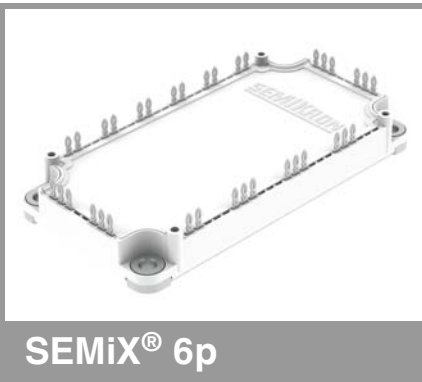


SEMiX156GD12M7p



IGBT Modules

SEMiX156GD12M7p

Target Data

Features*

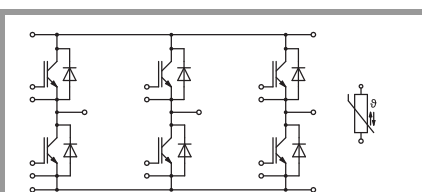
- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High overload capability
- Low loss high density IGBTs
- UL recognized file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- V_{isol} between temperature sensor and power section is only 2500V
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{jop} = -40 \dots 150^\circ\text{C}$)
- For storage and case temperature with TIM see document "TP(*) SEMiX 6p"

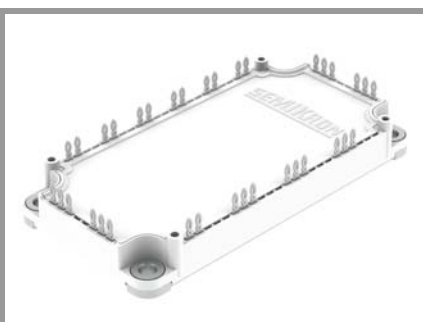


GD

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	235	A
		T _c = 80 °C	179	A
I _{Cnom}			150	A
I _{CRM}			300	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 600 V V _{GE} ≤ 15 V V _{CES} ≤ 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
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 = 150 A	T _J = 25 °C		1.55	1.88	V
	V _{GE} = 15 V chiplevel	T _J = 150 °C		1.80	2.13	V
V _{CE0}	chiplevel	T _J = 25 °C		0.85	1.02	V
		T _J = 150 °C		0.75	0.92	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C		4.7	5.7	mΩ
	chiplevel	T _J = 150 °C		7.0	8.1	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				2.0	mA
C _{ies}	V _{CE} = 10 V V _{GE} = 0 V	f = 1 MHz		30.0		nF
C _{oes}		f = 1 MHz		0.90		nF
C _{res}		f = 1 MHz		0.32		nF
Q _G	V _{GE} = -8V ... + 15V			1340		nC
R _{Gint}	T _J = 25 °C			3.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 150 °C		261		ns
t _r	I _C = 150 A	T _J = 150 °C		106		ns
E _{on}	V _{GE} = +15/-15 V R _{G on} = 1 Ω	T _J = 150 °C		25.1		mJ
t _{d(off)}	R _{G off} = 1 Ω	T _J = 150 °C		306		ns
t _f	di/dt _{on} = 860 A/μs di/dt _{off} = 1600 A/μs	T _J = 150 °C		76		ns
E _{off}	dv/dt = 5600 V/μs L _s = 35 nH	T _J = 150 °C		17.4		mJ
R _{th(j-c)}	per IGBT				0.22	K/W
R _{th(c-s)}	per IGBT (λ _{grease} =0.81 W/(m*K))			0.040		K/W

SEMiX156GD12M7p



SEMiX® 6p

IGBT Modules

SEMiX156GD12M7p

Target Data

Features*

- Press Fit
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High overload capability
- Low loss high density IGBTs
- UL recognized file no. E63532

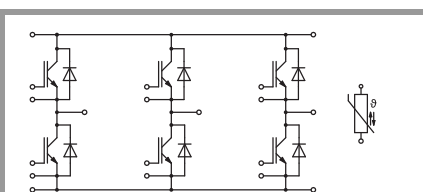
Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- V_{isol} between temperature sensor and power section is only 2500V
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{jop} = -40 \dots 150^\circ\text{C}$)
- For storage and case temperature with TIM see document "TP(*) SEMiX 6p"

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 150 A	T _j = 25 °C		2.14	2.46	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.07	2.38	V
V _{F0}	chiplevel	T _j = 25 °C		1.30	1.50	V
		T _j = 150 °C		0.90	1.10	V
r _F	chiplevel	T _j = 25 °C		5.6	6.4	mΩ
		T _j = 150 °C		7.8	8.5	mΩ
I _{RRM}	I _F = 150 A	T _j = 150 °C		235		A
Q _{rr}	di/dt _{off} = 2500 A/μs	T _j = 150 °C		22		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _j = 150 °C		9.04		mJ
R _{th(j-c)}	per diode				0.33	K/W
R _{th(c-s)}	per diode (λ _{grease} =0.81 W/(m*K))			0.050		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))			0.0061		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



GD

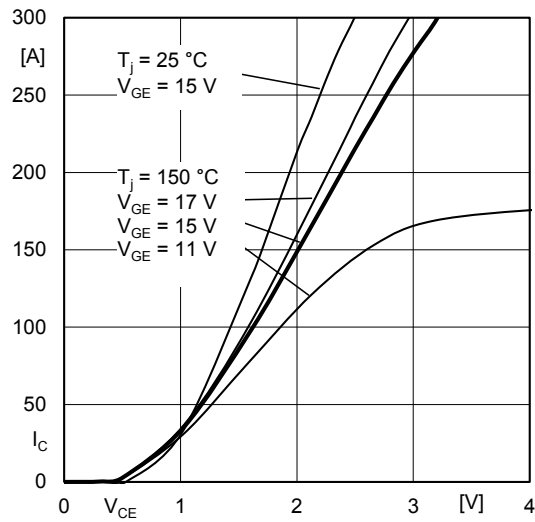


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

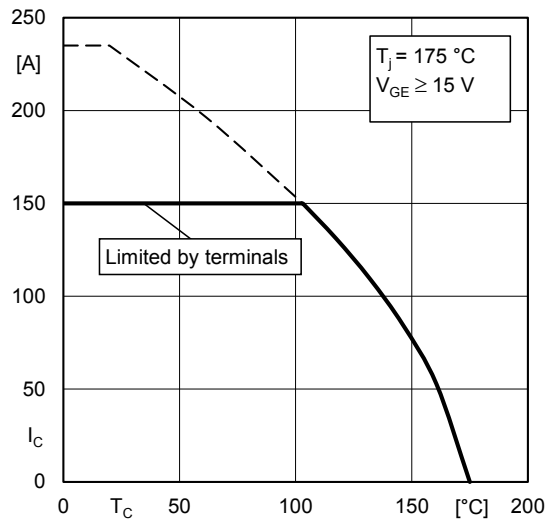


Fig. 2: IGBT rated current vs. temperature $I_C = f(T_C)$

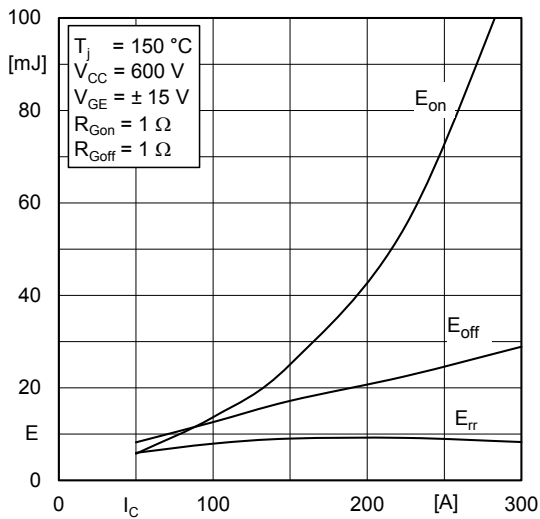


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

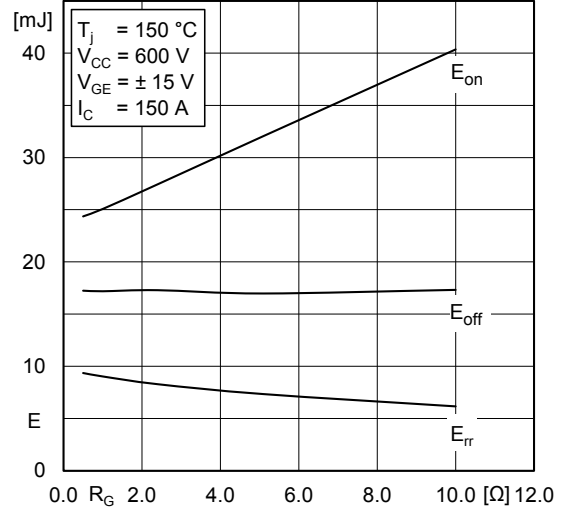


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

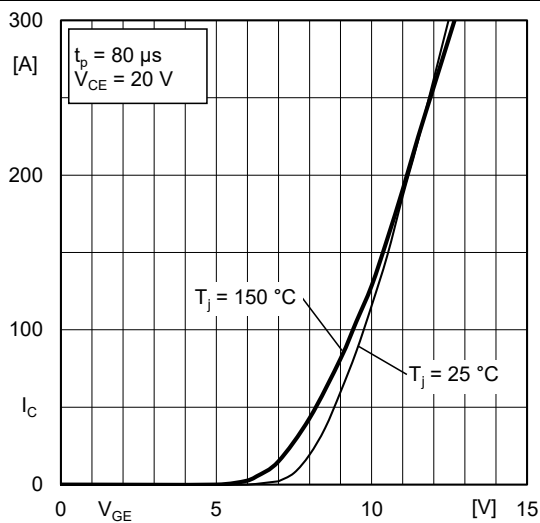


Fig. 5: Typ. transfer characteristic

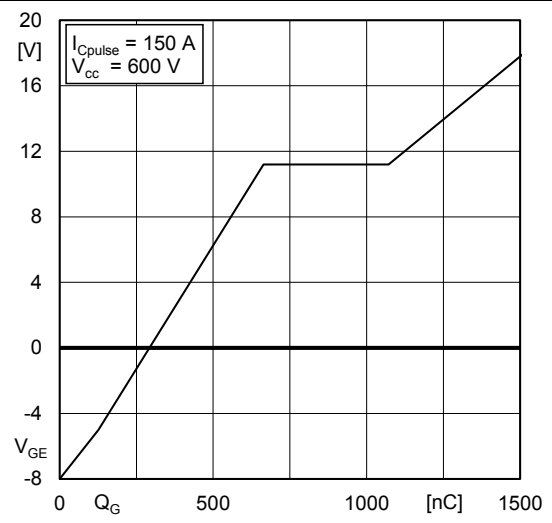


Fig. 6: Typ. gate charge characteristic

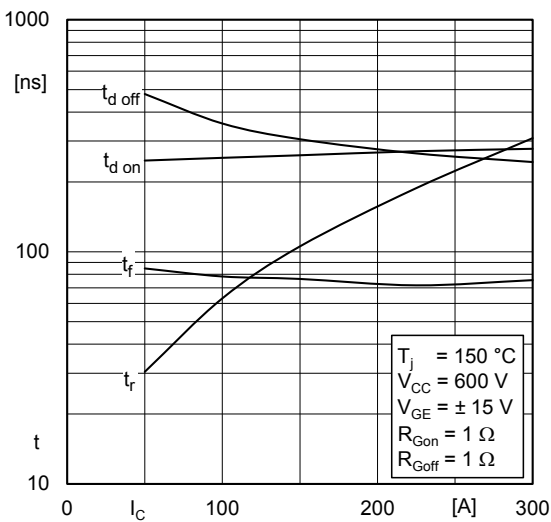


Fig. 7: Typ. switching times vs. I_C

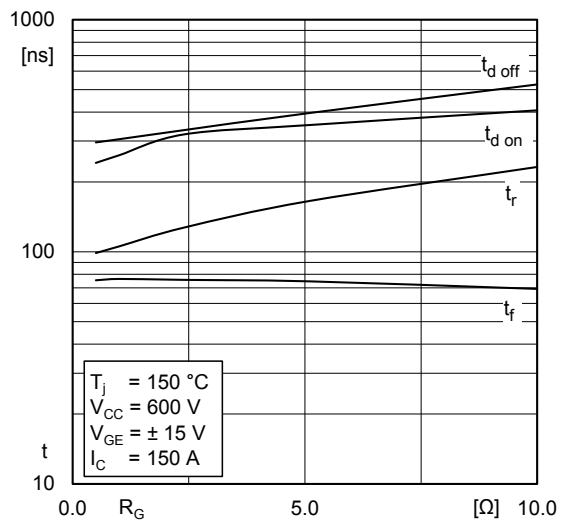


Fig. 8: Typ. switching times vs. gate resistor R_G

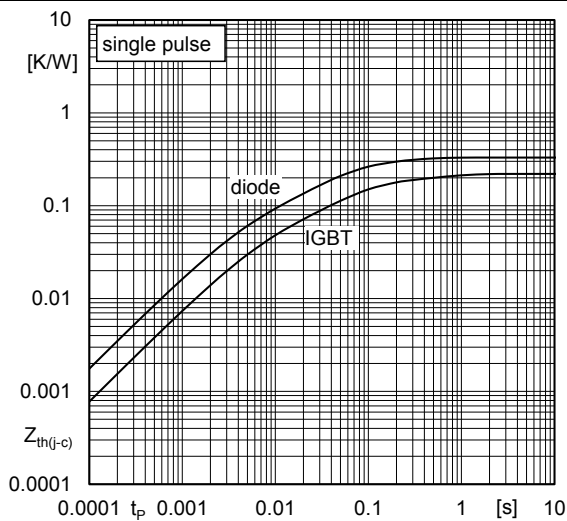


Fig. 9: Transient thermal impedance

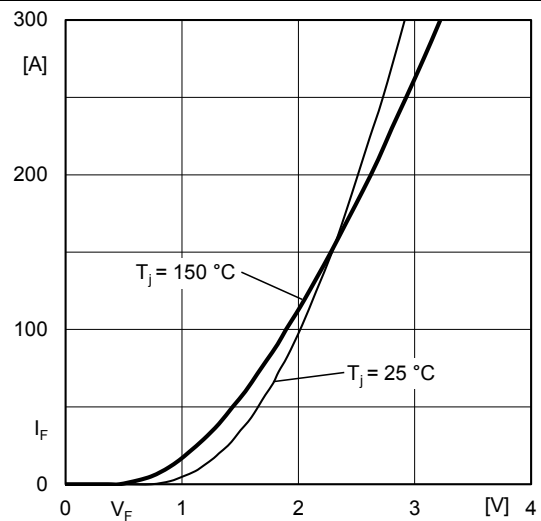


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC}'+EE'$

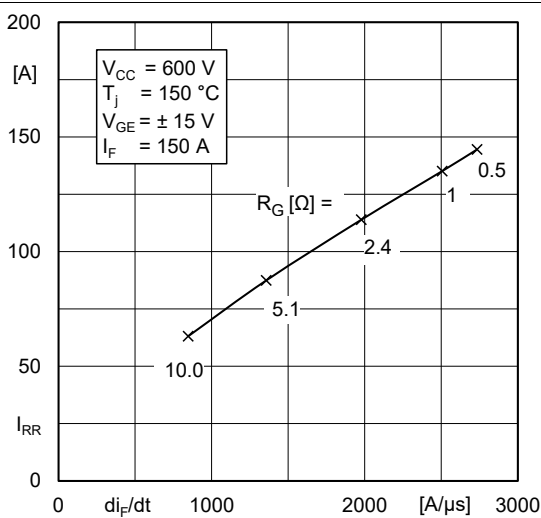


Fig. 11: Typ. CAL diode peak reverse recovery current

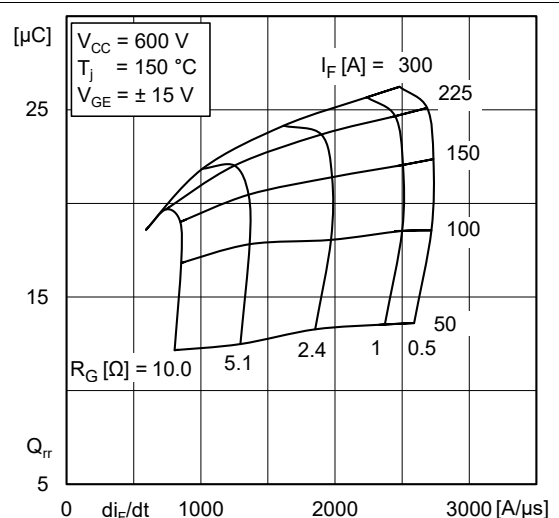
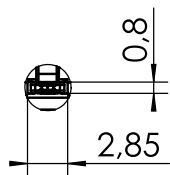
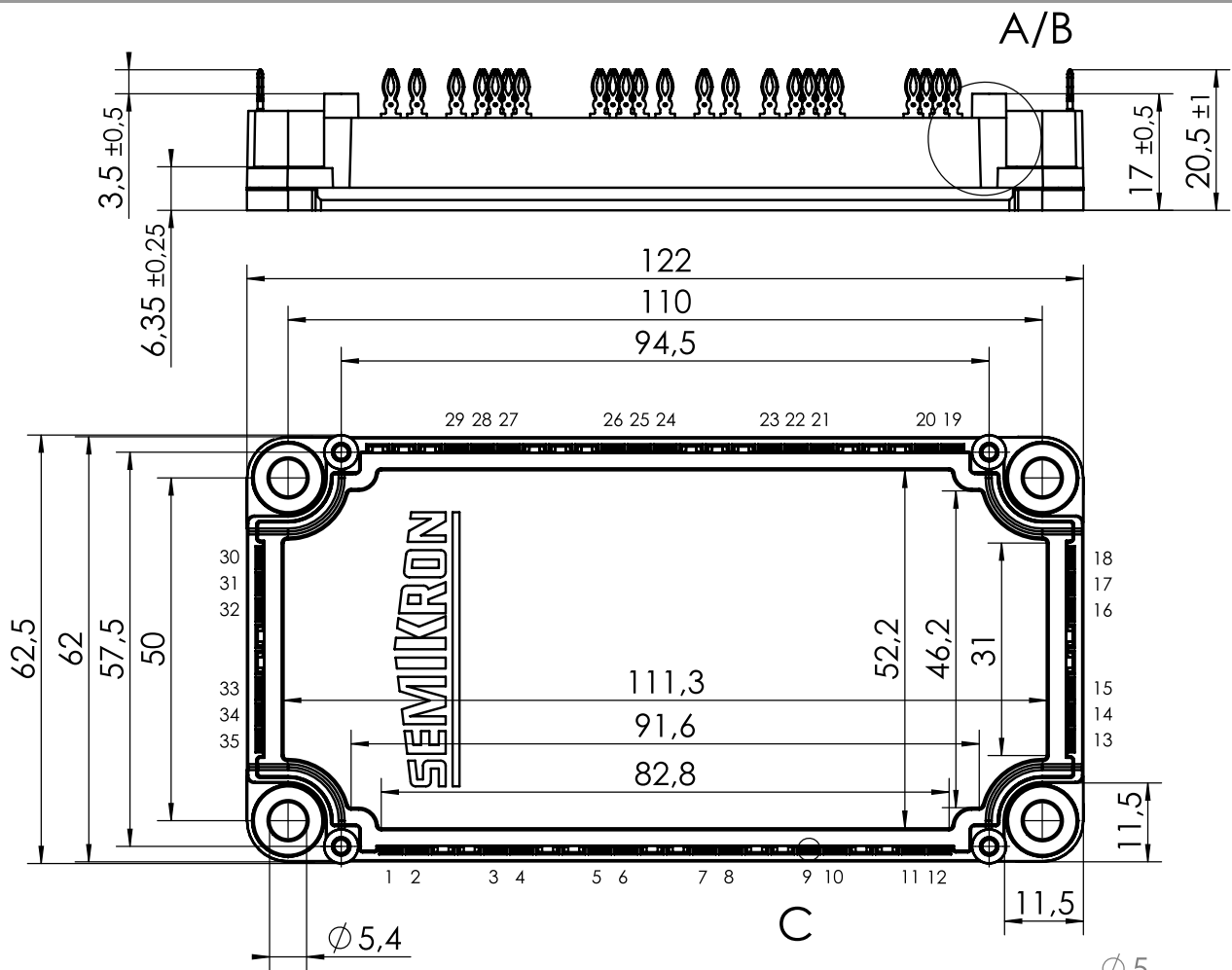
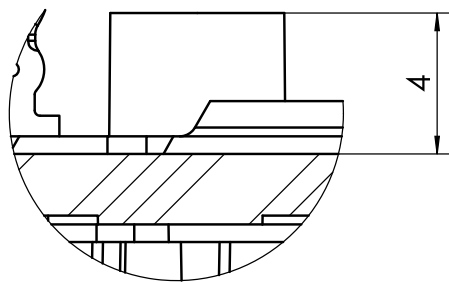


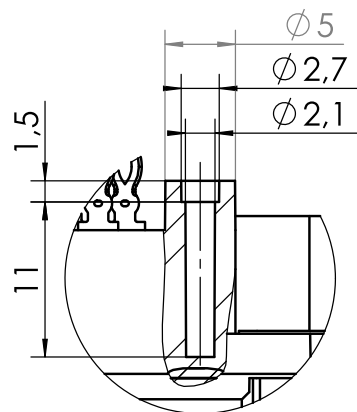
Fig. 12: Typ. CAL diode recovery charge



C (2 : 1)



B (5 : 1)
Sectional plane in the
middle of module

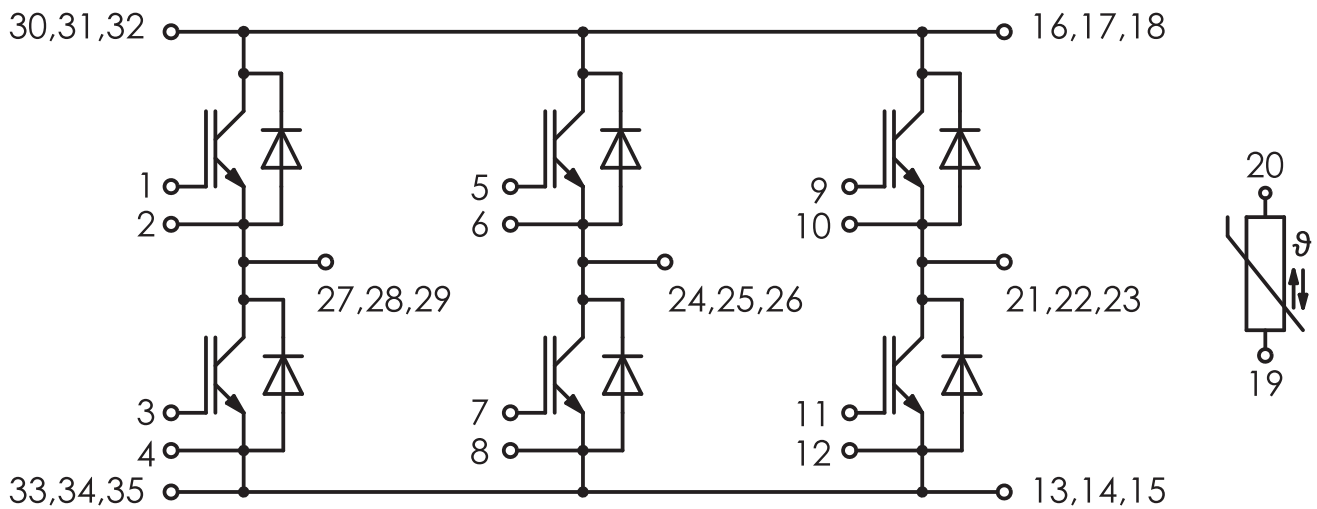


A (2 : 1)
Cut-out shows section
through the center of PCB-dome

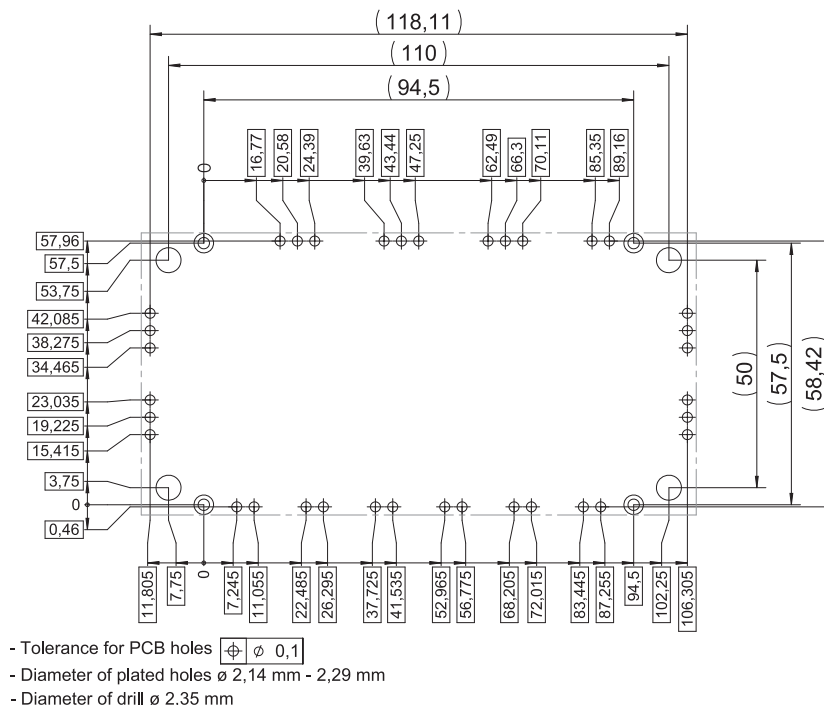
Dimensions in mm

general tolerance ± 0.2

SEMIX 6p



pinout



Spring configuration

IMPORTANT INFORMATION AND WARNINGS

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

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