

SEMiX302GB17E4s



SEMiX® 2s

SEMiX302GB17E4s

Features

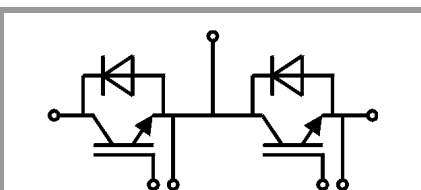
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_j=150^\circ\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 1,95 \Omega$
 $R_{Goff,main} = 1,95 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$



GB

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit	
IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1700	V	
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	516	A
		$T_c = 80^\circ\text{C}$	392	A
I_{Cnom}		300	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	900	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 1000 \text{ V}$ $V_{GE} \leq 15 \text{ V}$ $V_{CES} \leq 1700 \text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
T_j		-40 ... 175	$^\circ\text{C}$	
Inverse diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1700	V	
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	324	A
		$T_c = 80^\circ\text{C}$	238	A
I_{Fnom}		300	A	
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	600	A	
I_{FSM}	$t_p = 10 \text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$	1710	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Module				
$I_{t(RMS)}$		600	A	
T_{stg}		-40 ... 125	$^\circ\text{C}$	
V_{isol}	AC sinus 50Hz, t = 1 min	4000	V	

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 300 \text{ A}$ $V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	1.90	2.20	V
		$T_j = 150^\circ\text{C}$	2.26	2.45	V
V_{CE0}	chiplevel	$T_j = 25^\circ\text{C}$	1.1	1.2	V
		$T_j = 150^\circ\text{C}$	1	1.1	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	2.7	3.3	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	4.2	4.5	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 12 \text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0 \text{ V}$ $V_{CE} = 1700 \text{ V}$	$T_j = 25^\circ\text{C}$		4	mA
					mA
C_{ies}	$V_{CE} = 25 \text{ V}$		24		nF
C_{oes}	$V_{GE} = 0 \text{ V}$		1.00		nF
C_{res}			0.76		nF
Q_G	$V_{GE} = -8 \text{ V...} + 15 \text{ V}$		2400		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		2.50		Ω
$t_{d(on)}$	$V_{CC} = 1200 \text{ V}$ $I_C = 300 \text{ A}$	$T_j = 150^\circ\text{C}$	380		ns
t_r	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$	50		ns
E_{on}	$R_{Gon} = 3.3 \Omega$	$T_j = 150^\circ\text{C}$	140		mJ
$t_{d(off)}$	$R_{Goff} = 3.3 \Omega$	$T_j = 150^\circ\text{C}$	840		ns
t_f	$di/dt_{on} = 6600 \text{ A}/\mu\text{s}$ $di/dt_{off} = 1600 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	160		ns
E_{off}	$du/dt = 4400 \text{ V}/\mu\text{s}$ $L_s = 30 \text{ nH}$	$T_j = 150^\circ\text{C}$	122		mJ

SEMiX302GB17E4s



SEMiX® 2s

SEMiX302GB17E4s

Features

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

Typical Applications*

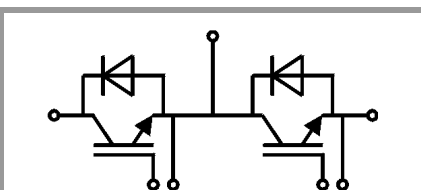
- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_j=150^\circ\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 1,95 \Omega$
 $R_{Goff,main} = 1,95 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	$V_{CC} = 900 \text{ V}$	$T_j = 150^\circ\text{C}$		410		ns
t_r	$I_C = 300 \text{ A}$	$T_j = 150^\circ\text{C}$		90		ns
E_{on}	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$		73		mJ
$t_{d(off)}$	$R_{G on} = 3.3 \Omega$	$T_j = 150^\circ\text{C}$		780		ns
t_f	$R_{G off} = 3.3 \Omega$	$T_j = 150^\circ\text{C}$		170		ns
E_{off}	$di/dt_{on} = 3400 \text{ A}/\mu\text{s}$ $di/dt_{off} = 1400 \text{ A}/\mu\text{s}$ $du/dt = 4400 \text{ V}/\mu\text{s}$ $L_s = 80 \text{ nH}$	$T_j = 150^\circ\text{C}$		100		mJ
$R_{th(j-c)}$	per IGBT				0.083	K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 300 \text{ A}$	$T_j = 25^\circ\text{C}$		1.98	2.37	V
	$V_{GE} = 0 \text{ V}$ chipelevel	$T_j = 150^\circ\text{C}$		2.11	2.52	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$	1.16	1.32	1.56	V
		$T_j = 150^\circ\text{C}$		1.08	1.22	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$	1.7	2.2	2.7	m Ω
		$T_j = 150^\circ\text{C}$		3.4	4.3	m Ω
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 150^\circ\text{C}$		310		A
Q_{rr}	$di/dt_{off} = 5600 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		103		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_R = 1200 \text{ V}$	$T_j = 150^\circ\text{C}$		70		mJ
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 150^\circ\text{C}$		300		A
Q_{rr}	$di/dt_{off} = 3400 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		100		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_R = 900 \text{ V}$	$T_j = 150^\circ\text{C}$		61		mJ
$R_{th(j-c)}$	per diode				0.184	K/W
Module						
L_{CE}				18		nH
$R_{CC'+EE'}$	res. terminal-chip	$T_C = 25^\circ\text{C}$		0.7		m Ω
		$T_C = 125^\circ\text{C}$		1		m Ω
$R_{th(c-s)}$	per module			0.045		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t	to terminals (M6)		2.5		5	Nm
						Nm
w					250	g
Temperature Sensor						
R_{100}	$T_C=100^\circ\text{C}$ ($R_{25}=5 \text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[\text{K}]$;			$3550 \pm 2\%$		K



GB

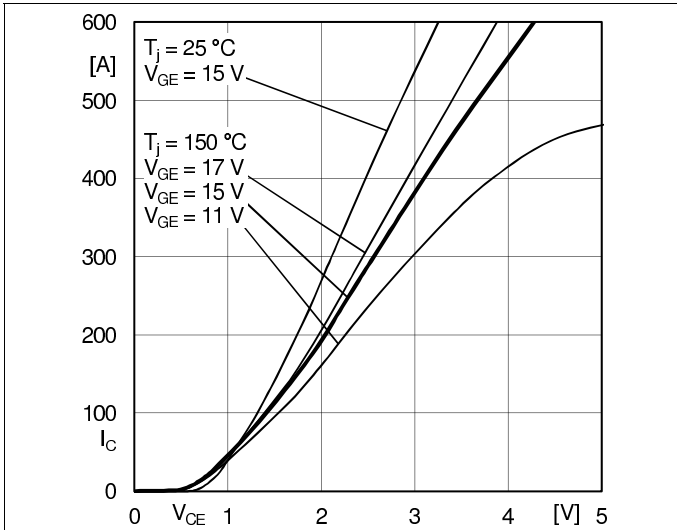


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

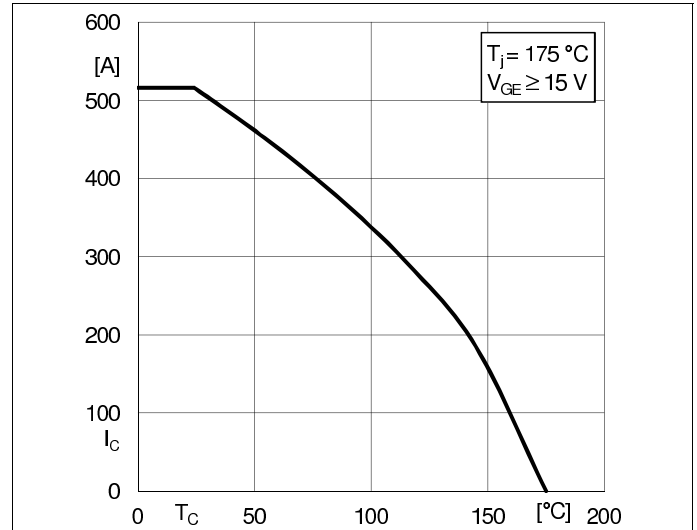


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

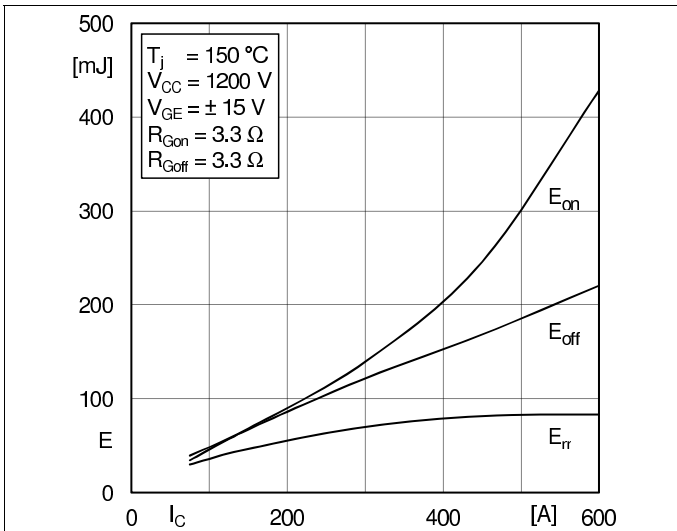


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

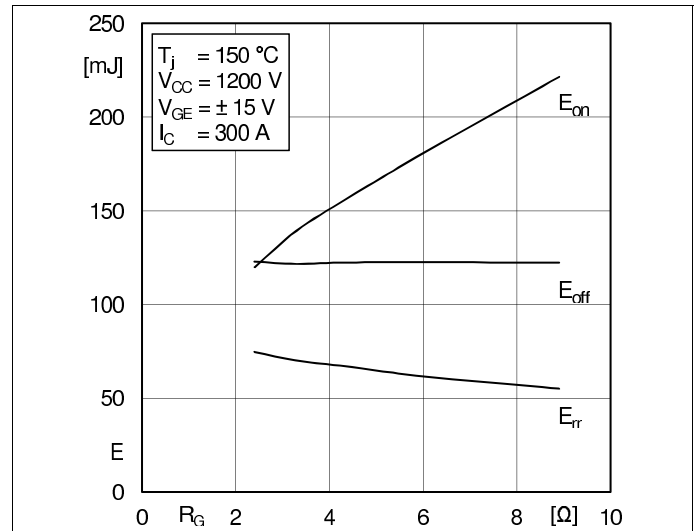


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

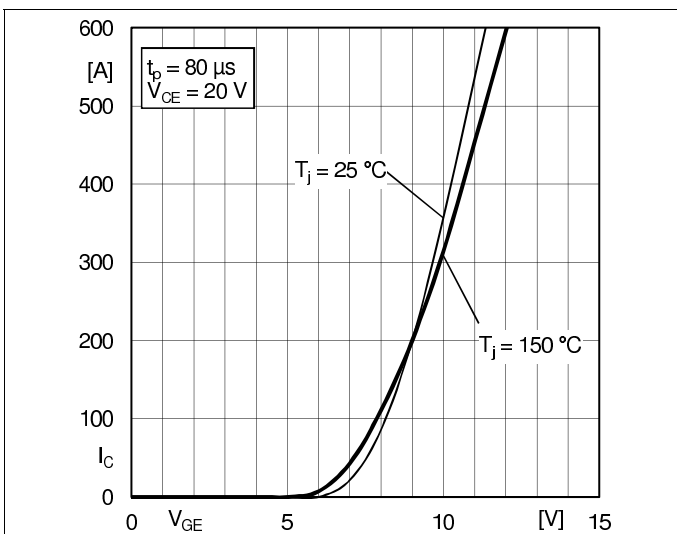


Fig. 5: Typ. transfer characteristic

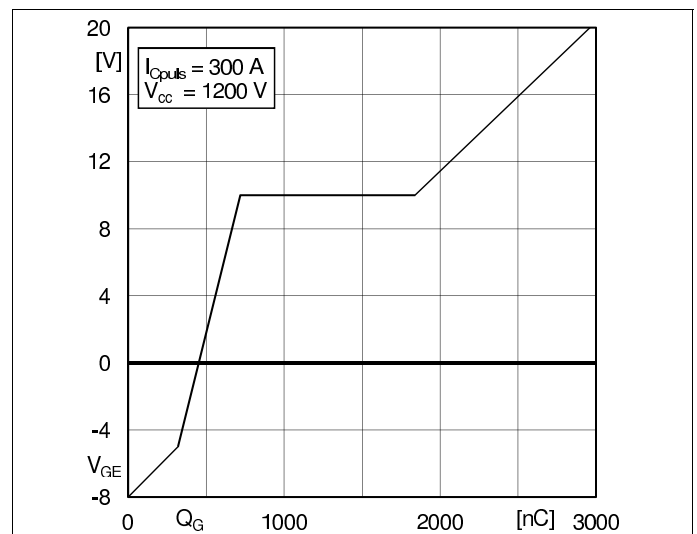


Fig. 6: Typ. gate charge characteristic

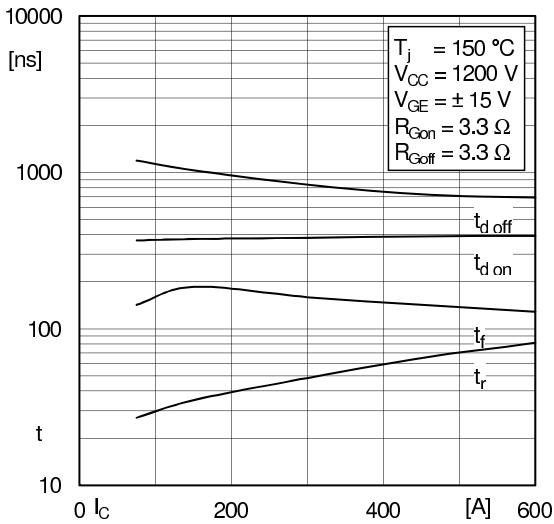


Fig. 7: Typ. switching times vs. I_C

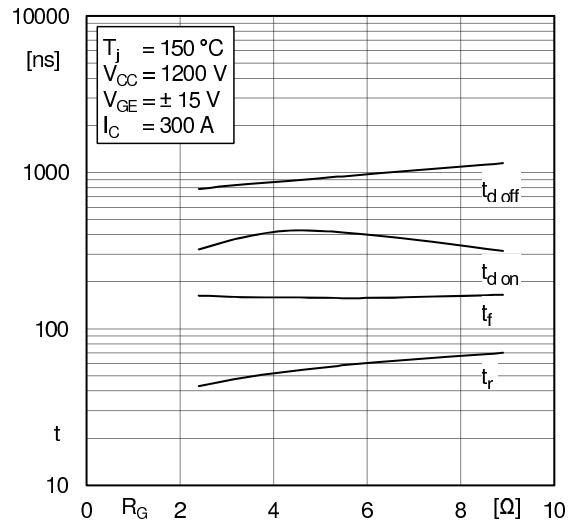


Fig. 8: Typ. switching times vs. gate resistor R_G

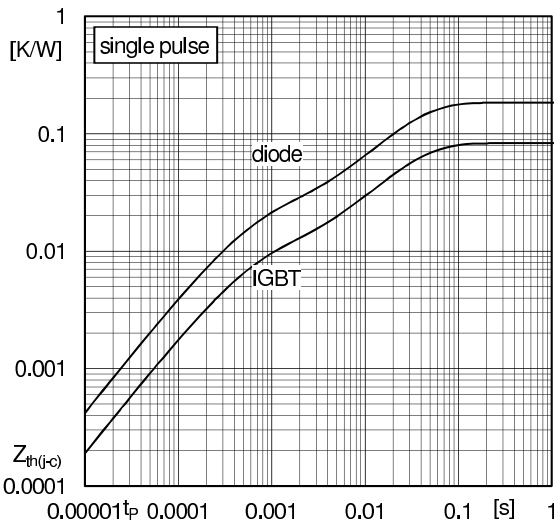


Fig. 9: Typ. transient thermal impedance

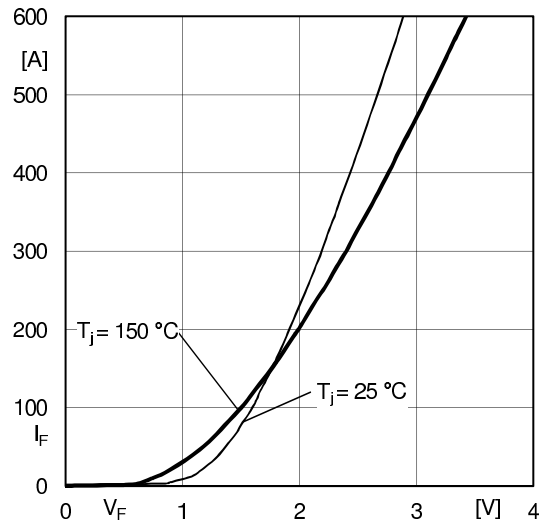


Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

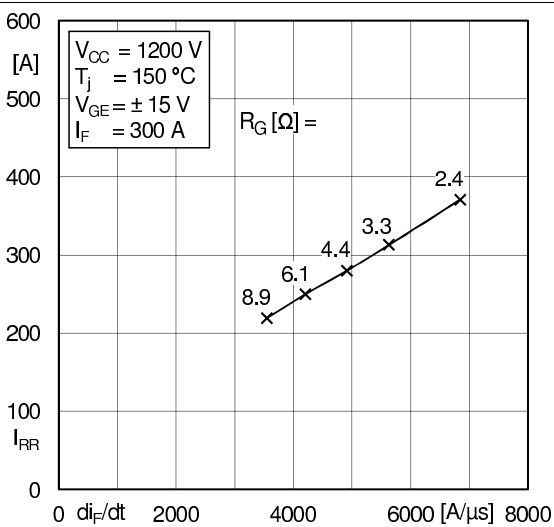


Fig. 11: Typ. CAL diode peak reverse recovery current

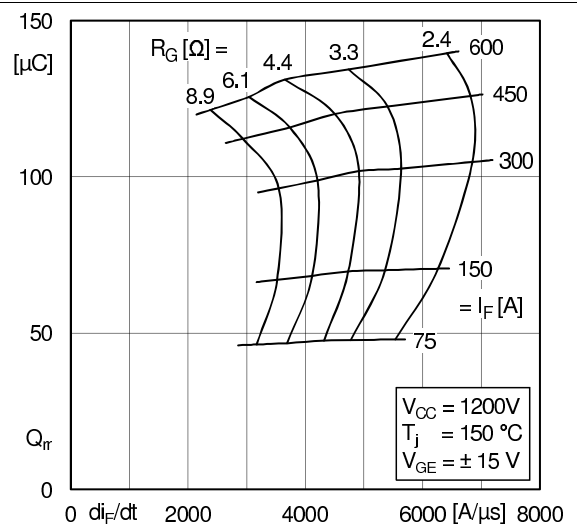
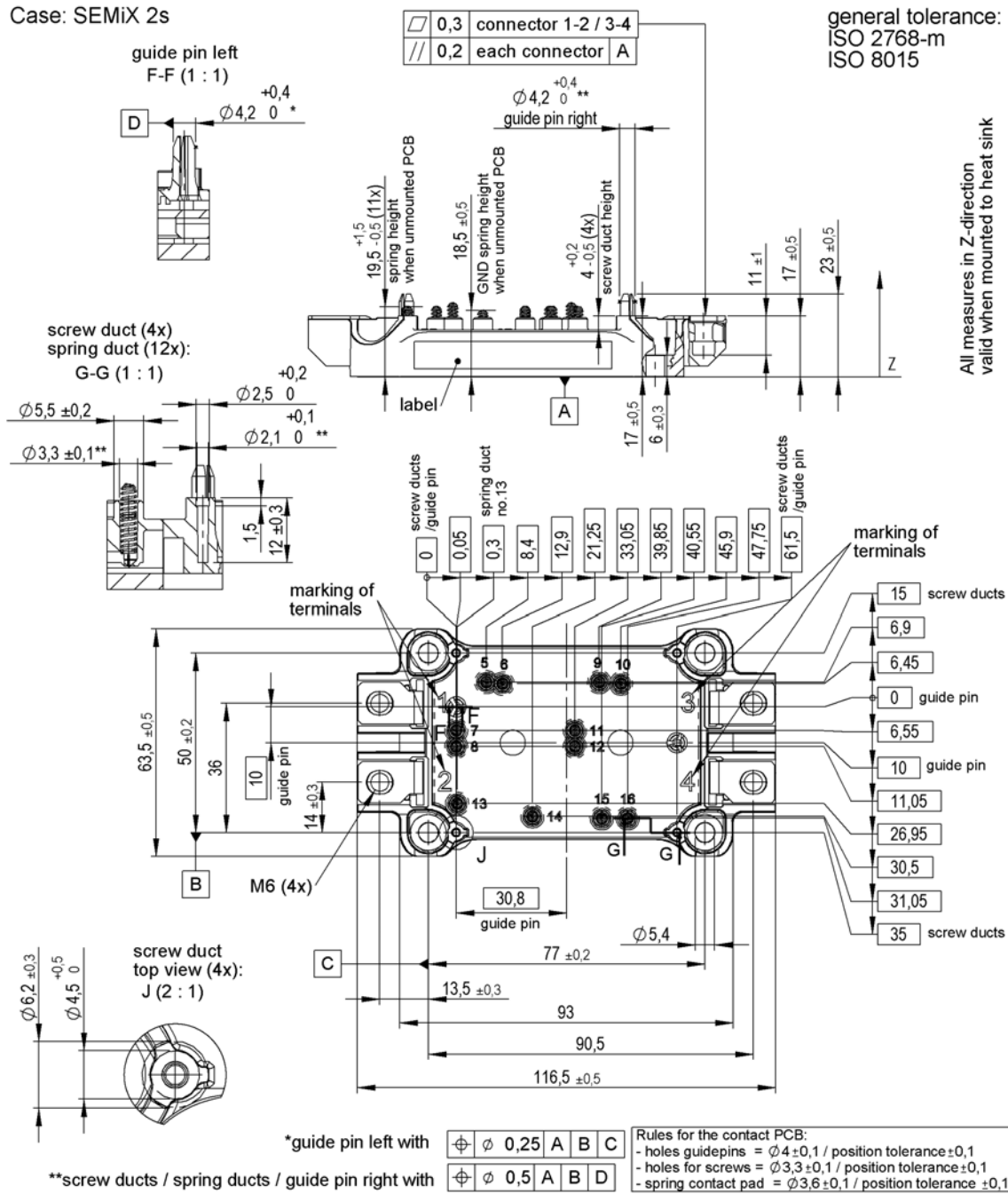


Fig. 12: Typ. CAL diode recovery charge

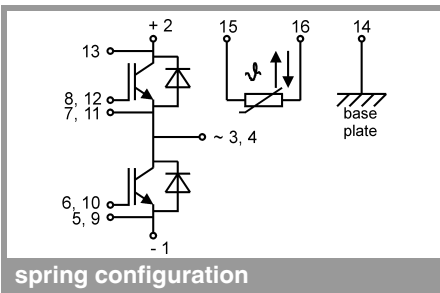
SEMiX302GB17E4s

Case: SEMiX 2s



All measures in Z-direction
 valid when mounted to heat sink

SEMIX 2s



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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.