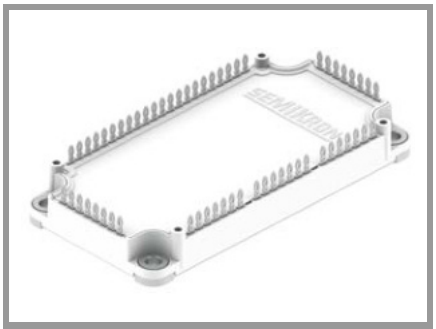


SEMiX® 6p

3-phase bridge rectifer + brake chopper + 3-phase bridge inverter

SEMiX206DGDL12M7p

Features*

- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- SKR PEP diode-technology for enhanced power and environmental robustness
- UL recognized file no. E63532

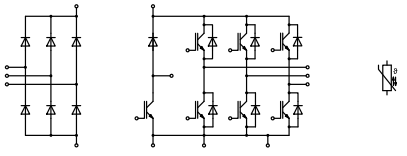
Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

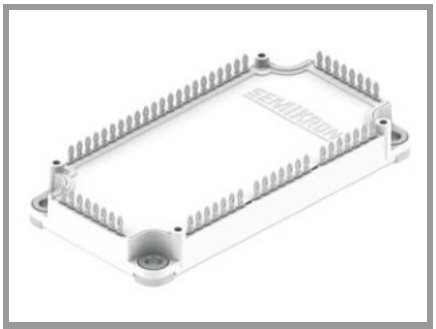
- Case temperature limited to T_C=125°C max.
- V_{isol} between temperature sensor and power section is 2500V
- For storage and case temperature with TIM see document “TP(*) SEMiX 6p”

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	287	A
		T_c = 80 °C	217	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
Chopper - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	229	A
		T_c = 80 °C	174	A
I_{Cnom}			150	A
I_{CRM}			300	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	181	A
		T_c = 80 °C	136	A
I_{FRM}			300	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Freewheeling - Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	95	A
		T_c = 80 °C	72	A
I_{FRM}			150	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		430	A
T_j			-40 ... 175	°C



DGDL

SEMiX206DGDL12M7p



SEMiX® 6p

3-phase bridge rectifer + brake chopper + 3-phase bridge inverter

SEMiX206DGDL12M7p

Features*

- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- SKR PEP diode-technology for enhanced power and environmental robustness
- UL recognized file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

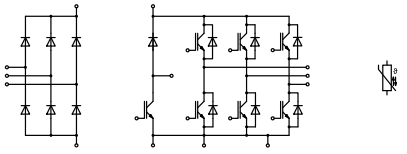
- Case temperature limited to T_C=125°C max.
- V_{isol} between temperature sensor and power section is 2500V
- For storage and case temperature with TIM see document “TP(*) SEMiX 6p”

Absolute Maximum Ratings

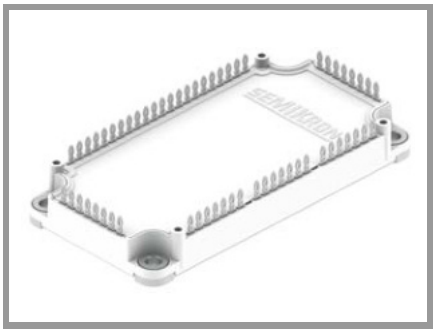
Symbol	Conditions		Values	Unit
Rectifier - Diode				
V_{RRM}	T_j = 25 °C		1600	V
I_F	T_j = 150 °C	T_c = 25 °C	262	A
		T_c = 80 °C	174	A
I_{FSM}	t_p = 10 ms sin 180°	T_j = 25 °C	1600	A
		T_j = 150 °C	1260	A
i^2t	t_p = 10 ms sin 180°	T_j = 25 °C	13000	A^2s
		T_j = 150 °C	7940	A^2s
T_j			-40 ... 150	°C
Module				
$I_{t(RMS)}$	per connector pin		50	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50Hz, 1 min		4000	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.54	1.88	V
		T_j = 150 °C		1.80		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		1.2		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 $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt$_{on}$ = 1300 A/µs di/dt$_{off}$ = 2300 A/µs dv/dt = 5850 V/µs V_{GE} = +15/-15 V L_s = 35	T_j = 150 °C		256		ns
t_r		T_j = 150 °C		92		ns
E_{on}		T_j = 150 °C		27.8		mJ
$t_{d(off)}$		T_j = 150 °C		316		ns
t_f		T_j = 150 °C		80		ns
E_{off}		T_j = 150 °C		21.2		mJ
$R_{th(j-c)}$	per IGBT				0.19	K/W
$R_{th(c-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.04		K/W



DGDL



SEMiX® 6p

3-phase bridge rectifer + brake chopper + 3-phase bridge inverter

SEMiX206DGDL12M7p

Features*

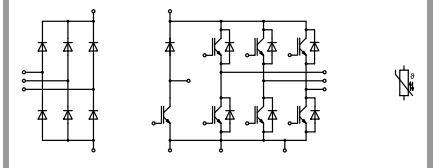
- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- SKR PEP diode-technology for enhanced power and environmental robustness
- UL recognized file no. E63532

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 2500V
- For storage and case temperature with TIM see document “TP(*) SEMiX 6p”

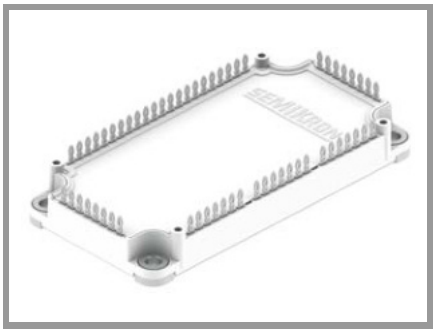


DGDL

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
$V_{CE(sat)}$	I_C = 150 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.55	1.88	V
		T_j = 150 °C		1.80		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		4.7	5.7	mΩ
		T_j = 150 °C		7.0		mΩ
$V_{GE(th)}$	V_{CE} = 10 V, I_C = 15 mA		5.4	6	6.6	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				1.5	mA
Q_G	V_{GE} = -8V ... + 15V			1340		nC
R_{Gint}	T_j = 25 °C			3.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 150 A $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt_{on} = 820 A/µs di/dt_{off} = 1800 A/µs dv/dt = 5830 V/µs V_{GE} = +15/-15 V L_s = 35 nH	T_j = 150 °C		251		ns
t_r		T_j = 150 °C		106		ns
E_{on}		T_j = 150 °C		20.8		mJ
$t_{d(off)}$		T_j = 150 °C		308		ns
t_f		T_j = 150 °C		69		ns
E_{off}		T_j = 150 °C		16.7		mJ
$R_{th(j-c)}$	per IGBT				0.23	K/W
$R_{th(c-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.04		K/W
Inverse - Diode						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.14	2.46	V
		T_j = 150 °C		2.07		V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90		V
r_F	chiplevel	T_j = 25 °C		5.6	6.4	mΩ
		T_j = 150 °C		7.8		mΩ
I_{RRM}	I_F = 150 A di/dt_{off} = 3411 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		173		A
Q_{rr}		T_j = 150 °C		24.7		µC
E_{rr}		T_j = 150 °C		11.6		mJ
$R_{th(j-c)}$	per diode				0.33	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(mK))			0.05		K/W
Freewheeling - Diode						
$V_F = V_{EC}$	I_F = 75 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.17	2.49	V
		T_j = 150 °C		2.11		V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90		V
r_F	chiplevel	T_j = 25 °C		12	13	mΩ
		T_j = 150 °C		16		mΩ
I_{RRM}	I_F = 75 A di/dt_{off} = 1161 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		51		A
Q_{rr}		T_j = 150 °C		12		µC
E_{rr}		T_j = 150 °C		5.3		mJ
$R_{th(j-c)}$	per diode				0.6	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(mK))			0.08		K/W

SEMiX206DGDL12M7p



SEMiX® 6p

3-phase bridge rectifer + brake chopper + 3-phase bridge inverter

SEMiX206DGDL12M7p

Features*

- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- SKR PEP diode-technology for enhanced power and environmental robustness
- UL recognized file no. E63532

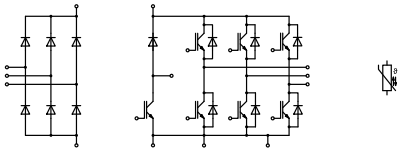
Typical Applications

- 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 2500V
- For storage and case temperature with TIM see document “TP(*) SEMiX 6p”

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Rectifier - Diode						
$V_F = V_{EC}$	I_F = 71 A	T_j = 25 °C		1.00	1.10	V
	chiplevel	T_j = 125 °C		0.91	1.01	V
V_{F0}	chiplevel	T_j = 25 °C		0.90	0.97	V
		T_j = 125 °C		0.78	0.83	V
r_F	chiplevel	T_j = 25 °C		1.41	1.90	mΩ
		T_j = 125 °C		1.83	2.5	mΩ
I_R	T_j = 150 °C, V_{RRM}				2.3	mA
$R_{th(j-c)}$	per diode				0.32	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(mK))			0.07		K/W
Module						
L_{CE}				21		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		1.8		mΩ
		T_C = 125 °C		2.5		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.003		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.005		K/W
M_s	to heat sink (M5)		3		6	Nm
M_t				-		Nm
				-		Nm
w				300		g
Temperature Sensor						
R_{100}	T_r = 100 °C			493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			3550 ±2%		K



DGDL

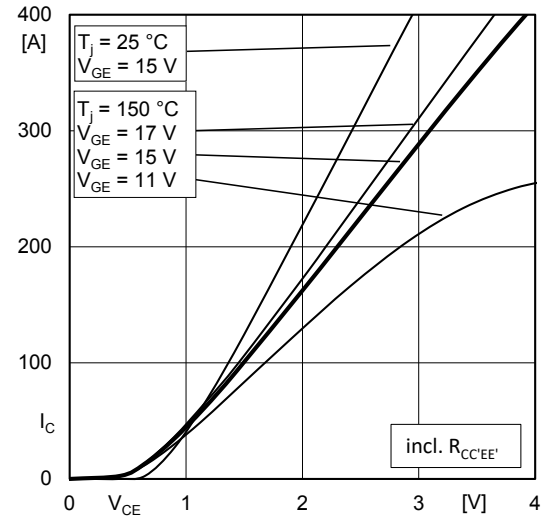


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+ EE'}$

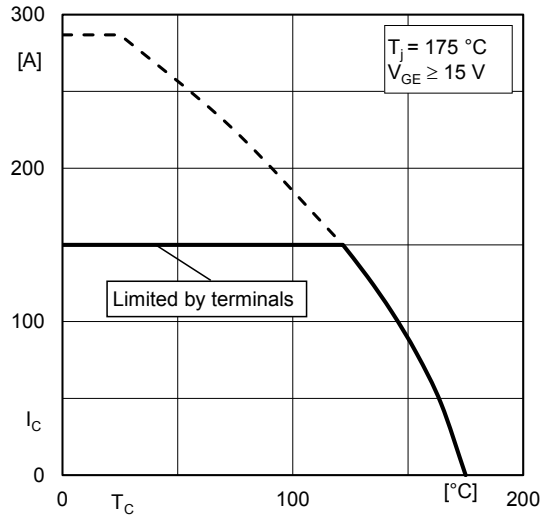


Fig. 2: IGBT rated current vs. temperature $I_c=f(T_c)$

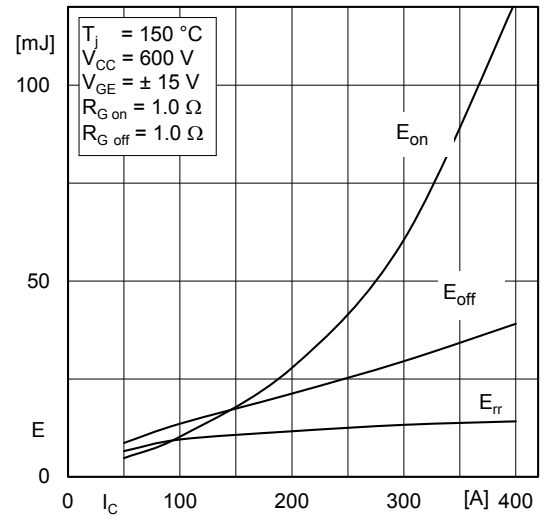


Fig. 3: Typ. turn-on /-off energy = f (I_C)

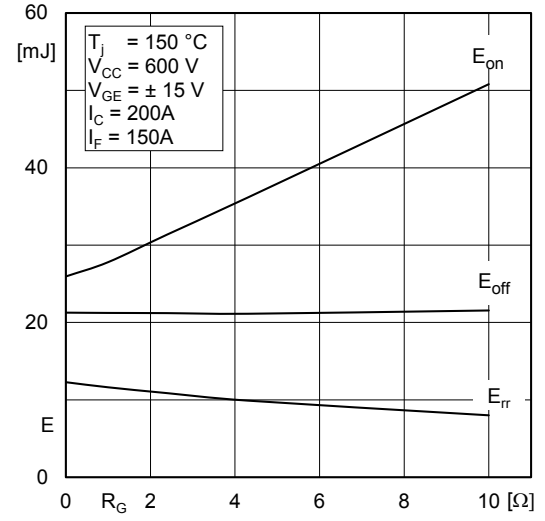


Fig. 4: Typ. turn-on /-off energy = f (R_G)

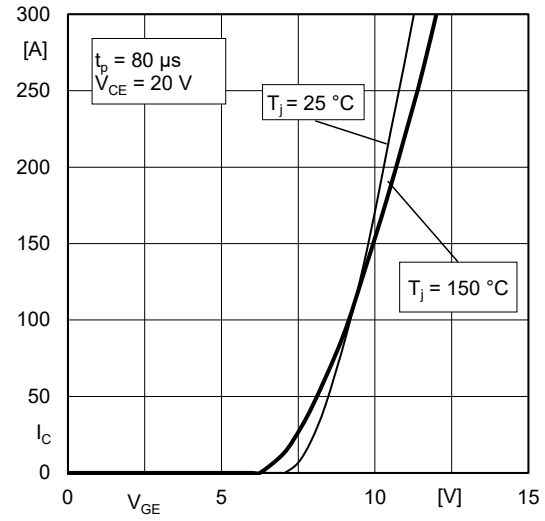


Fig. 5: Typ. transfer characteristic

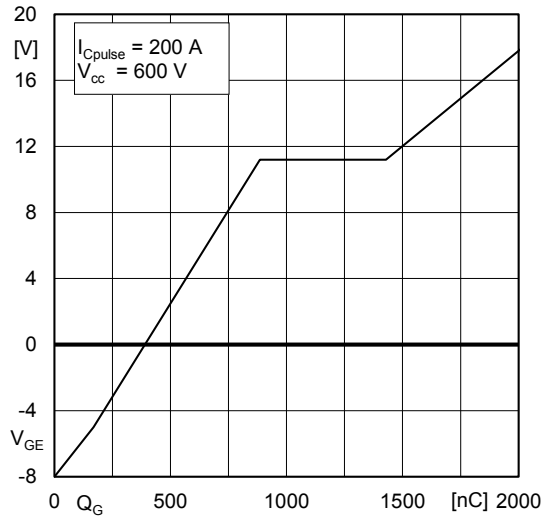


Fig. 6: Typ. gate charge characteristic

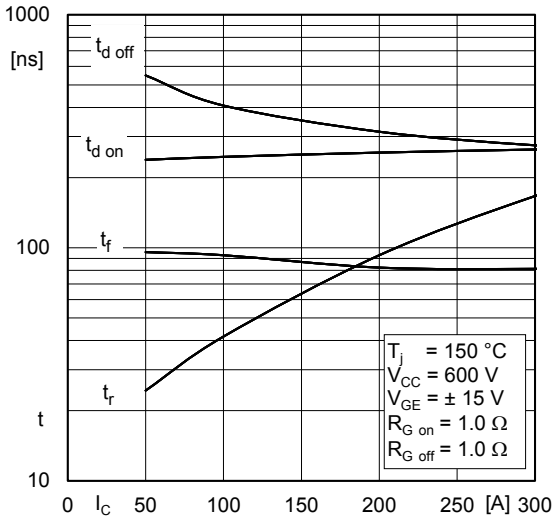


Fig. 7: Typ. switching times vs. I_C

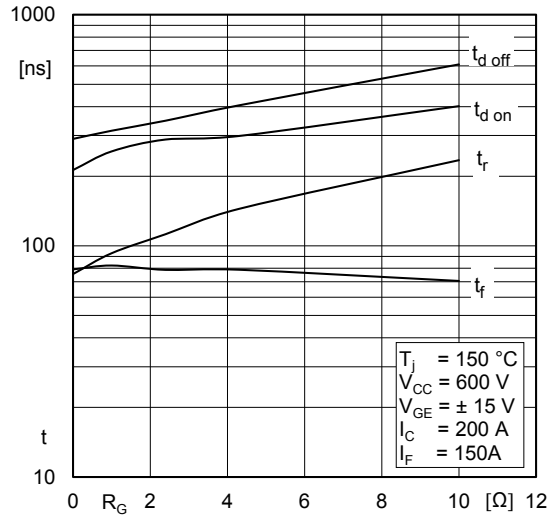


Fig. 8: Typ. switching times vs. gate resistor R_G

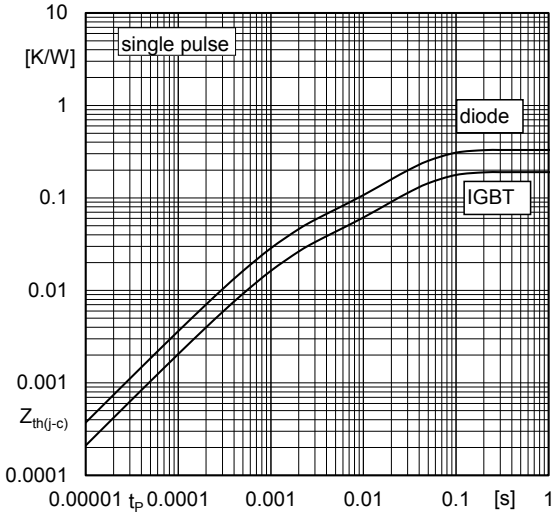


Fig. 9: Transient thermal impedance

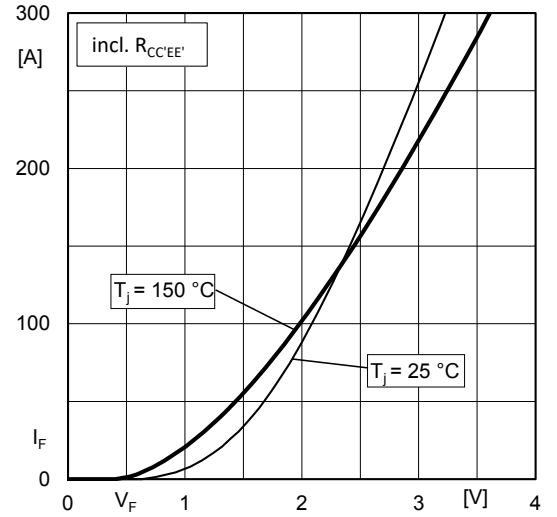


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

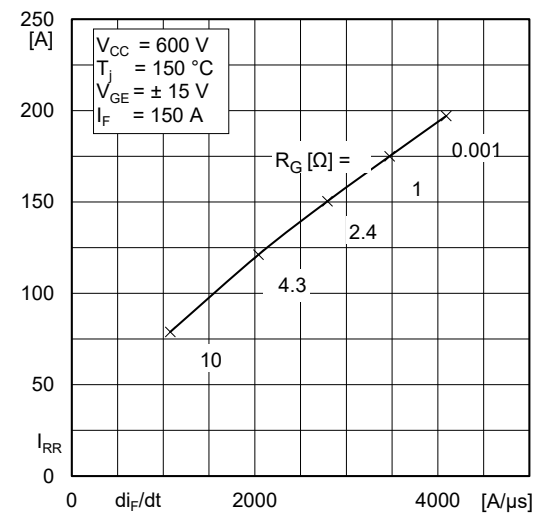


Fig. 11: Typ. CAL diode peak reverse recovery current

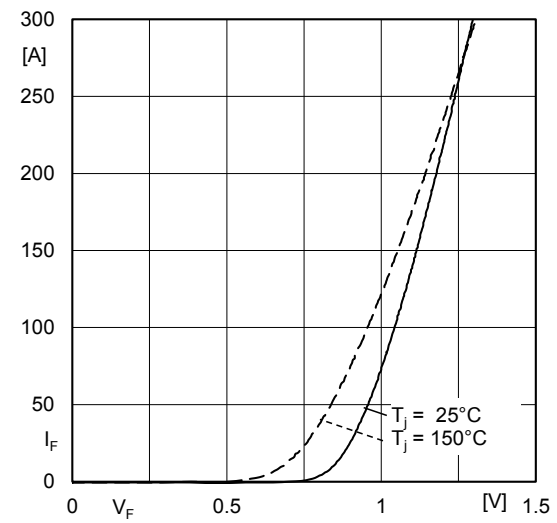
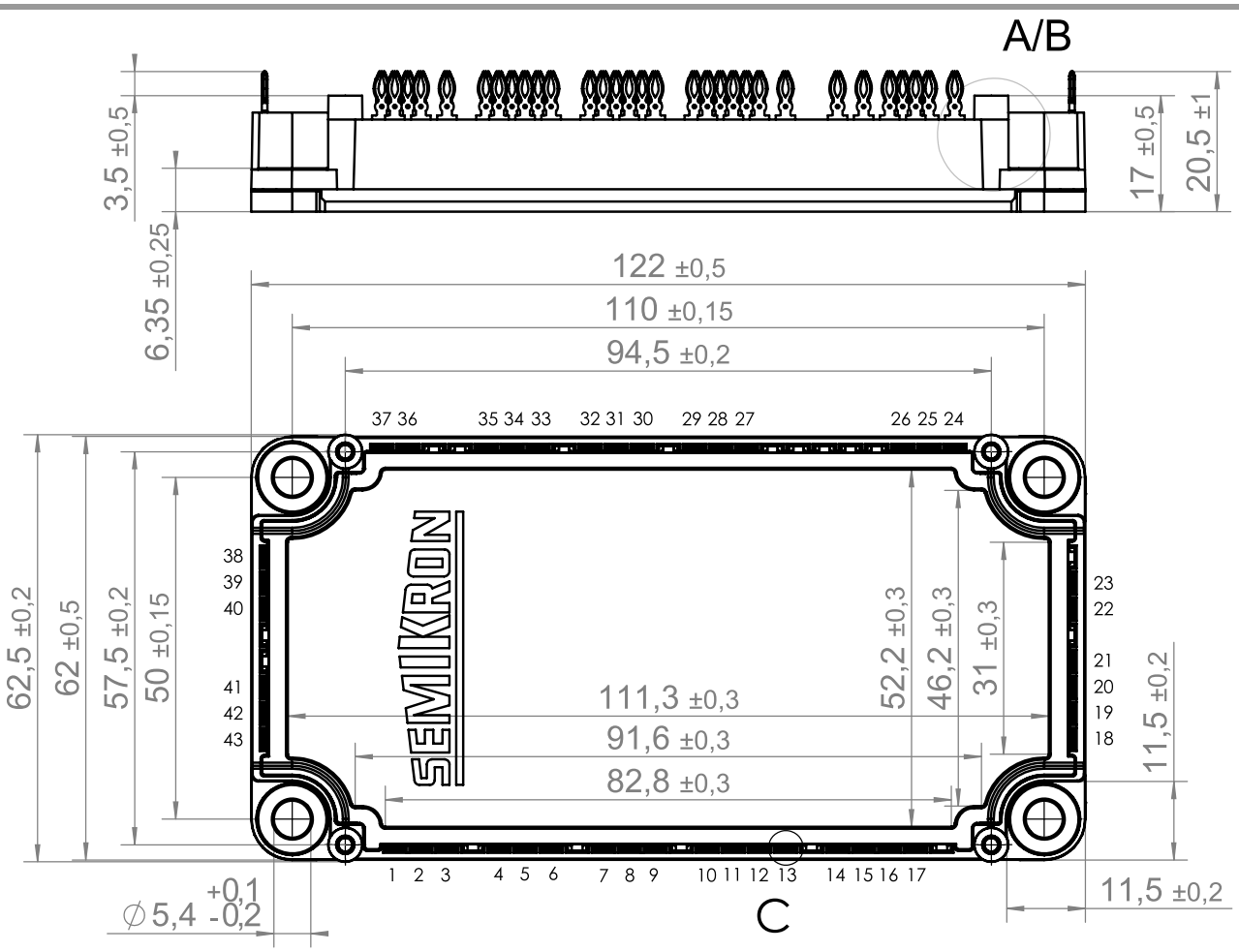
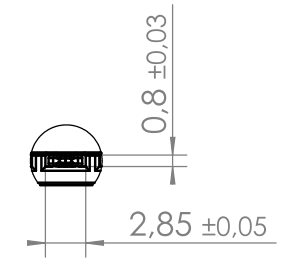
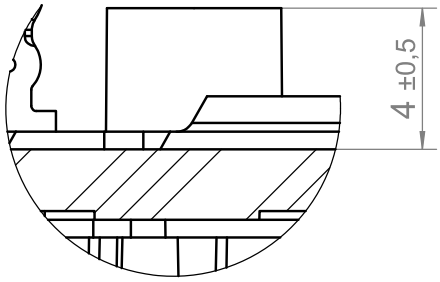


Fig. 12: Typ. input bridge forward characteristic

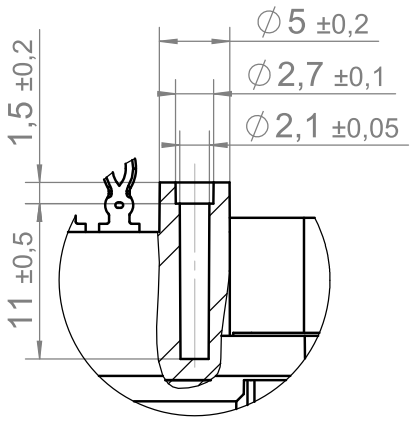




C (2 : 1)



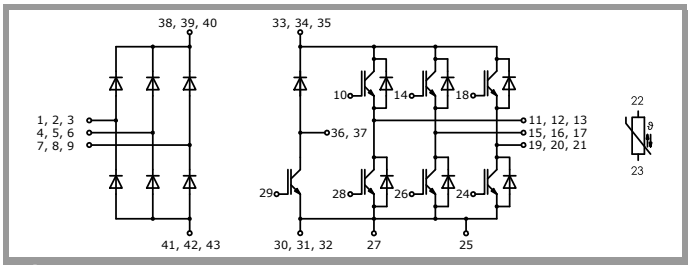
B (5 : 1)
Cross-sectional plane in the middle of the module



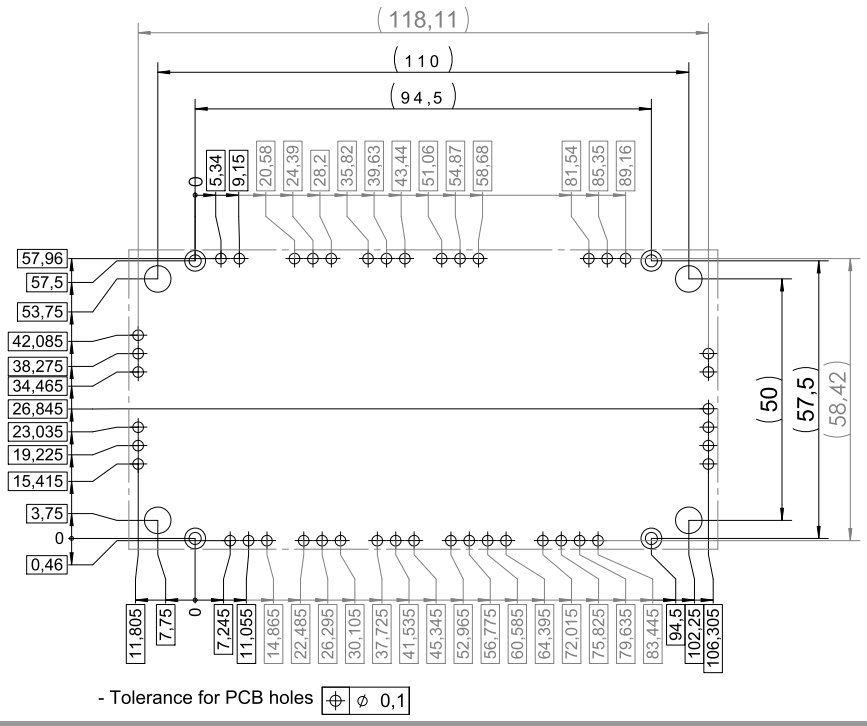
A (2 : 1)
Cut-out shows section through the center of the PCB-dome

Dimensions in mm

SEMiX 6p



pinout



Spring configuration

IMPORTANT INFORMATION AND WARNINGS

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

*The specifications of Semikron Danfoss products may not be considered as any guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of Semikron Danfoss products describe only the usual characteristics of Semikron Danfoss products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Resulting from this, application adjustments of any kind may be necessary. Any user of Semikron Danfoss products is responsible for the safety of their applications embedding Semikron Danfoss products and must take adequate safety measures to prevent the applications from causing any physical injury, fire or other problem, also if any Semikron Danfoss product becomes faulty. Any user is responsible for making sure that the application design and realization are compliant with all laws, regulations, norms and standards applicable to the scope of application. Unless otherwise explicitly approved by Semikron Danfoss in a written document signed by authorized representatives of Semikron Danfoss, Semikron Danfoss products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. Semikron Danfoss does not convey any license under its or a third party's patent rights, copyrights, trade secrets or other intellectual property rights, neither does it make any representation or warranty of non-infringement of intellectual property rights of any third party which may arise from a user's applications.

