SEMiX®2s

SPT IGBT Modules

SEMiX352GAR128Ds

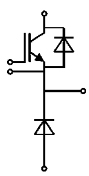
Preliminary Data

Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz



GAR

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}			1200	V
I_C	T_j = 150 °C	T_c = 25 °C	377	A
		T_c = 80 °C	268	A
I_{Cnom}			200	A
I_{CRM}	$I_{CRM} = 2xI_{Cnom}$		400	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 600 V $V_{GE} \leq$ 20 V T_j = 125 °C $V_{CES} \leq$ 1200 V		10	µs
T_j			-40 ... 150	°C
Inverse diode				
I_F	T_j = 150 °C	T_c = 25 °C	297	A
		T_c = 80 °C	204	A
I_{Fnom}			200	A
I_{FRM}	$I_{FRM} = 2xI_{Fnom}$		400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		2000	A
T_j			-40 ... 150	°C
Freewheeling diode				
I_F	T_j = 150 °C	T_c = 25 °C		A
		T_c = 80 °C		A
I_{Fnom}			200	A
I_{FRM}	$I_{FRM} = 2xI_{Fnom}$		400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		2000	A
T_j			-40 ... 150	°C
Module				
$I_{t(RMS)}$			600	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 = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.9	2.35	V
		T_j = 125 °C		2.10	2.55	V
V_{CE0}		T_j = 25 °C		1	1.15	V
		T_j = 125 °C		0.9	1.05	V
r_{CE}	V_{GE} = 15 V	T_j = 25 °C		4.5	6.0	mΩ
		T_j = 125 °C		6.0	7.5	mΩ
$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C = 8 mA		4.5	5	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C		0.1	0.3	mA
		T_j = 125 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		18.9		nF
C_{oes}		f = 1 MHz		1.24		nF
C_{res}		f = 1 MHz		0.78		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1920		nC
R_{Gint}	T_j = 25 °C			2.00		Ω

SEMiX®2s

SPT IGBT Modules

SEMiX352GAR128Ds

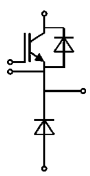
Preliminary Data

Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz



GAR

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$t_{d(on)}$	V_{CC} = 600 V			230		ns
t_r	I_C = 200 A			55		ns
E_{on}	T_j = 125 °C			20		mJ
$t_{d(off)}$	$R_{G\ on}$ = 3 Ω			585		ns
t_f	$R_{G\ off}$ = 3 Ω			90		ns
E_{off}				21		mJ
$R_{th(j-c)}$	per IGBT				0.083	K/W
$R_{th(j-s)}$	per IGBT					K/W
Inverse diode						
$V_F = V_{EC}$	I_F = 200 A	T_j = 25 °C		2.0	2.5	V
	V_{GE} = 0 V chiplevel	T_j = 125 °C		1.8	2.3	V
V_{F0}		T_j = 25 °C	0.75	1.1	1.45	V
		T_j = 125 °C	0.5	0.85	1.2	V
r_F		T_j = 25 °C	3.8	4.5	5.3	mΩ
		T_j = 125 °C	4.0	4.8	5.5	mΩ
I_{RRM}	I_F = 200 A	T_j = 125 °C		240		A
Q_{rr}	di/dt_{off} = 5350 A/µs	T_j = 125 °C		31		µC
E_{rr}	V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		11		mJ
$R_{th(j-c)}$	per diode				0.15	K/W
$R_{th(j-s)}$	per diode					K/W
Freewheeling diode						
$V_F = V_{EC}$	I_F = 200 A	T_j = 25 °C		2.0	2.5	V
	V_{GE} = 0 V chiplevel	T_j = 125 °C		1.8	2.3	V
V_{F0}		T_j = 25 °C	0.75	1.1	1.45	V
		T_j = 125 °C	0.5	0.85	1.2	V
r_F		T_j = 25 °C	3.8	4.5	5.3	mΩ
		T_j = 125 °C	4.0	4.8	5.5	mΩ
I_{RRM}	I_F = 200 A	T_j = 125 °C		240		A
Q_{rr}	di/dt_{off} = 5320 A/µs	T_j = 125 °C		31		µC
E_{rr}	V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		11		mJ
$R_{th(j-c)}$	per diode				0.15	K/W
$R_{th(j-s)}$	per diode					K/W
Module						
L_{CE}				18		nH
$R_{CC'+EE'}$	res., terminal-chip	T_C = 25 °C		0.7		mΩ
		T_C = 125 °C		1		mΩ
$R_{th(c-s)}$	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°C (R_{25}=5 kΩ)			0,493 ±5%		kΩ
$B_{100/125}$	$R_{(T)}=R_{100}exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			3550 ±2%		K

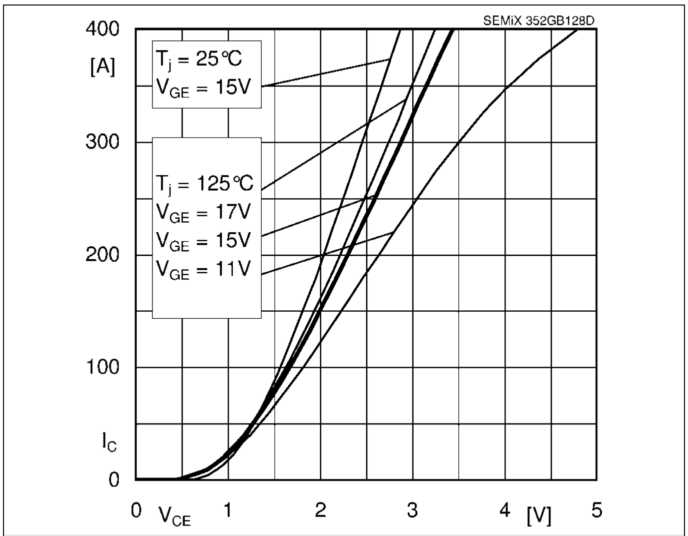


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

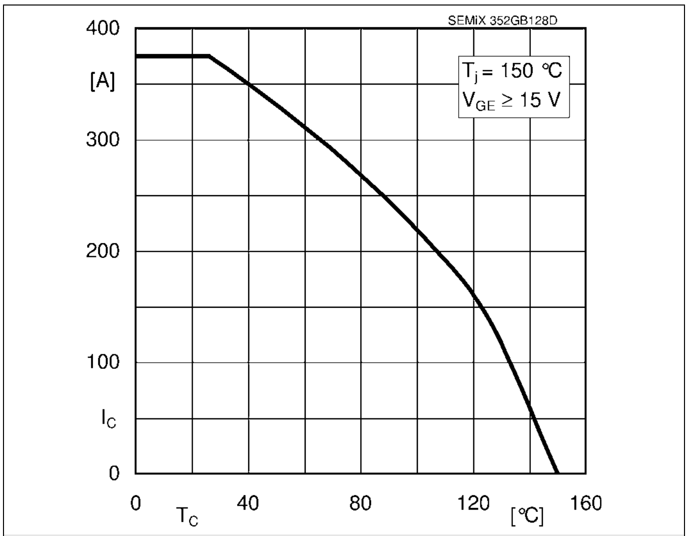


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

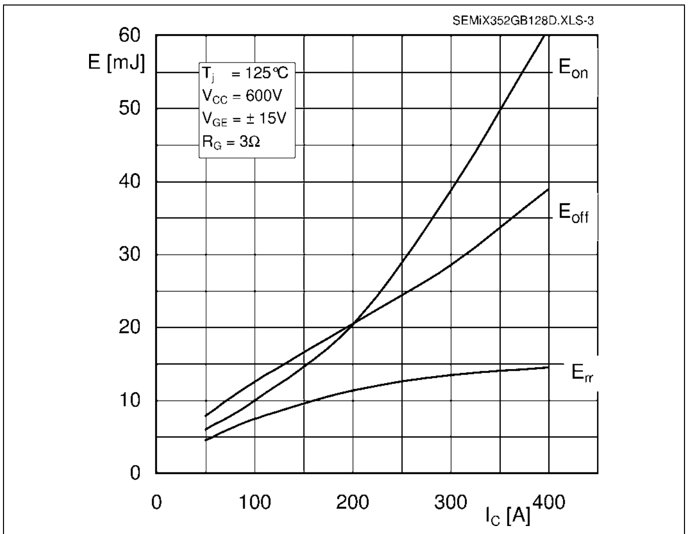


Fig. 3 Typ. turn-on /-off energy = f (I_C)

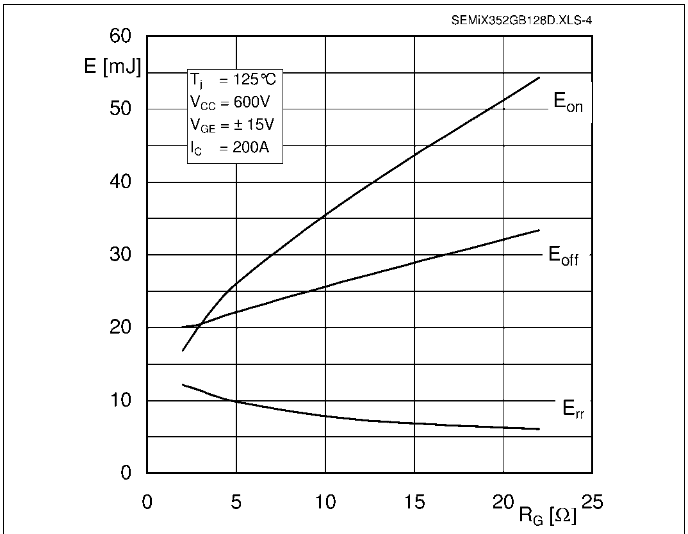


Fig. 4 Typ. turn-on /-off energy = f (R_G)

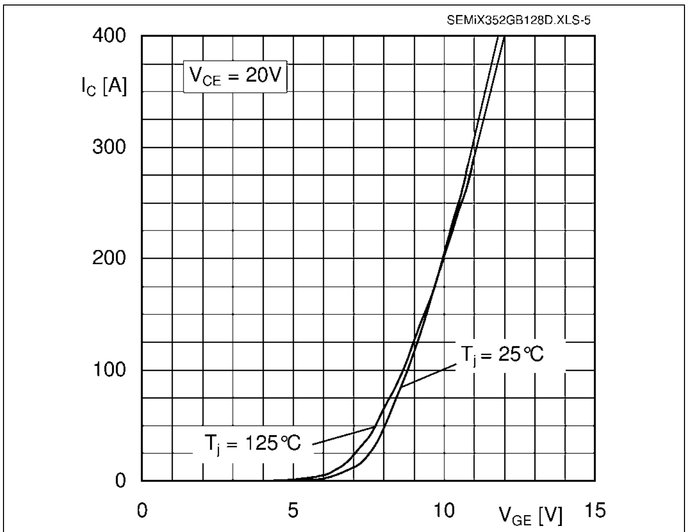


Fig. 5 Typ. transfer characteristic

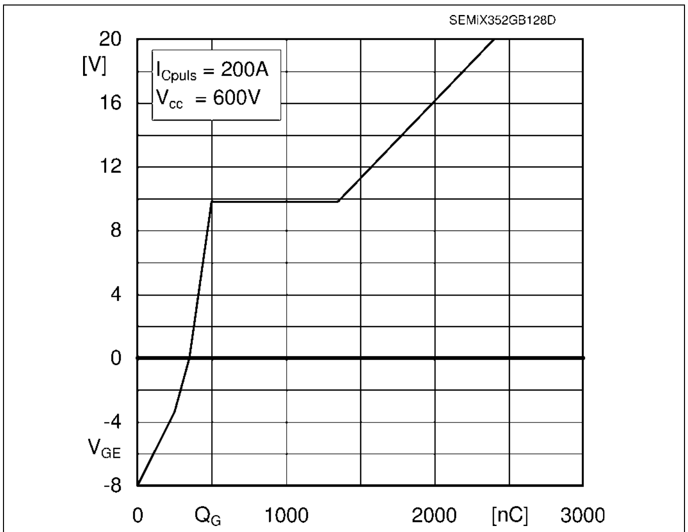


Fig. 6 Typ. gate charge characteristic

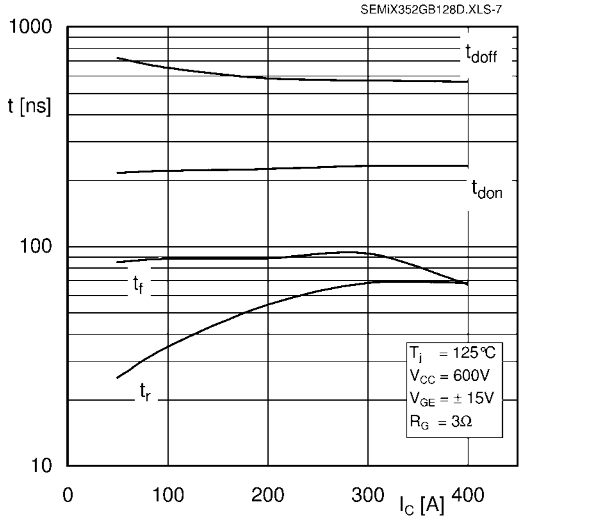


Fig. 7 Typ. switching times vs. I_C

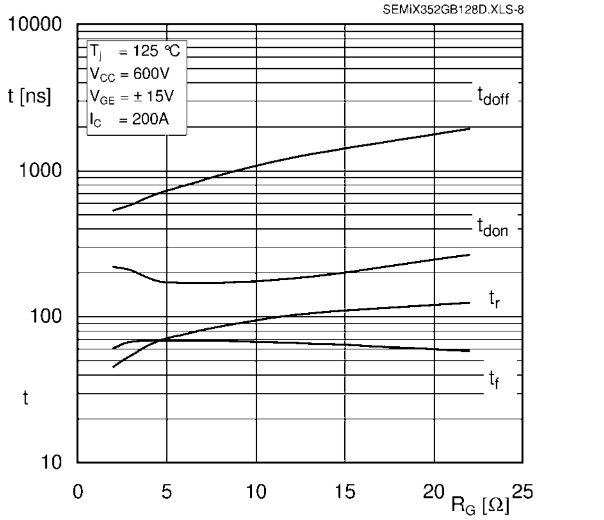


Fig. 8 Typ. switching times vs. gate resistor R_G

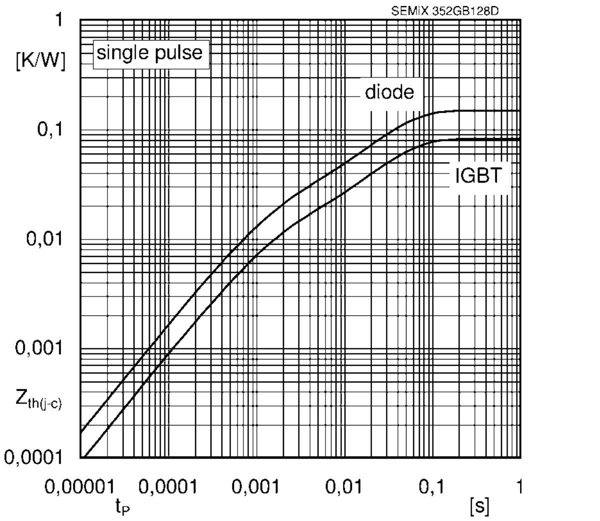


Fig. 9 Typ. transient thermal impedance

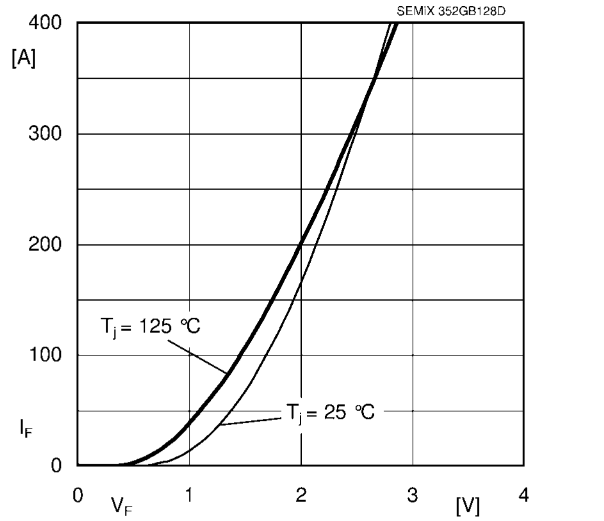


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

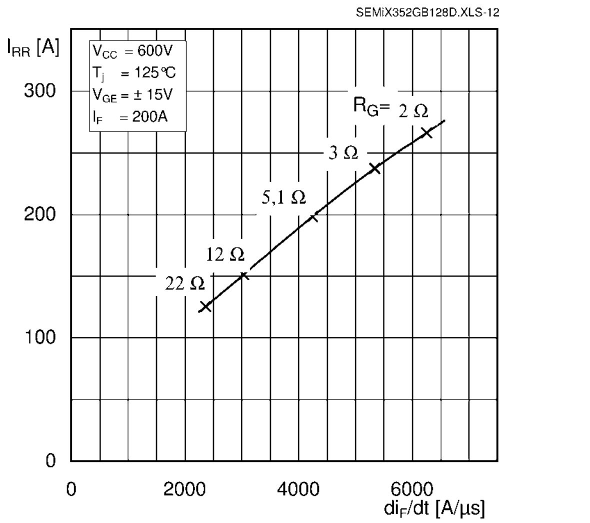


Fig. 11 Typ. CAL diode peak reverse recovery current

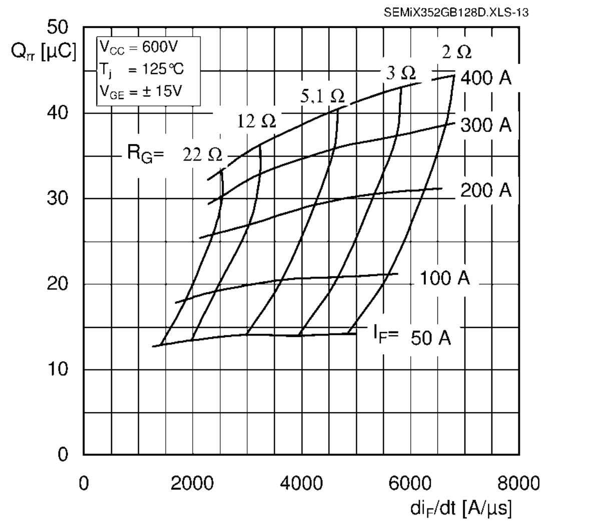
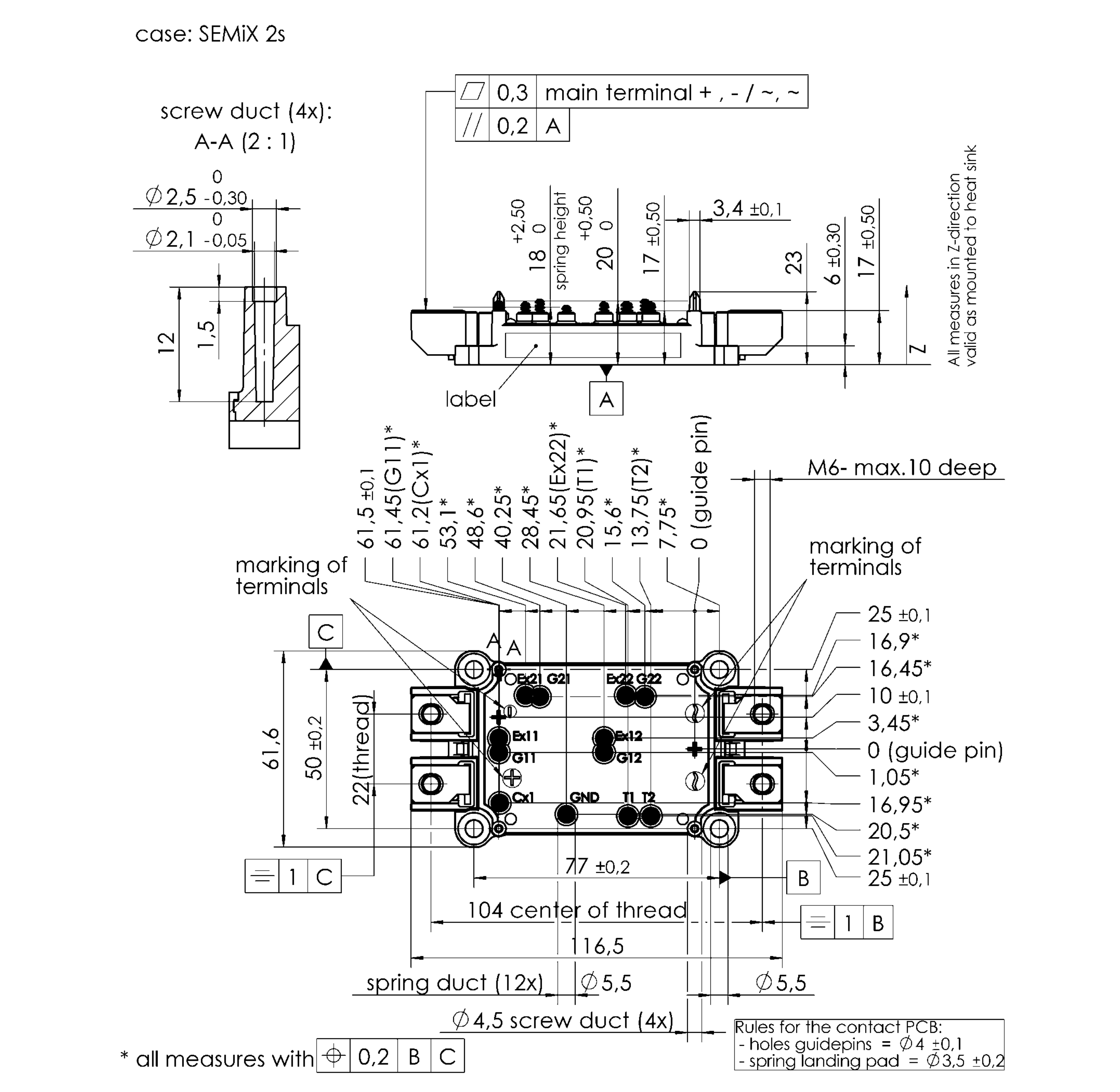
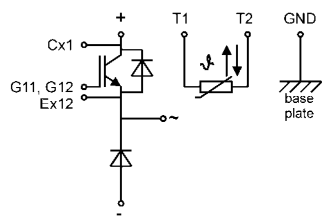


Fig. 12 Typ. CAL diode recovery charge



SEMiX 2s



GAR

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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.