SKiM909GD066HD

SKiM® 93

Trench IGBT Modules

SKiM909GD066HD

Features

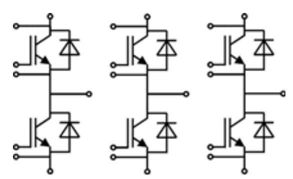
- IGBT 3 Trench Gate Technology
- Solderless sinter technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Insulated by Al_2O_3 DCB (Direct Copper Bonded) ceramic substrate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- High short circuit capability, self limiting to 6 x I_C
- Integrated temperature sensor

Typical Applications*

- Automotive inverter
- High reliability AC inverter wind
- High reliability AC inverter drives

Remarks

- Case temperature limited to T_s = 125°C max; T_c = T_s (for baseplateless modules)
- Recommended T_{op} = -40 … +150°C



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	T_j = 25 °C		600	V
I_C	λ_{paste}=0.8 W/(mK) T_j = 175 °C	T_s = 25 °C	897	A
		T_s = 70 °C	713	A
I_C	λ_{paste}=2.5 W/(mK) T_j = 175 °C	T_s = 25 °C	1089	A
		T_s = 70 °C	873	A
I_{Cnom}			900	A
I_{CRM}	I_{CRM} = 2 x I_{Cnom}		1800	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 360 V V_{GE} ≤ 15 V V_{CES} ≤ 600 V	T_j = 150 °C	6	µs
T_j			-40 ... 175	°C
Inverse - Diode				
I_F	λ_{paste}=0.8 W/(mK) T_j = 175 °C	T_s = 25 °C	690	A
		T_s = 70 °C	535	A
I_F	λ_{paste}=2.5 W/(mK) T_j = 175 °C	T_s = 25 °C	826	A
		T_s = 70 °C	645	A
I_{Fnom}			900	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		1800	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		3537	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C,		700	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 900 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.45	1.85	V
		T_j = 150 °C		1.70	2.10	V
V_{CE0}	chiplevel	T_j = 25 °C		0.90	1.00	V
		T_j = 150 °C		0.85	0.90	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		0.61	0.94	mΩ
		T_j = 150 °C		0.94	1.33	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 14.4 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 600 V, T_j = 25 °C			0.1	0.3	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		55.44		nF
C_{oes}		f = 1 MHz		3.456		nF
C_{res}		f = 1 MHz		1.644		nF
Q_G	V_{GE}=- 8 V...+ 15 V			7200		nC
R_{Gint}	T_j = 25 °C			0.3		Ω
$t_{d(on)}$	V_{CC} = 300 V I_C = 900 A $R_{G\ on}$ = 3 Ω $R_{G\ off}$ = 3 Ω di/dt_{on} = 5100 A/µs di/dt_{off} = 9000 A/µs V_{GE} = +15/-7.5 V	T_j = 150 °C		570		ns
t_r		T_j = 150 °C		160		ns
E_{on}		T_j = 150 °C		36		mJ
$t_{d(off)}$		T_j = 150 °C		1290		ns
t_f		T_j = 150 °C		90		ns
E_{off}		T_j = 150 °C		88		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.078		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.057		K/W

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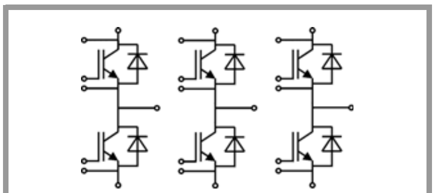

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse - Diode						
$V_F = V_{EC}$	I_F = 900 A	T_j = 25 °C		1.52	1.75	V
	chiplevel	T_j = 150 °C		1.57	1.80	V
V_{F0}	chiplevel	T_j = 25 °C		1.00	1.10	V
		T_j = 150 °C		0.85	0.95	V
r_F	chiplevel	T_j = 25 °C		0.58	0.72	mΩ
		T_j = 150 °C		0.80	0.94	mΩ
I_{RRM}	I_F = 900 A	T_j = 150 °C		500		A
Q_{rr}	di/dt_{off} = 4800 A/µs V_{GE} = +15/-7.5 V	T_j = 150 °C		118		µC
E_{rr}	V_{CC} = 300 V	T_j = 150 °C		29		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.135		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.104		K/W
Module						
L_{CE}				10	15	nH
$R_{CC'+EE'}$	measured per switch	T_s = 25 °C		0.3		mΩ
		T_s = 125 °C		0.5		mΩ
w				1042		g
Temperature Sensor						
R_{100}	T_{Sensor} = 100 °C (R_{25} = 5 kΩ)			339		Ω
$B_{100/125}$	$R_{(T)} = R_{100}exp[B_{100/125}(1/T-1/373)]$; T[K];			4096		K

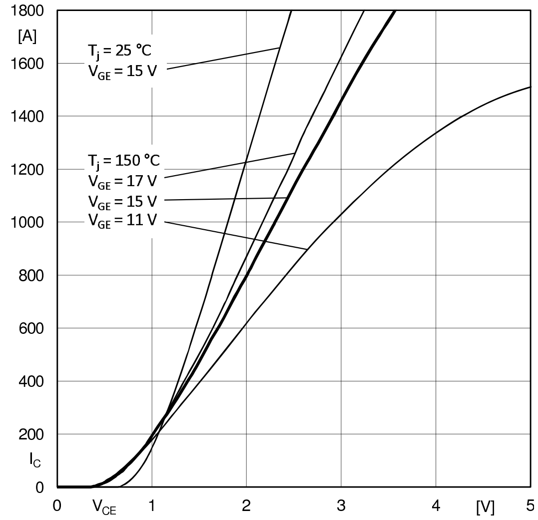


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

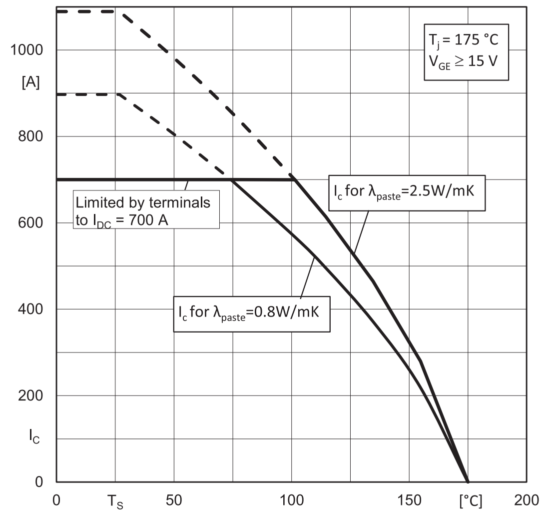


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

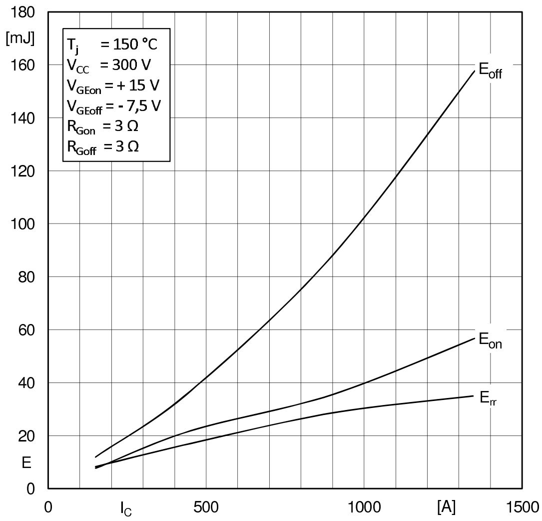


Fig. 3: Typ. turn-on /-off energy = f (I_C)

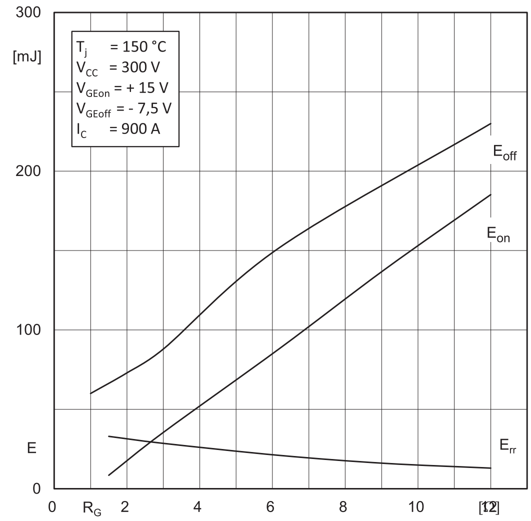


Fig. 4: Typ. turn-on /-off energy = f (R_G)

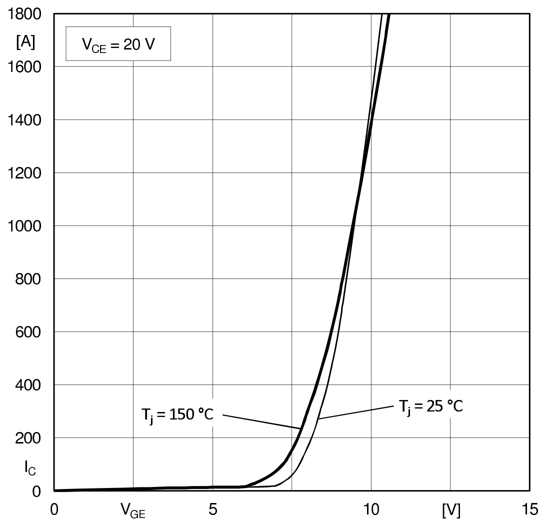


Fig. 5: Typ. transfer characteristic

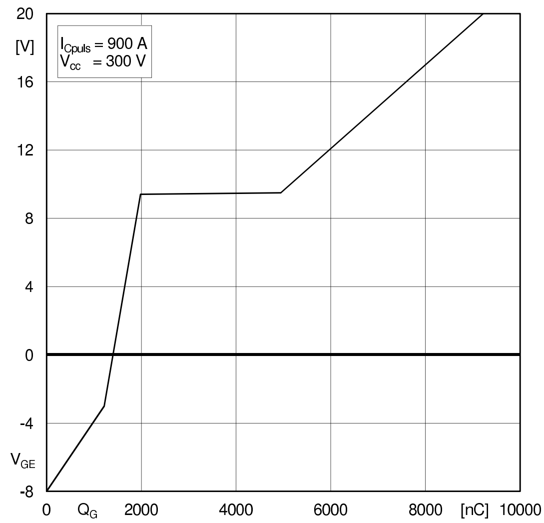


Fig. 6: Typ. gate charge characteristic

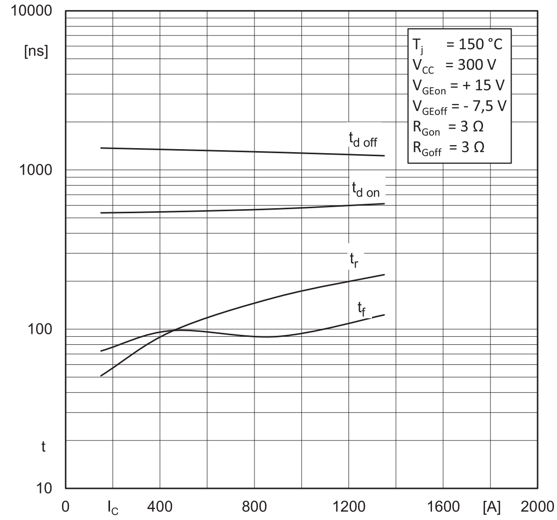


Fig. 7: Typ. switching times vs. I_C

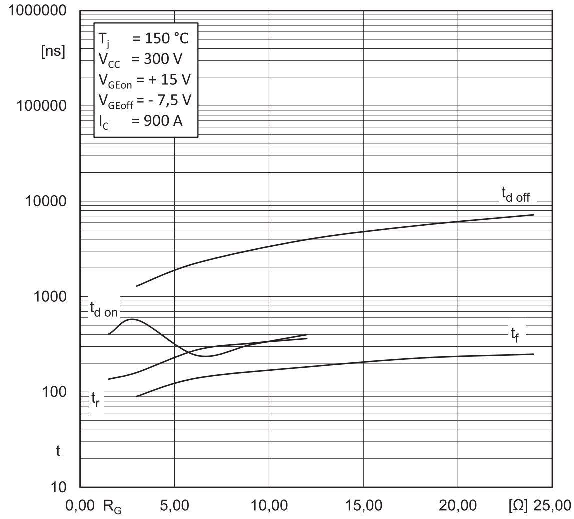


Fig. 8: Typ. switching times vs. gate resistor R_G

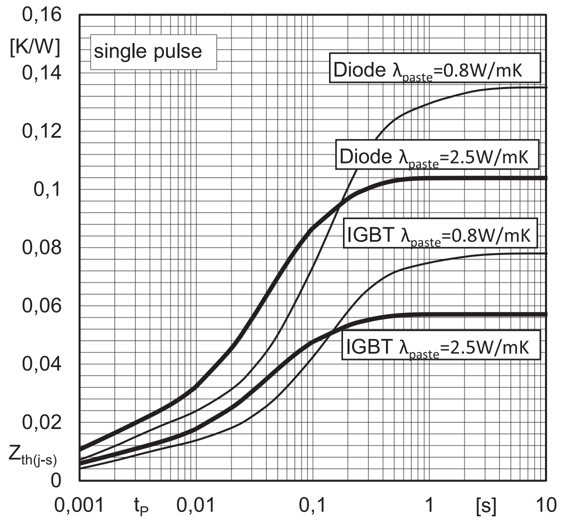


Fig. 9: Typ. transient thermal impedance

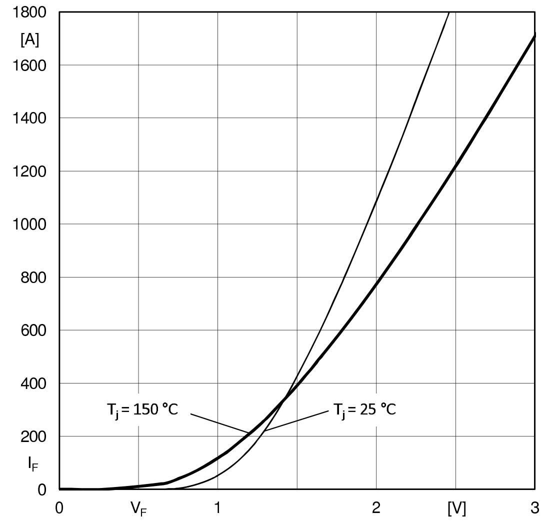


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

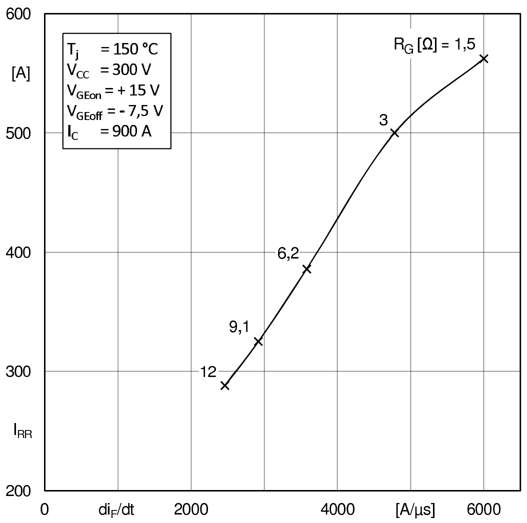


Fig. 11: Typ. CAL diode peak reverse recovery current

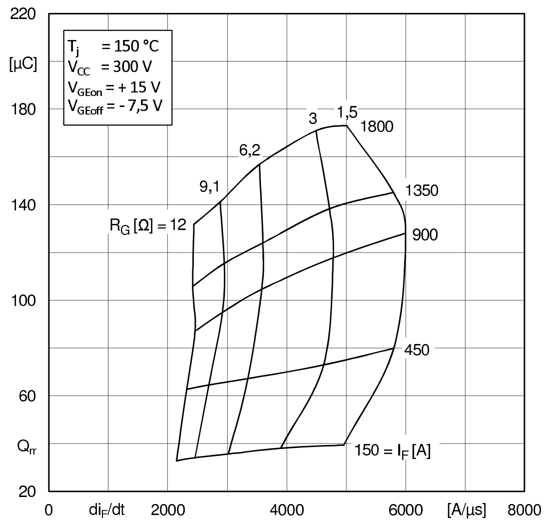
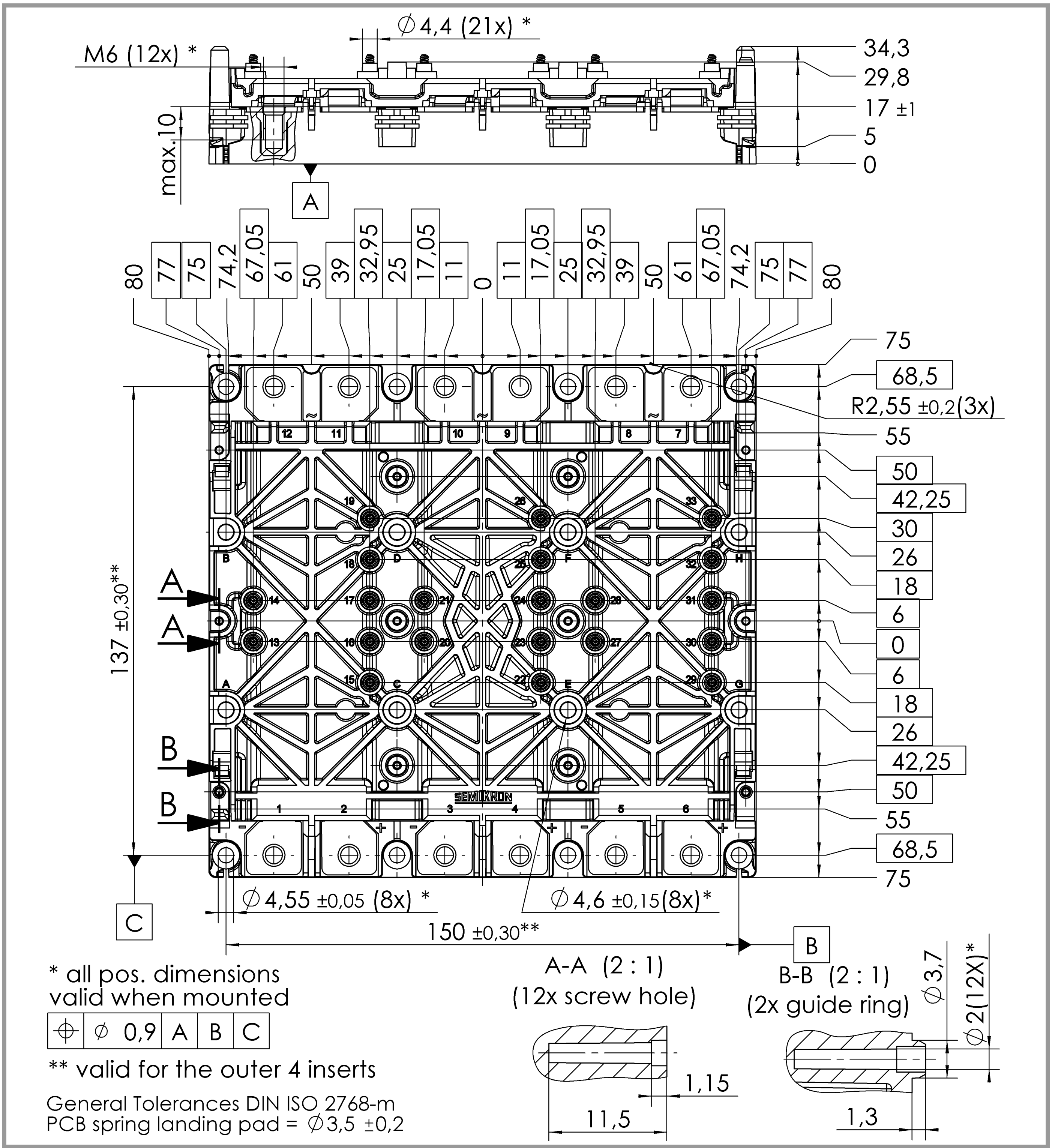
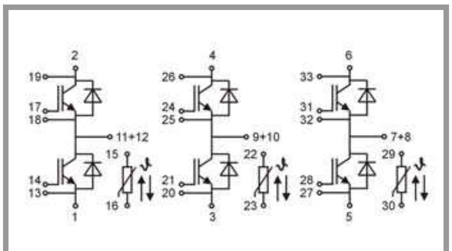


Fig. 12: Typ. CAL diode recovery charge


∅4,4 (21x) *
M6 (12x) *
34,3
29,8
17 ±1
5
0
max.10
A
80 77 75 74,2 67,05 61 50 39 32,95 25 17,05 11 0 11 17,05 25 32,95 39 50 61 67,05 74,2 75 77 80
75
68,5
R2,55 ±0,2(3x)
55
50
42,25
30
26
18
6
0
6
18
26
42,25
50
55
68,5
75
137 ±0,30**
A
A
B
B
SEMIKRON
C
∅4,55 ±0,05 (8x) *
∅4,6 ±0,15(8x)*
150 ±0,30**
B
A-A (2 : 1)
(12x screw hole)
B-B (2 : 1)
(2x guide ring)
∅3,7
∅2(12X)*
1,15
11,5
1,3
* all pos. dimensions
valid when mounted
∅ 0,9 A B C
** valid for the outer 4 inserts
General Tolerances DIN ISO 2768-m
PCB spring landing pad = ∅3,5 ±0,2



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

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