SEMiX452GAL126HDs

SEMiX®2s

Trench IGBT Modules

SEMiX452GAL126HDs

Preliminary Data

Features

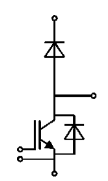
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperatur limited to T_C=125°C max.
- Not for new design



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}			1200	V
I_C	T_j = 150 °C	T_c = 25 °C	455	A
		T_c = 80 °C	319	A
I_{Cnom}			300	A
I_{CRM}	I_{CRM} = 2xI_{Cnom}		600	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 600 V V_{GE} ≤ 20 V T_j = 125 °C V_{CES} ≤ 1200 V		10	µs
T_j			-40 ... 150	°C
Inverse diode				
I_F	T_j = 150 °C	T_c = 25 °C	394	A
		T_c = 80 °C	272	A
I_{Fnom}			300	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1900	A
T_j			-40 ... 150	°C
Freewheeling diode				
I_F	T_j = 150 °C	T_c = 25 °C	394	A
		T_c = 80 °C	272	A
I_{Fnom}			300	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1900	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 = 300 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.7	2.1	V
		T_j = 125 °C		2.00	2.45	V
V_{CE0}		T_j = 25 °C		1	1.2	V
		T_j = 125 °C		0.9	1.1	V
r_{CE}	V_{GE} = 15 V	T_j = 25 °C		2.3	3.0	mΩ
		T_j = 125 °C		3.7	4.5	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 12 mA		5	5.8	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		21.5		nF
C_{oes}		f = 1 MHz		1.13		nF
C_{res}		f = 1 MHz		0.98		nF
Q_G	V_{GE} = - 8 V...+ 15 V			2400		nC
R_{Gint}	T_j = 25 °C			2.50		Ω

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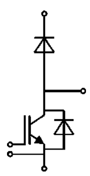

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$t_{d(on)}$	V_{CC} = 600 V I_C = 300 A T_j = 125 °C $R_{G\ on}$ = 2 Ω $R_{G\ off}$ = 2 Ω			280		ns
t_r				65		ns
E_{on}				35		mJ
$t_{d(off)}$				630		ns
t_f				130		ns
E_{off}				45		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 = 300 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.6	1.8	V
		T_j = 125 °C		1.6	1.8	V
V_{F0}		T_j = 25 °C	0.9	1	1.1	V
		T_j = 125 °C	0.7	0.8	0.9	V
r_F		T_j = 25 °C	1.7	2.0	2.3	mΩ
		T_j = 125 °C	2.3	2.7	3.0	mΩ
I_{RRM}	I_F = 300 A di/dt$_{off}$ = 6200 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		375		A
Q_{rr}		T_j = 125 °C		75		µC
E_{rr}		T_j = 125 °C		33		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 = 300 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.6	1.8	V
		T_j = 125 °C		1.6	1.8	V
V_{F0}		T_j = 25 °C	0.9	1	1.1	V
		T_j = 125 °C	0.7	0.8	0.9	V
r_F		T_j = 25 °C	1.7	2.0	2.3	mΩ
		T_j = 125 °C	2.3	2.7	3.0	mΩ
I_{RRM}	I_F = 300 A di/dt$_{off}$ = 6200 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		375		A
Q_{rr}		T_j = 125 °C		75		µC
E_{rr}		T_j = 125 °C		33		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

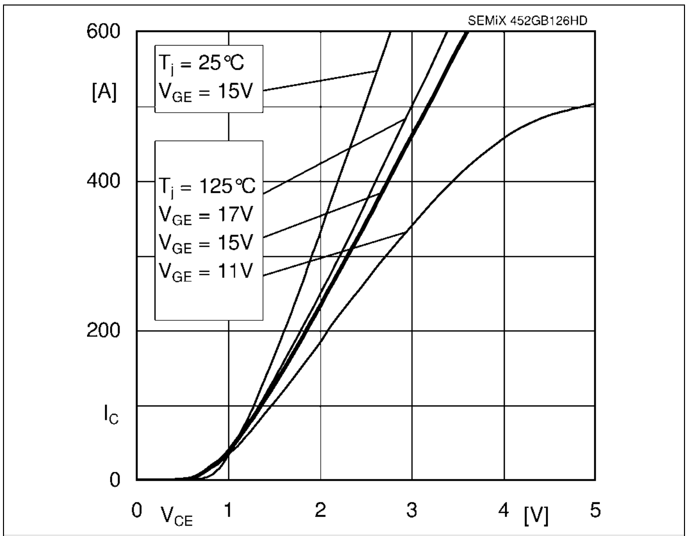


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

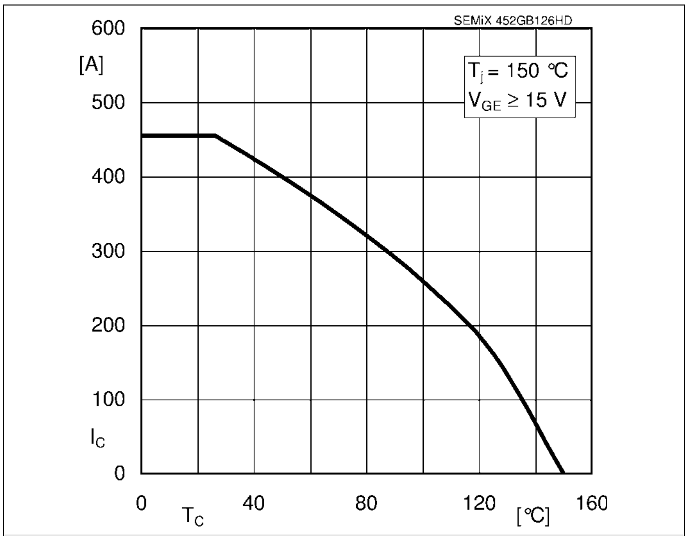


Fig. 2 Rated current vs. temperature $I_C = f (T_C)$

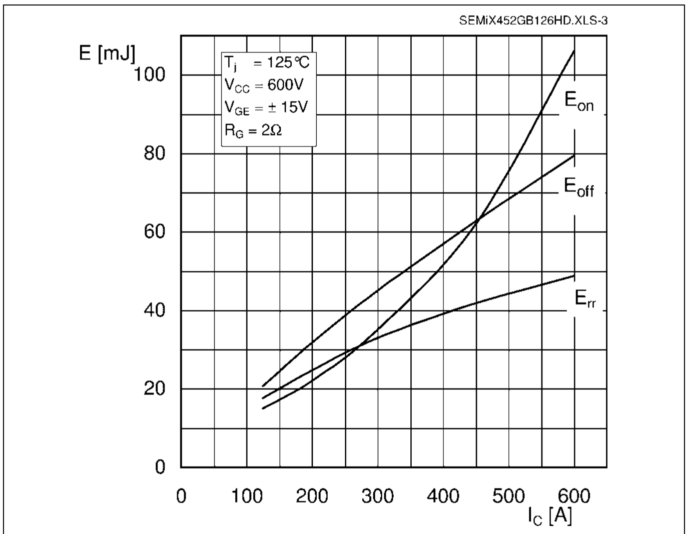


Fig. 3 Typ. turn-on /-off energy = f (I_C)

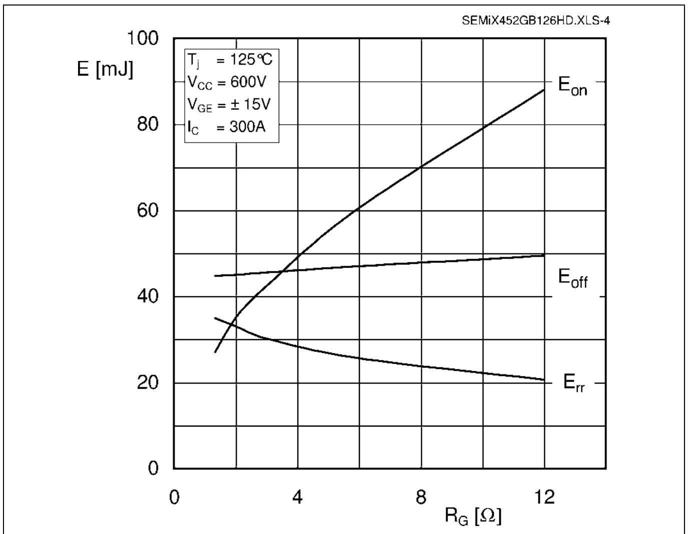


Fig. 4 Typ. turn-on /-off energy = f (R_G)

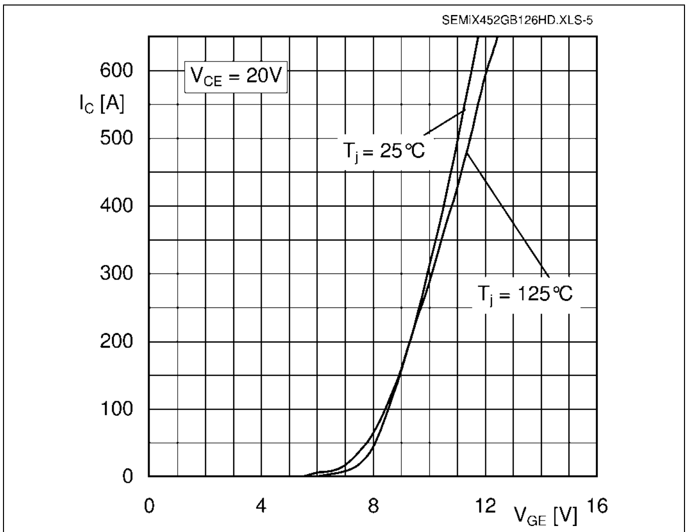


Fig. 5 Typ. transfer characteristic

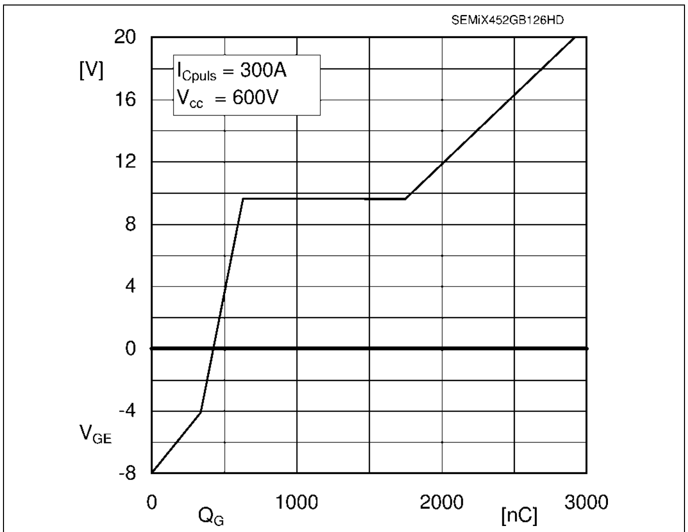


Fig. 6 Typ. gate charge characteristic

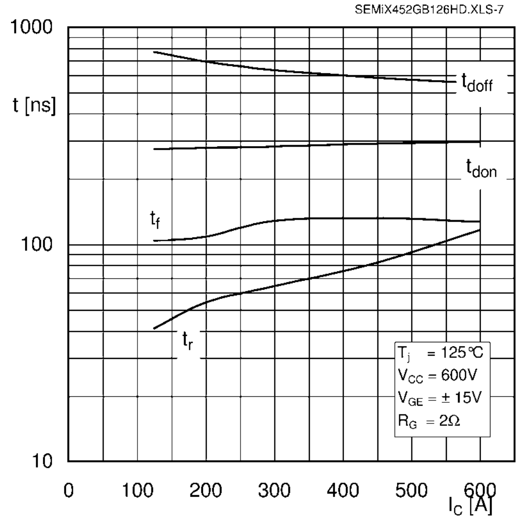


Fig. 7 Typ. switching times vs. I_C

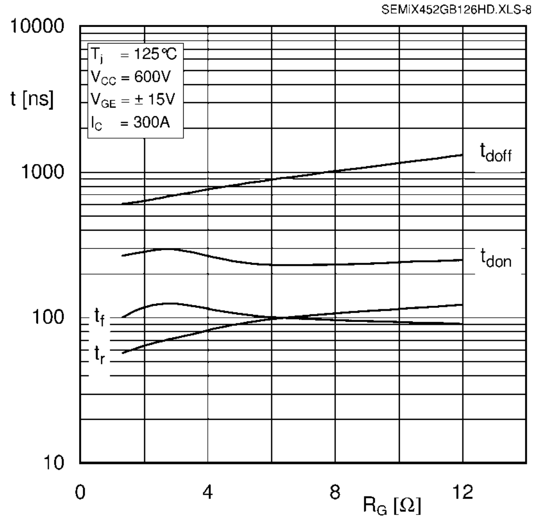


Fig. 8 Typ. switching times vs. gate resistor R_G

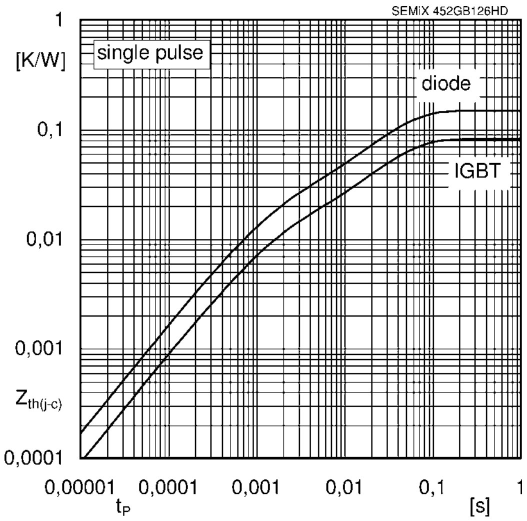


Fig. 9 Typ. transient thermal impedance

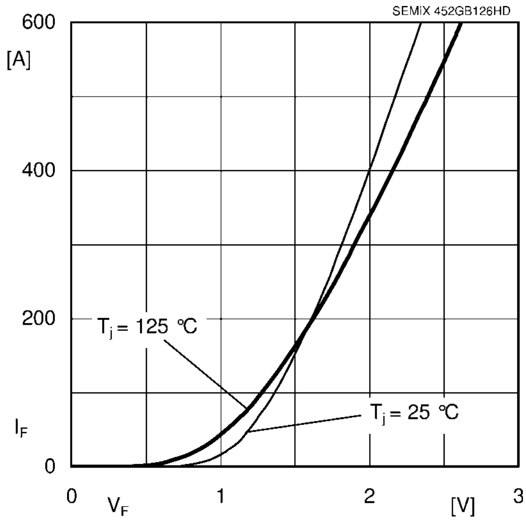


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

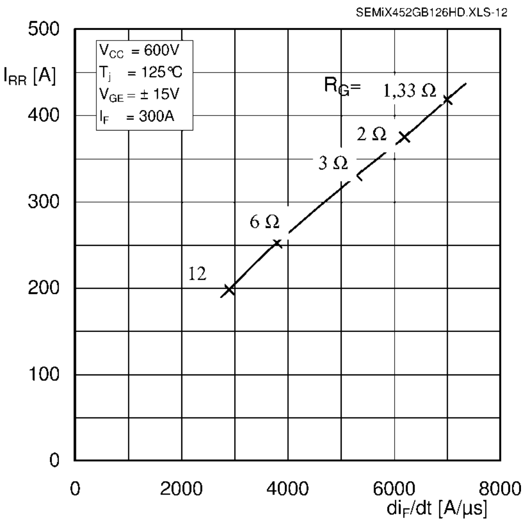


Fig. 11 Typ. CAL diode peak reverse recovery current

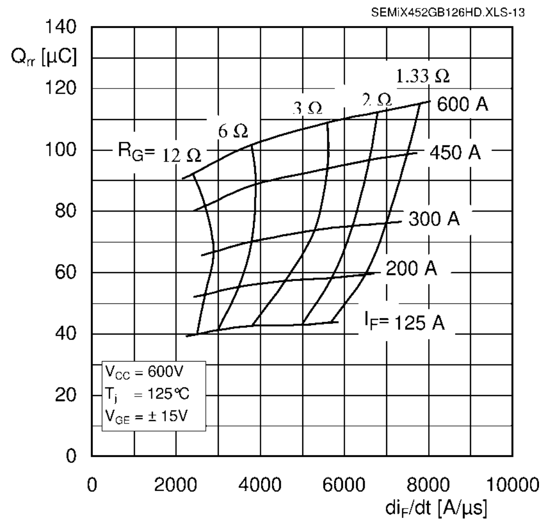
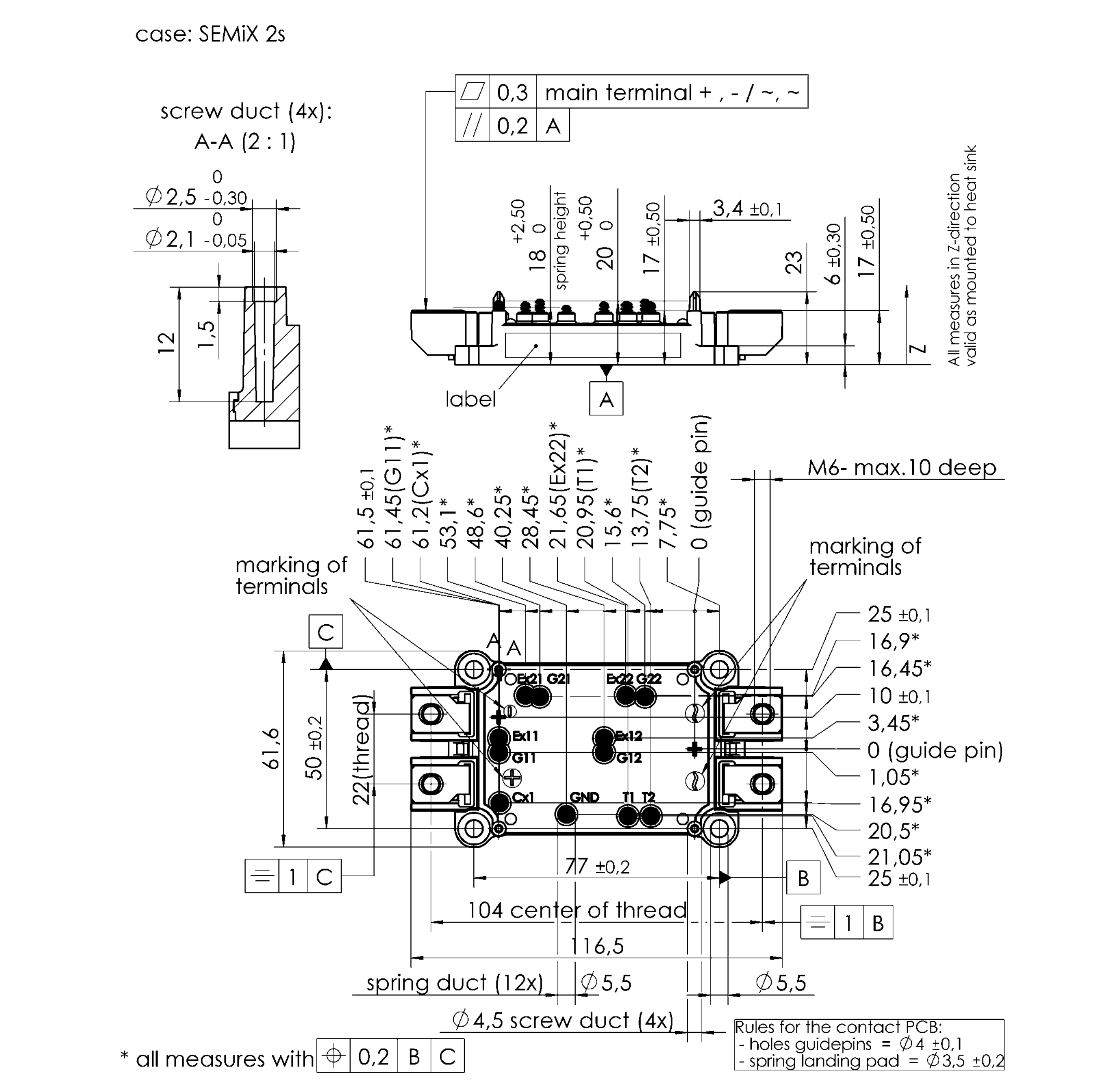


Fig. 12 Typ. CAL diode recovery charge



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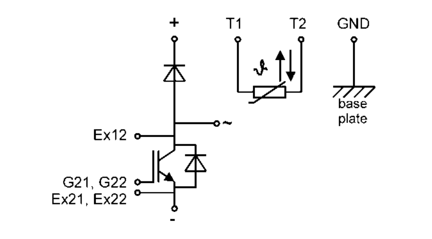

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

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