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Semikron SEMIX302GB12VS Datasheet

SEMIX; Trench IGBT Module; 1200V; 300A | SEMIKRON SEMIX302GB12VS

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SEMIX302GB12Vs



SEMIX302GB12Vs

Features

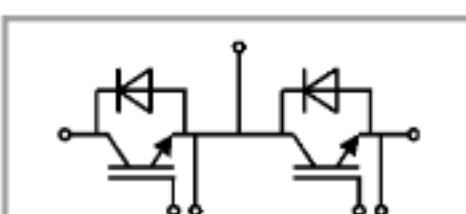
- Homogeneous Si
- V_{CEsat} with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to T_{case}125°C max.
- Product reliability results are valid for T_J150°C
- Dynamic values apply to the following combination of resistors:
R_{DS(on)} = 0.5 Ω
R_{g(on)} = 0.5 Ω
R_{g(off)} = 2.2 Ω
R_g = 0.5 Ω



GB

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
IGBT			
V _{CEsat}	T _J = 25 °C	1200	V
I _C	T _J = 175 °C	448	A
I _{CDM}	T _J = 80 °C	342	A
I _{DM}	I _{GBT} = 3xI _{CDM}	900	A
V _{DES}	V _{CE} = 720 V V _{GE} ≤ 15 V V _{CE} ≤ 1200 V	-20 ... 20	V
t _{dec}	T _J = 125 °C	10	µs
T _J		-40 ... 175	°C
Inverse diode			
I _F	T _J = 175 °C	356	A
I _{FM}	T _J = 80 °C	266	A
I _{DM}	I _{GBT} = 3xI _{FM}	900	A
I _{FSM}	t ₀ = 10 ms, sin 180°, T _J = 25 °C	1620	A
T _J		-40 ... 175	°C
Module			
I _{PM} (48)	T _{terminal} = 80 °C	600	A
T _{ag}		-40 ... 125	°C
V _{ap}	AC sinus 50Hz, t = 1 min	4000	V

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
V _{CEsat}	I _C = 300 A V _{GE} = 15 V chip level	T _J = 25 °C	1.75	2.2	V
		T _J = 150 °C	2.2	2.5	V
V _{CE0}		T _J = 25 °C	0.94	1.04	V
		T _J = 150 °C	0.88	0.98	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C	2.7	3.9	mΩ
		T _J = 150 °C	4.4	5.1	mΩ
V _{GEsat}	V _{GE} =V _{CE} , I _C = 12 mA		5.5	6	6.5 V
I _{CS}	V _{CE} = 0 V V _{CE} = 1200 V	T _J = 25 °C	0.1	0.3	mA
C _{ies}	V _{CE} = 25 V f = 1 MHz			18.0	nF
C _{res}	V _{GE} = 0 V f = 1 MHz			1.77	nF
C _{oss}	V _{GE} = -8 V, - + 15 V f = 1 MHz			1.77	nF
Q _g	V _{GE} = -8 V, - + 15 V			3300	nC
R _{DS(on)}	T _J = 25 °C			2.50	Ω
t _{SD(on)}	V _{CE} = 600 V I _C = 300 A V _{GE} = 15 V	T _J = 150 °C		424	ns
t _v		T _J = 150 °C		64	ns
E _{on}	R _{DS(on)} = 1.8 Ω	T _J = 150 °C		37.3	mJ
t _{SD(off)}	R _{DS(on)} = 1.8 Ω di/dt _{on} = 5700 A/μs	T _J = 150 °C		618	ns
t _v	di/dt _{off} = 3000 A/μs	T _J = 150 °C		90	ns
E _{off}	du/dt _{off} = 6500 V/μs	T _J = 150 °C		36.1	mJ
R _{TH(j-c)}	per IGBT			0.1	K/W

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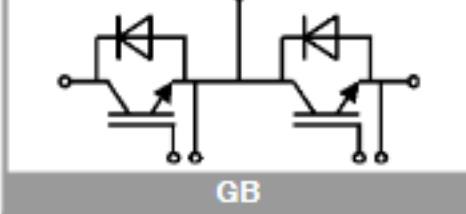
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R_g = 0.5 Ω



GB

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$ $V_{GE} = 0\text{ V}$ chip	$T_J = 25\text{ }^{\circ}\text{C}$		2.1	2.46	V
		$T_J = 150\text{ }^{\circ}\text{C}$		2.1	2.4	V
V_{F0}		$T_J = 25\text{ }^{\circ}\text{C}$	1.1	1.3	1.5	V
		$T_J = 150\text{ }^{\circ}\text{C}$	0.7	0.9	1.1	V
r_F		$T_J = 25\text{ }^{\circ}\text{C}$	2.2	2.8	3.2	m Ω
		$T_J = 150\text{ }^{\circ}\text{C}$	3.5	3.9	4.3	m Ω
I_{FSM}	$I_F = 300\text{ A}$ di/dt = 5800 A/ μ s	$T_J = 150\text{ }^{\circ}\text{C}$		318		A
E_{on}	$V_{GE} = -15\text{ V}$ $V_{CE} = 600\text{ V}$	$T_J = 150\text{ }^{\circ}\text{C}$		54		μ C
$R_{TH(j-c)}$	per diode			21.8		mW
					0.17	K/W
Module						
L_{CE}				18		nH
R_{CC+EE}	res. terminal-chip	$T_C = 25\text{ }^{\circ}\text{C}$		0.7		m Ω
		$T_C = 125\text{ }^{\circ}\text{C}$		1		m Ω
$R_{TH(j-c)}$	per module			0.045		K/W
M_1	to heat sink (M5)		3		5	Nm
M_2	to terminals (M6)		2.5		5	Nm
W					250	g
Temperature Sensor						
R_{100}	$T_J = 100\text{ }^{\circ}\text{C}$ ($R_{25} = 5\text{ k}\Omega$)			493 $\pm$ 5%		Ω
B_{100+25}	$R_{175}/R_{100} \exp[B_{100+25}(1/T_J - 1/T_{100})]$; T[K]			3550 $\pm$ 2%		K

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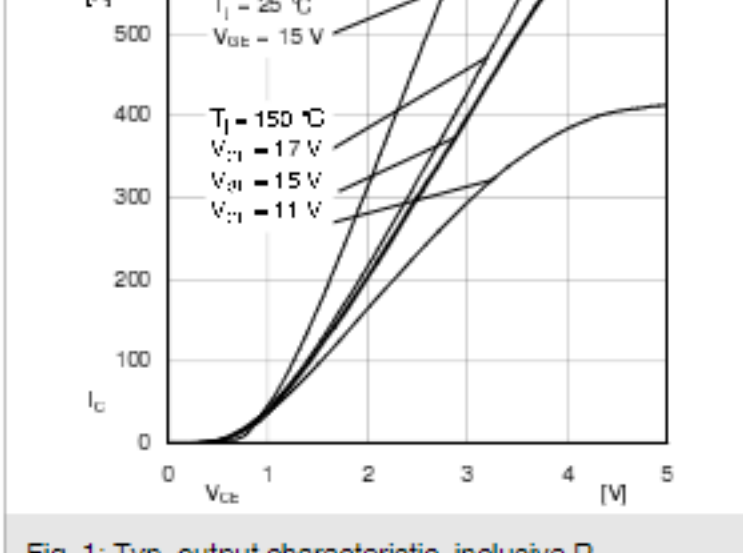


Fig. 1: Typ. output characteristic, inclusive R_{DS(on)}

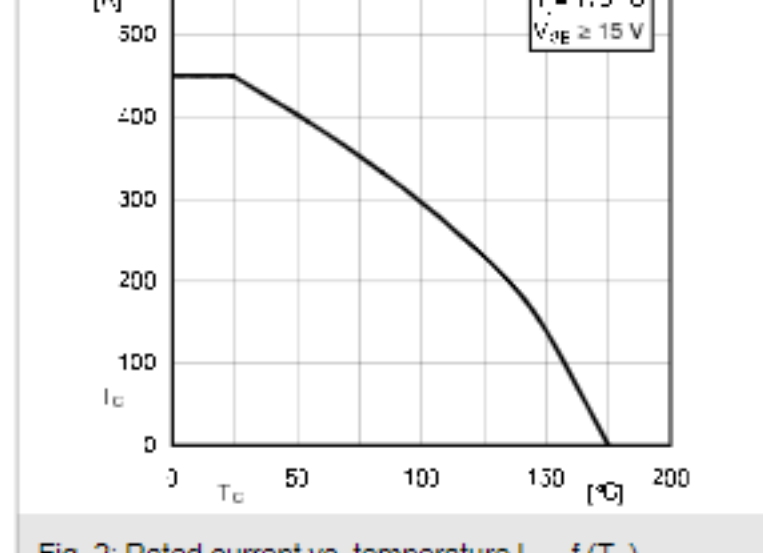


Fig. 2: Rated current vs. temperature I_C = f(T_J)

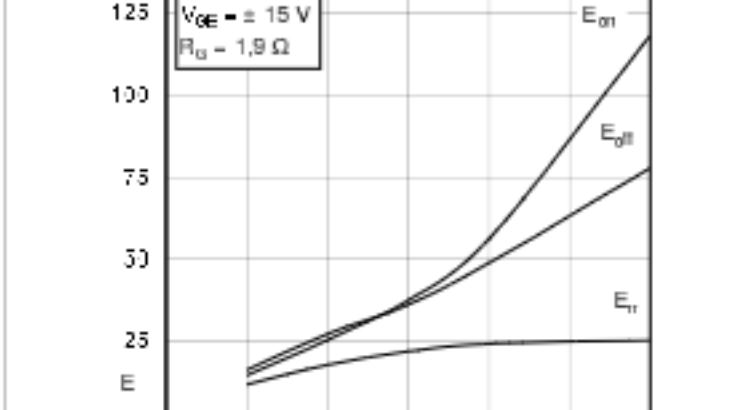


Fig. 3: Typ. turn-on /off energy = f(I_C)

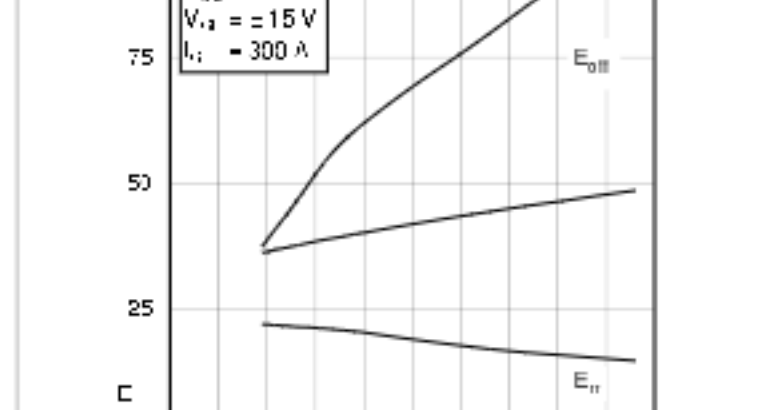


Fig. 4: Typ. turn-on /off energy = f(R_g)

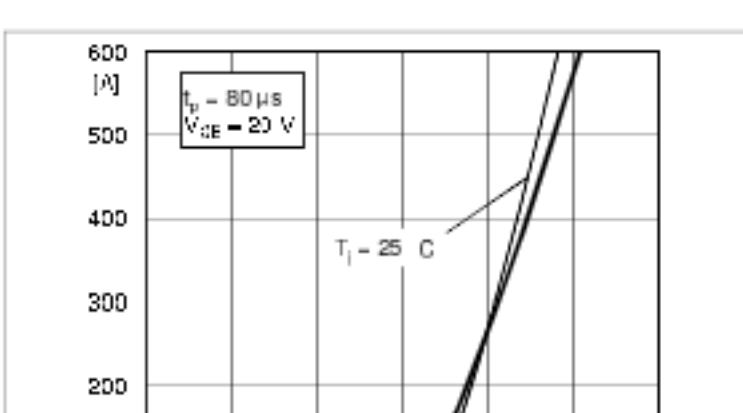


Fig. 5: Typ. transfer characteristic

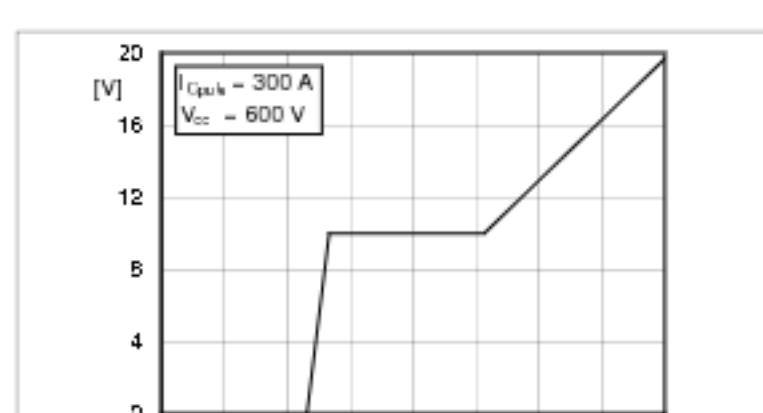


Fig. 6: Typ. gate charge characteristic

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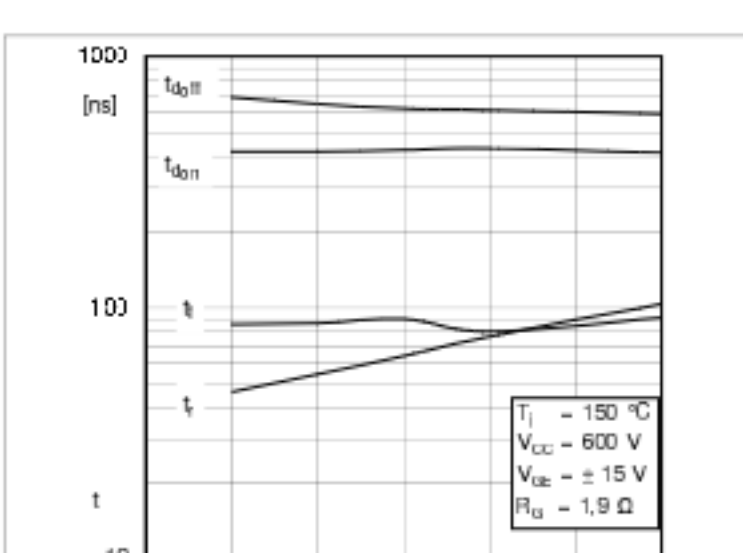


Fig. 7: Typ. switching times vs. I_C

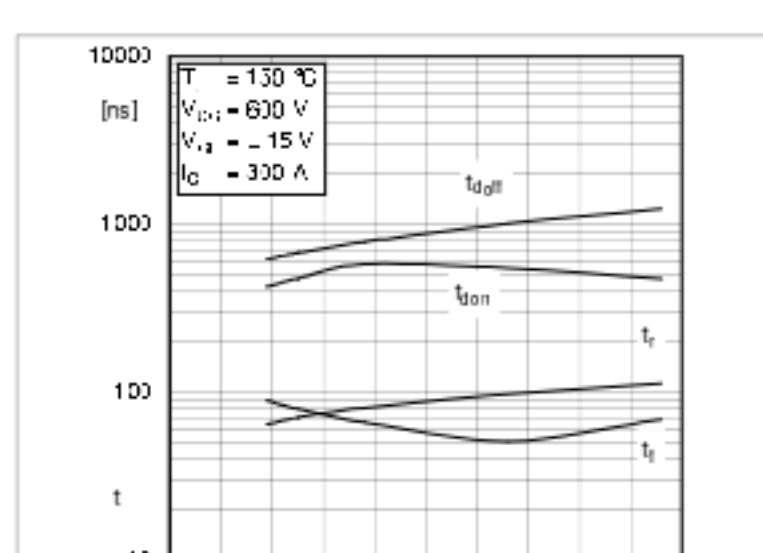


Fig. 8: Typ. switching times vs. gate resistor R_g

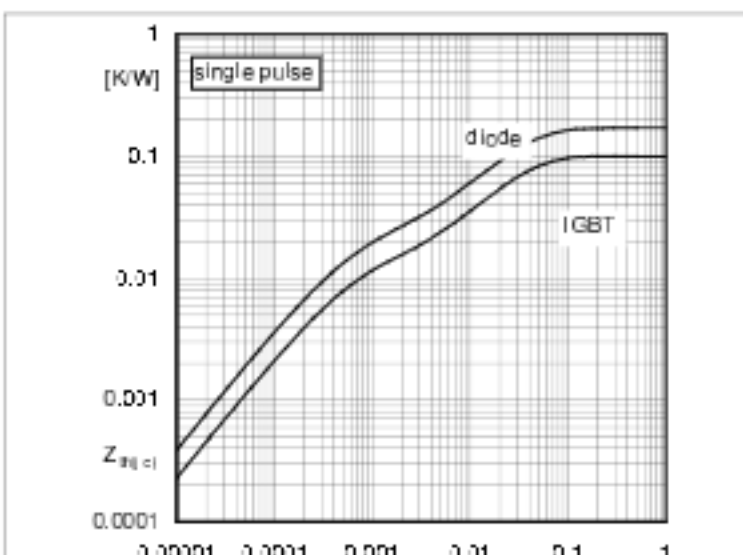


Fig. 9: Typ. transient thermal impedance

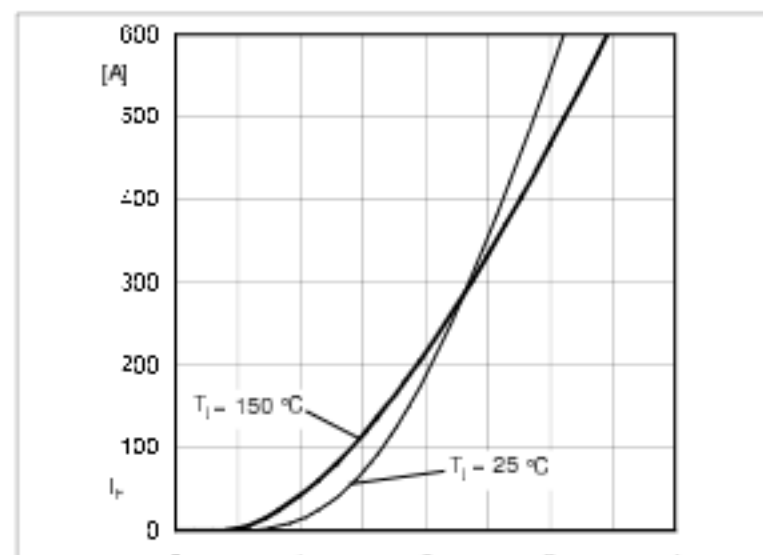


Fig. 10: Typ. CAL diode forward charact., incl. R_{DS(on)}

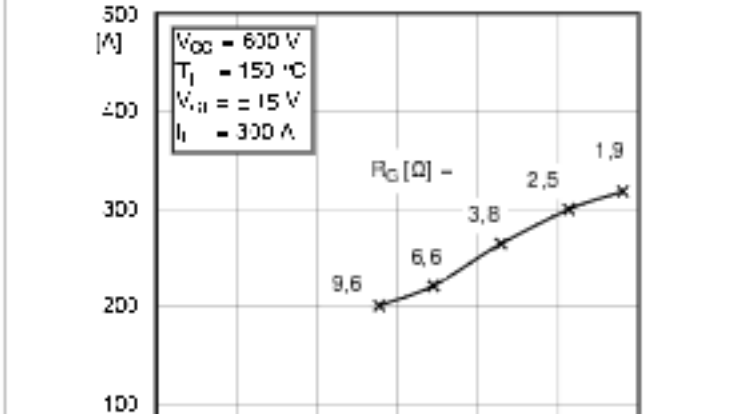


Fig. 11: Typ. CAL diode peak reverse recovery current

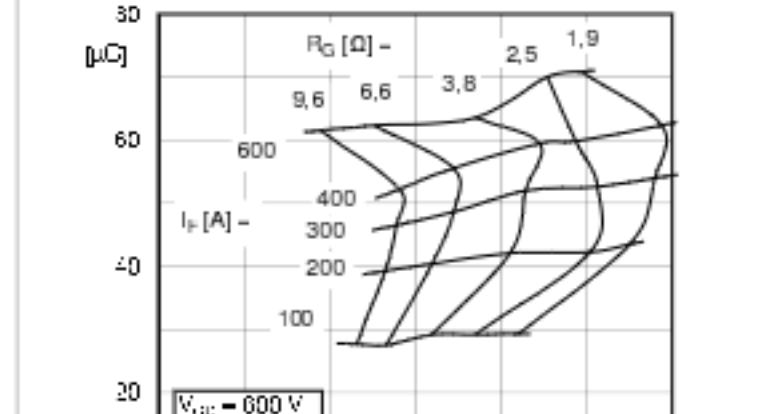
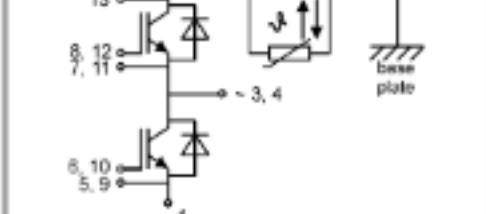
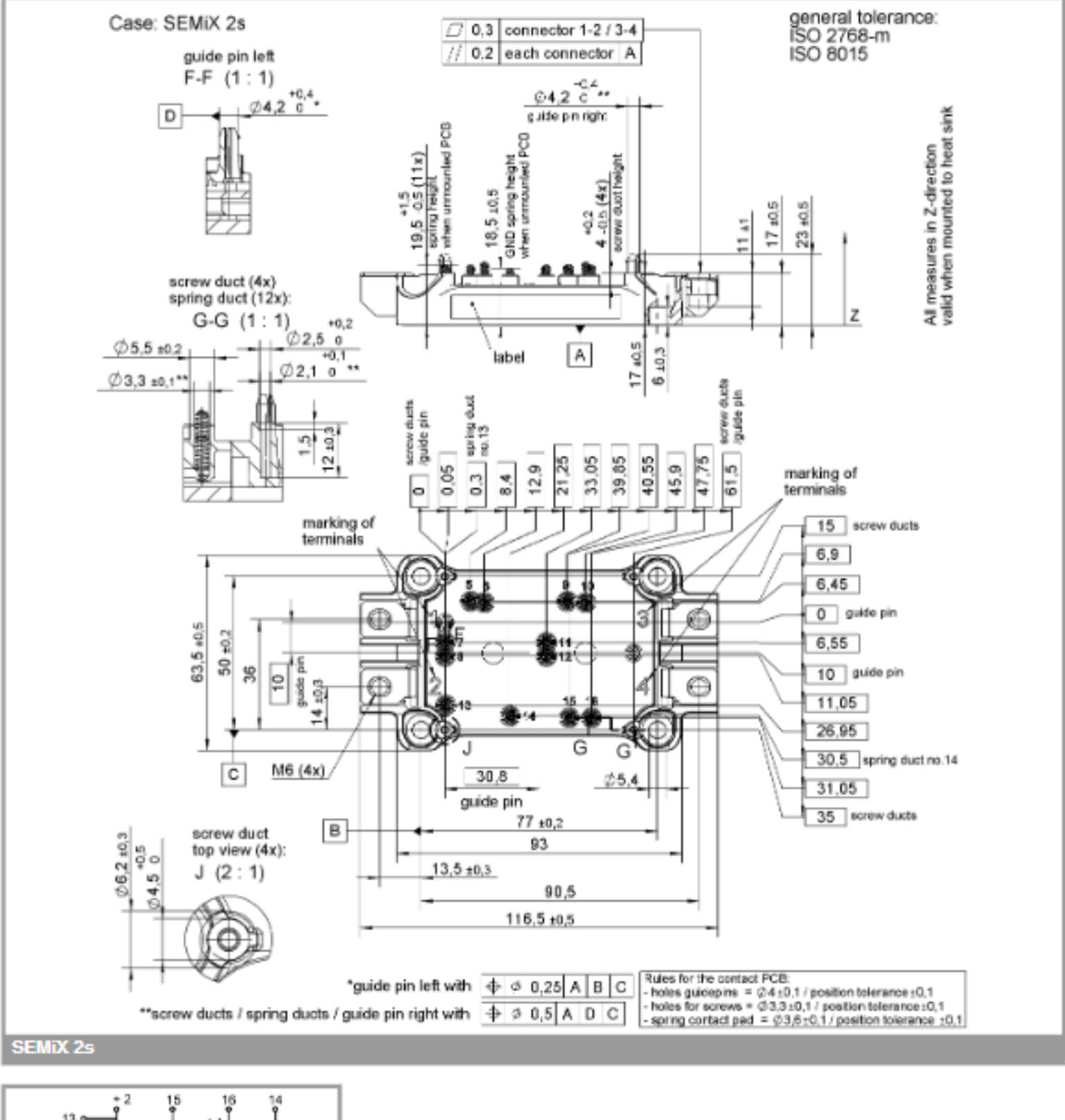


Fig. 12: Typ. CAL diode recovery charge

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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.

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