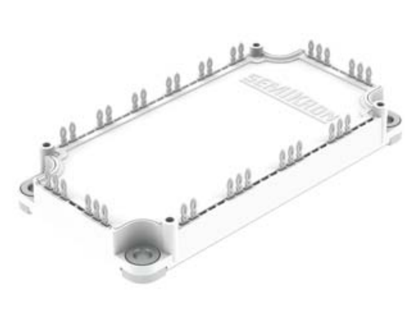
GD

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	167	A
		T_c = 80 °C	129	A
I_{Cnom}			100	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		300	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	121	A
		T_c = 80 °C	91	A
I_{Fnom}			100	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		200	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		550	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 = 100 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.80	2.05	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		10.0	11.5	mΩ
		T_j = 150 °C		14	16.0	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 3.8 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				1	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		6.2		nF
C_{oes}		f = 1 MHz		0.41		nF
C_{res}		f = 1 MHz		0.35		nF
Q_G	V_{GE} = - 8 V...+ 15 V			565		nC
R_{Gint}	T_j = 25 °C			7.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 100 A V_{GE} = +15/-15 V $R_{G\,on}$ = 1.6 Ω $R_{G\,off}$ = 1.6 Ω di/dt$_{on}$ = 3960 A/µs di/dt$_{off}$ = 1120 A/µs dv/dt = 3300 V/µs L_s = 25 nH	T_j = 150 °C		150		ns
t_r		T_j = 150 °C		28		ns
E_{on}		T_j = 150 °C		8		mJ
$t_{d(off)}$		T_j = 150 °C		415		ns
t_f		T_j = 150 °C		66		ns
E_{off}		T_j = 150 °C		11.5		mJ
$R_{th(j-c)}$	per IGBT				0.25	K/W
$R_{th(c-s)}$	per IGBT (λ_{grease}=0.81 W/(m*K))			0.06		K/W



SEMiX® 6p

Trench IGBT Modules

SEMiX106GD12T4p

Features*

- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
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- High short circuit capability
- UL recognised file no. E63532

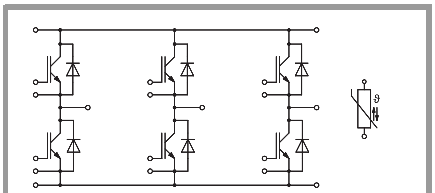
Typical Applications

- 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 ≤ 150°C (recommended T_{jop}= -40 ... 150°C)

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 100 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.20	2.52	V
		T_j = 150 °C		2.20	2.47	V
V_{F0}	chiplevel	T_j = 25 °C		1.3	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		9.0	10	mΩ
		T_j = 150 °C		13	14	mΩ
I_{RRM}	I_F = 100 A di/dt_{off} = 4000 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		161		A
Q_{rr}		T_j = 150 °C		16		µC
E_{rr}		T_j = 150 °C		6.5		mJ
$R_{th(j-c)}$	per diode				0.48	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(m*K))			0.08		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))			0.006		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.009		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



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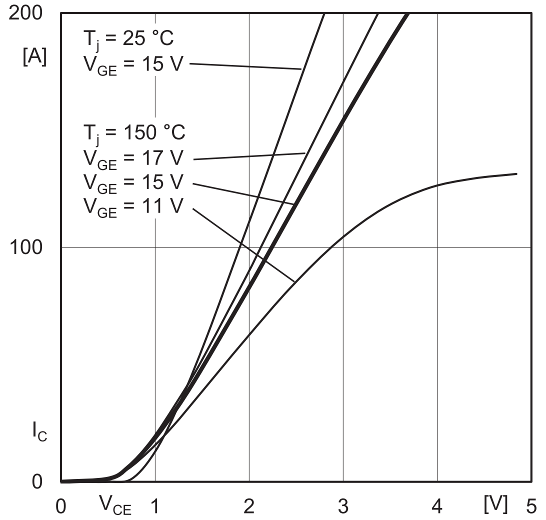


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

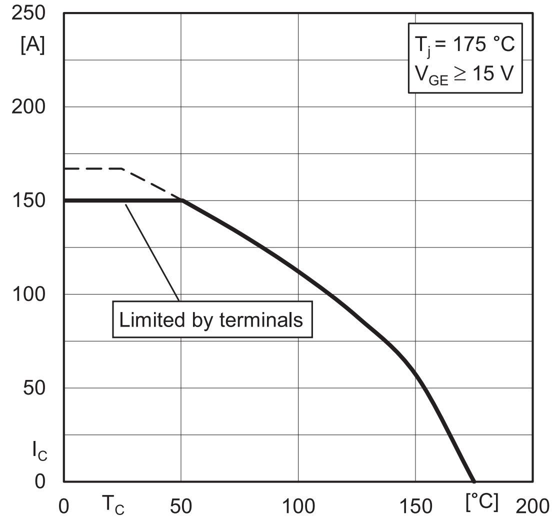


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

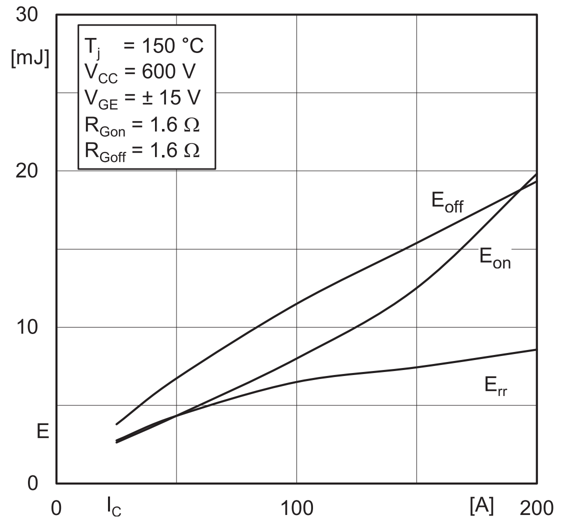


Fig. 3: Typ. turn-on /-off energy = f (I_C)

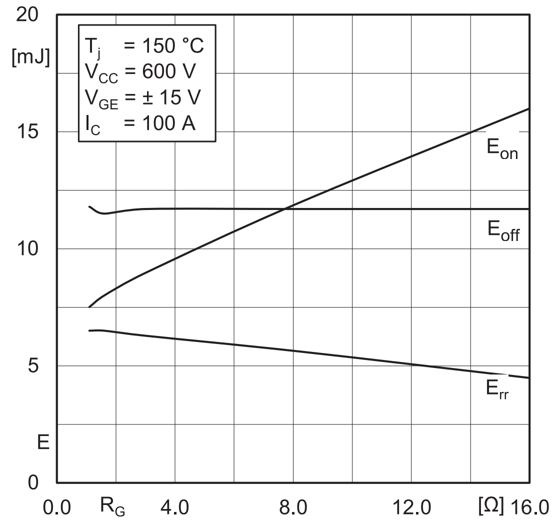


Fig. 4: Typ. turn-on /-off energy = f (R_G)

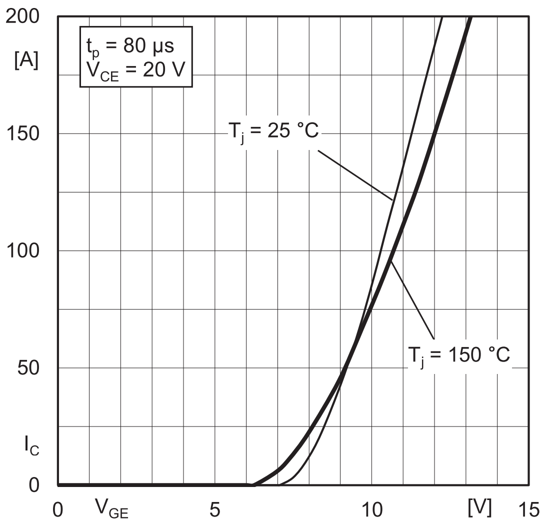


Fig. 5: Typ. transfer characteristic

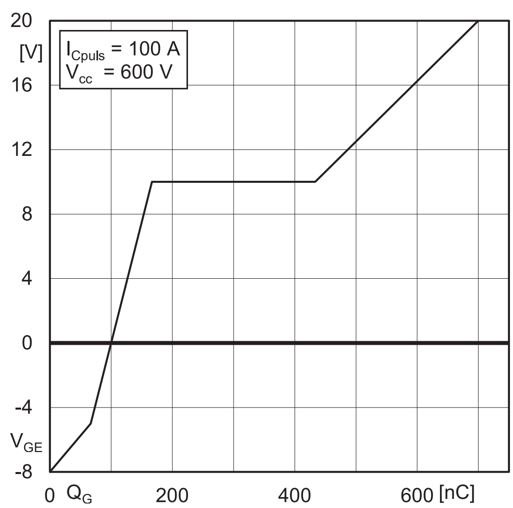


Fig. 6: Typ. gate charge characteristic

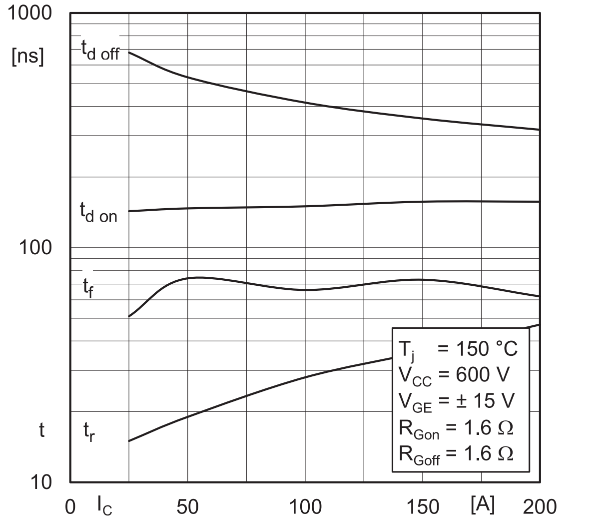


Fig. 7: Typ. switching times vs. I_C

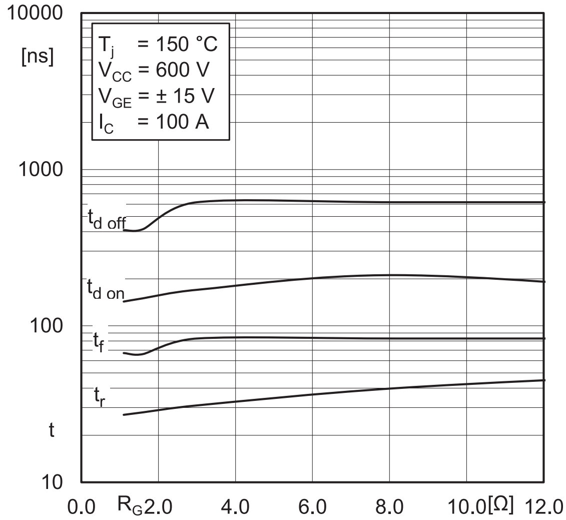


Fig. 8: Typ. switching times vs. gate resistor R_G

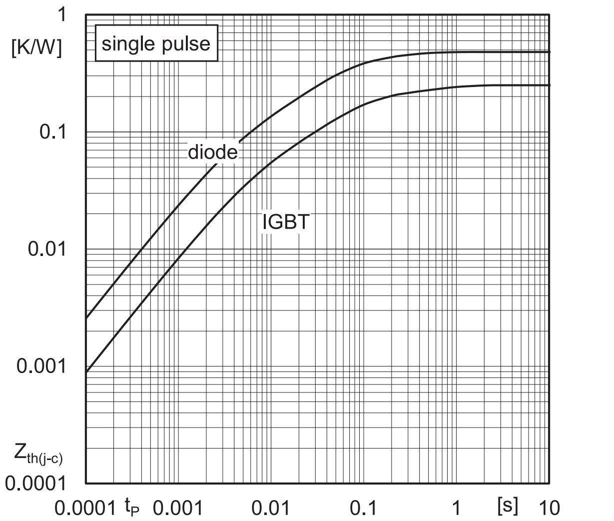


Fig. 9: Transient thermal impedance

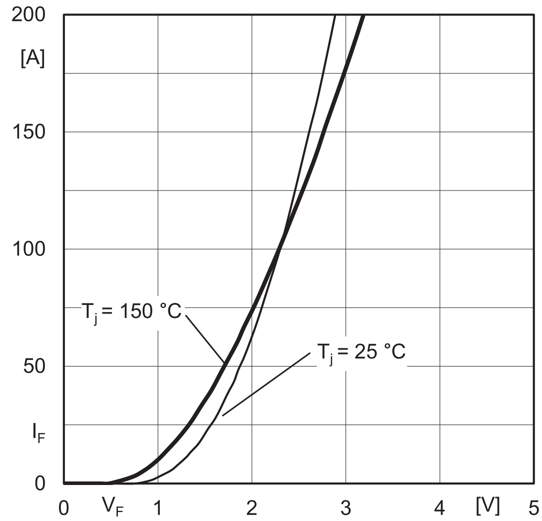


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

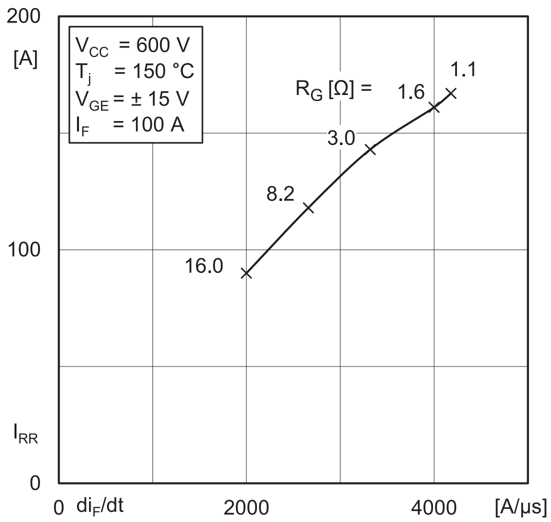


Fig. 11: Typ. CAL diode peak reverse recovery current

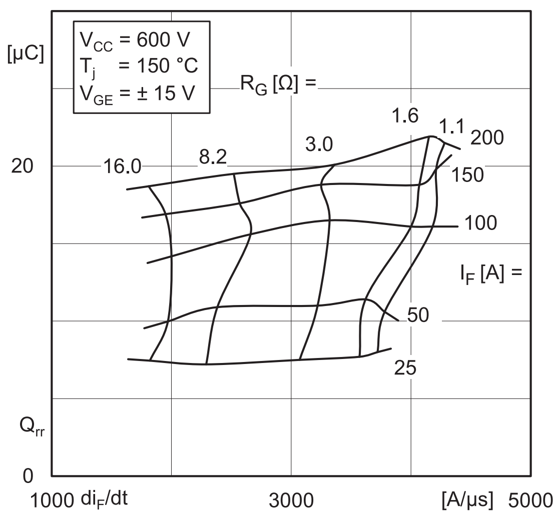
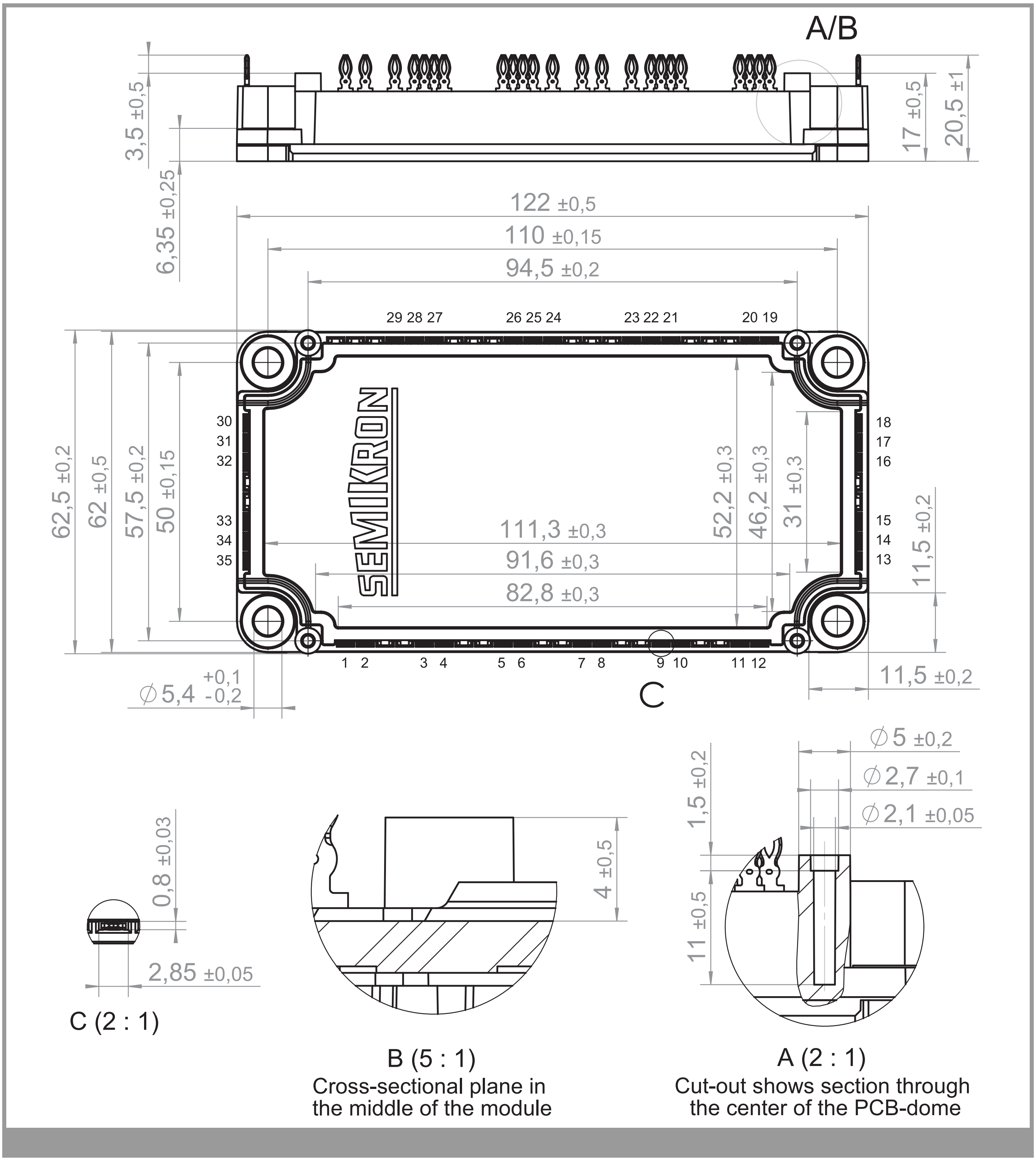
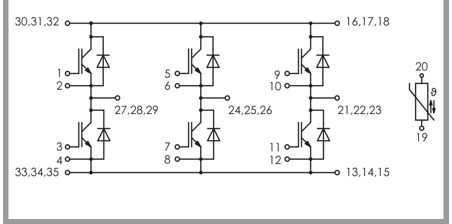
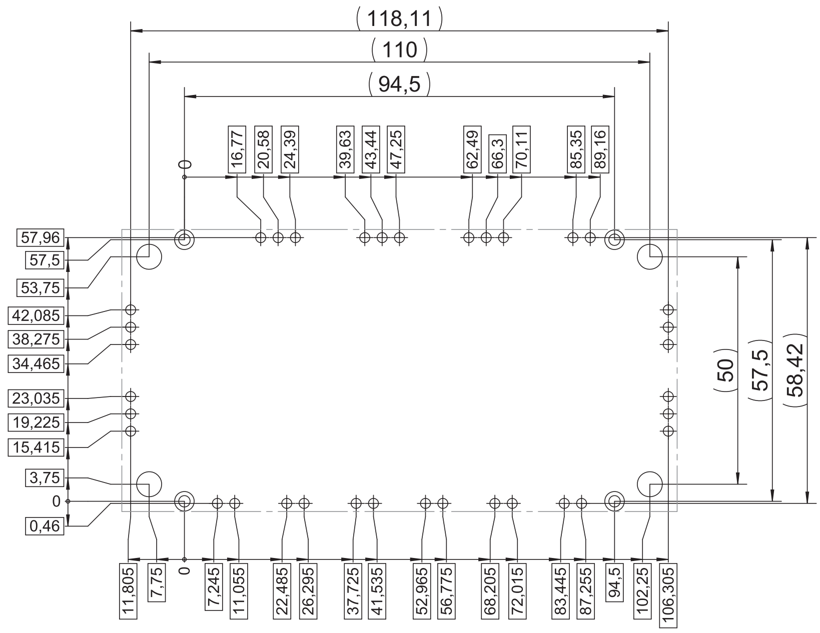


Fig. 12: Typ. CAL diode recovery charge


A/B
3,5 ±0,5
6,35 ±0,25
17 ±0,5
20,5 ±1
122 ±0,5
110 ±0,15
94,5 ±0,2
29 28 27
26 25 24
23 22 21
20 19
30
31
32
33
34
35
18
17
16
15
14
13
62,5 ±0,2
62 ±0,5
57,5 ±0,2
50 ±0,15
52,2 ±0,3
46,2 ±0,3
31 ±0,3
11,5 ±0,2
111,3 ±0,3
91,6 ±0,3
82,8 ±0,3
SEMIKRON
1 2 3 4 5 6 7 8 9 10 11 12
∅5,4 +0,1 -0,2
11,5 ±0,2
C
∅5 ±0,2
∅2,7 ±0,1
∅2,1 ±0,05
1,5 ±0,2
11 ±0,5
0,8 ±0,03
2,85 ±0,05
4 ±0,5
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


30,31,32
16,17,18
1
2
5
6
9
10
20
27,28,29
24,25,26
21,22,23
19
3
4
7
8
11
12
33,34,35
13,14,15

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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