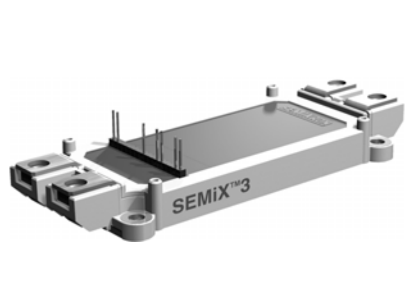


SEMiX®3

SPT IGBT Modules

SEMiX403GB128D

Preliminary Data

Features

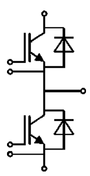
- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

Typical Applications

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

Remarks

- Not for new design



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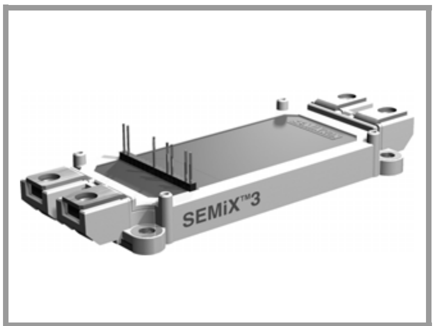
Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}			1200	V
I_C	T_{vj} = 150°C	T_c = 25°C	420	A
		T_c = 80°C	299	A
I_{CRM}	I_{CRM} = 2xI_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 600V V_{GE} ≤ 20V T_{vj} = 125°C V_{CES} ≤ 1200V		10	µs
T_{vj}			-40 ... 150	°C
Inverse diode				
I_F	T_{vj} = 150°C	T_c = 25°C	341	A
		T_c = 80°C	234	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		450	A
I_{FSM}	t_p = 10ms, half sine wave, T_{vj} = 25°C		2000	A
T_{vj}			-40 ... 150	°C
Module				
$I_{t(RMS)}$			600	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50Hz, t = 60s		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	I_{Cnom} = 225A V_{GE} = 15V chiplevel	T_{vj} = 25°C		1.9	2.35	V
		T_{vj} = 125°C		2.10	2.55	V
V_{CE0}		T_{vj} = 25°C		1	1.15	V
		T_{vj} = 125°C		0.9	1.05	V
r_{CE}	V_{GE} = 15V	T_{vj} = 25°C		4.0	5.3	mΩ
		T_{vj} = 125°C		5.3	6.7	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 9mA		4.5	5	6.5	V
I_{CES}	V_{GE} = 0V V_{CE} = 1200V	T_{vj} = 25°C		0.1	0.3	mA
		T_{vj} = 125°C				mA
C_{ies}	V_{CE} = 25V V_{GE} = 0V	f = 1MHz		20.8		nF
C_{oes}		f = 1MHz		1.38		nF
C_{res}		f = 1MHz		0.87		nF
Q_G	V_{GE} = - 8 V...+ 15 V			2160		nC
R_{Gint}	T_{vj} = 25°C			1.67		Ω
$t_{d(on)}$	V_{CC} = 600V I_{Cnom} = 225A T_{vj} = 125°C $R_{G\ on}$ = 4Ω $R_{G\ off}$ = 4Ω			145		ns
t_r				60		ns
E_{on}				20		mJ
$t_{d(off)}$				575		ns
t_f				70		ns
E_{off}				23		mJ
$R_{th(j-c)}$	per IGBT				0.075	K/W



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SEMiX403GB128D

Preliminary Data

Features

- Homogeneous Si
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- High short circuit capability

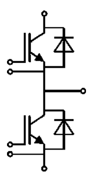
Typical Applications

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

Remarks

- Not for new design

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_{Fnom} = 225A V_{GE} = 0V chiplevel	T_{vj} = 25°C		2.0	2.5	V
		T_{vj} = 125°C		1.8	2.3	V
V_{F0}		T_{vj} = 25°C	0.75	1.1	1.45	V
		T_{vj} = 125°C	0.5	0.85	1.2	V
r_F		T_{vj} = 25°C	3.3	4.0	4.7	mΩ
		T_{vj} = 125°C	3.6	4.2	4.9	mΩ
I_{RRM}	I_{Fnom} = 225A di/dt_{off} = 4950A/µs V_{GE} = -15V V_{CC} = 600V	T_{vj} = 125°C		260		A
Q_{rr}		T_{vj} = 125°C		29		µC
E_{rr}		T_{vj} = 125°C		10		mJ
$R_{th(j-c)D}$	per diode				0.13	K/W
Module						
L_{CE}				20		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			0.04		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t	to terminals (M6)		2.5		5	Nm
w					0.3	kg
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



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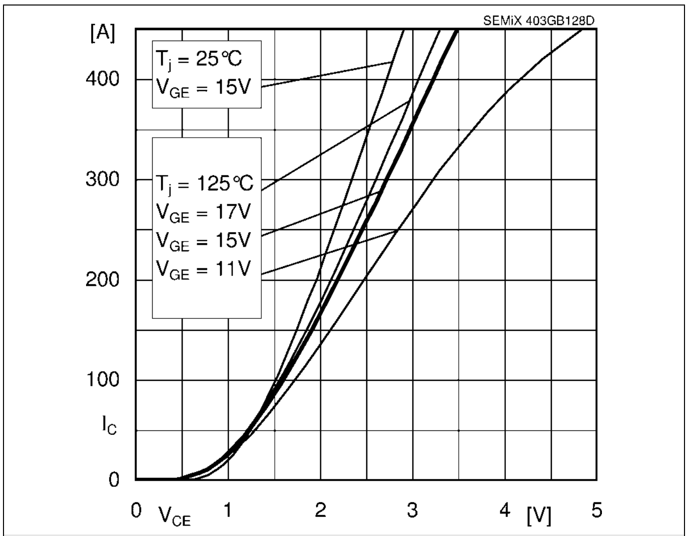


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

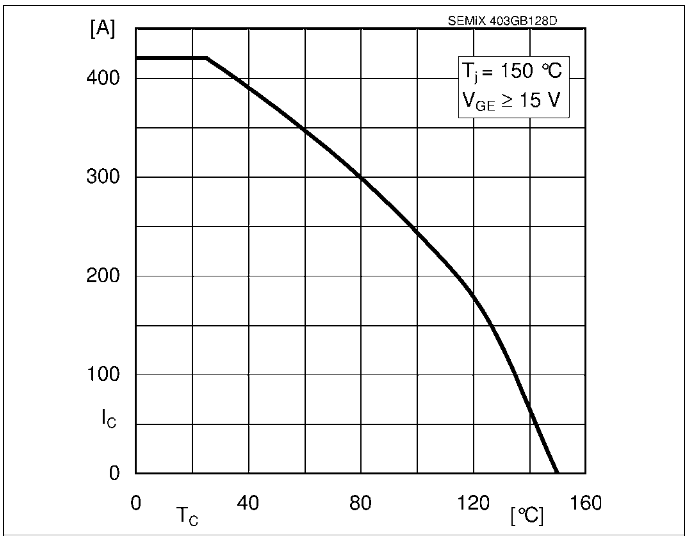


Fig. 2 Rated current vs. temperature I_C = f (T_C)

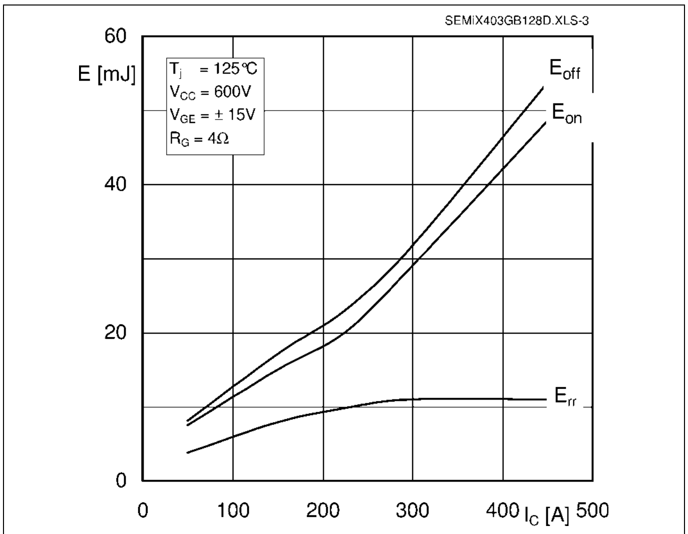


Fig. 3 Typ. turn-on /-off energy = f (I_C)

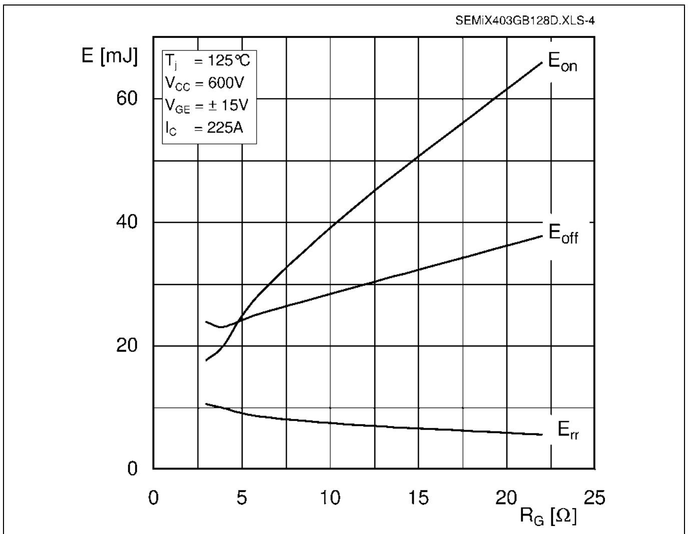


Fig. 4 Typ. turn-on /-off energy = f (R_G)

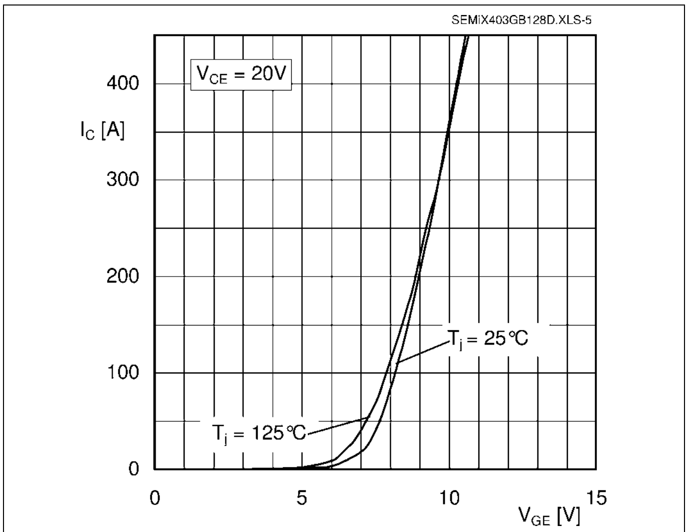


Fig. 5 Typ. transfer characteristic

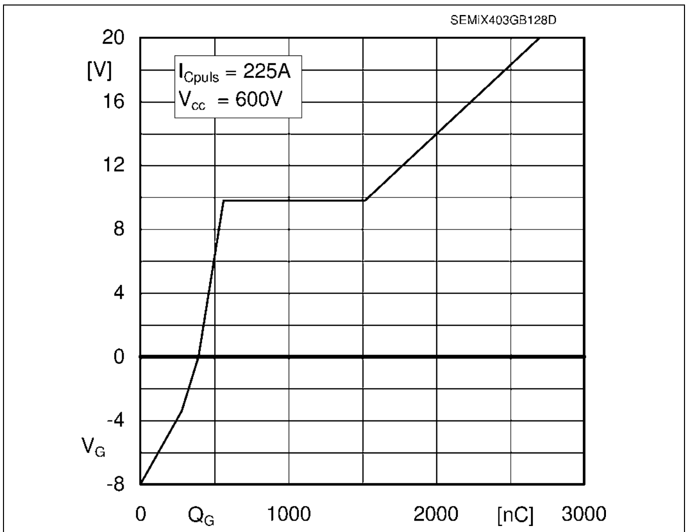


Fig. 6 Typ. gate charge characteristic

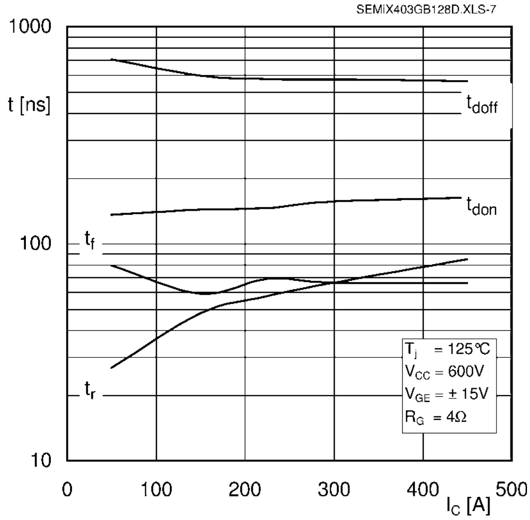


Fig. 7 Typ. switching times vs. I_C

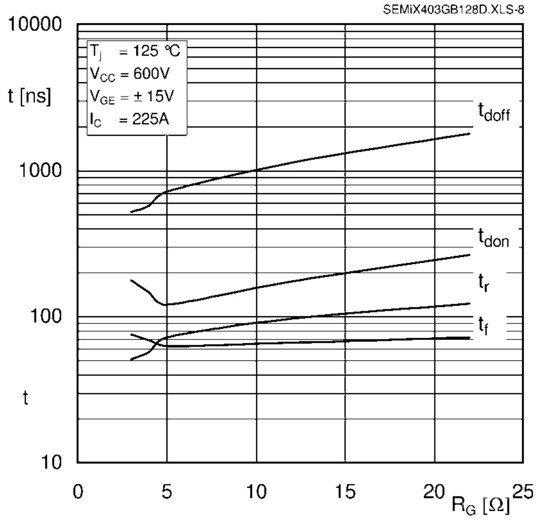


Fig. 8 Typ. switching times vs. gate resistor R_G

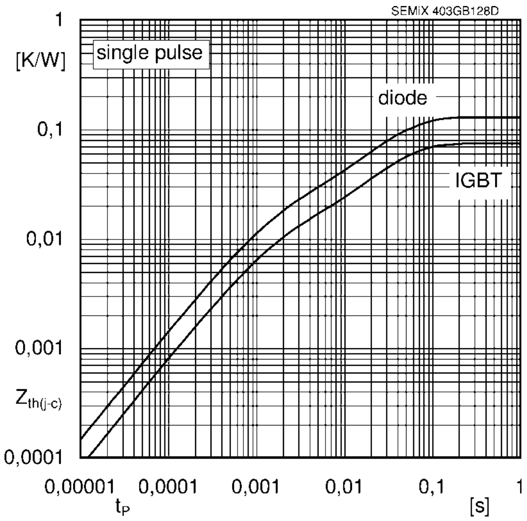


Fig. 9 Typ. transient thermal impedance

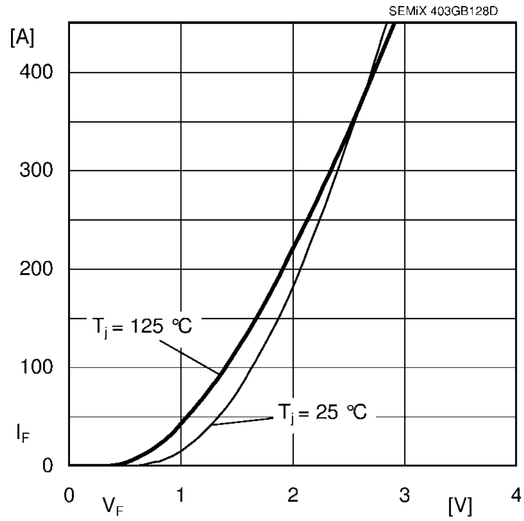


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

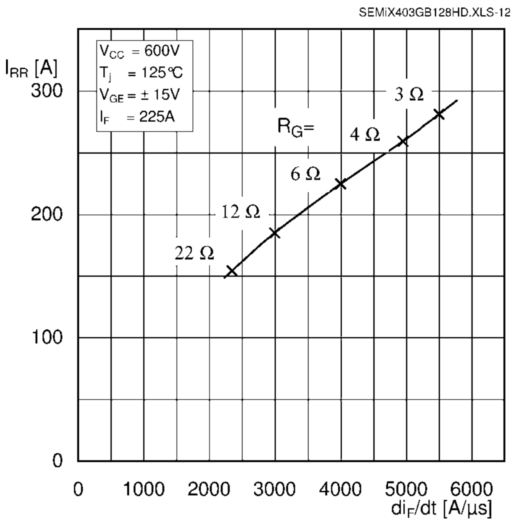


Fig. 11 Typ. CAL diode peak reverse recovery current

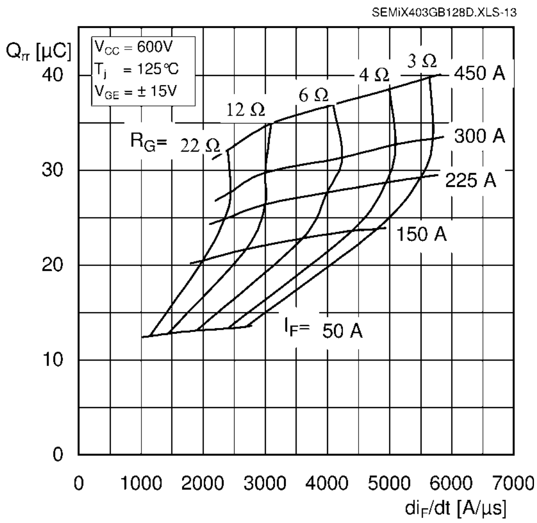
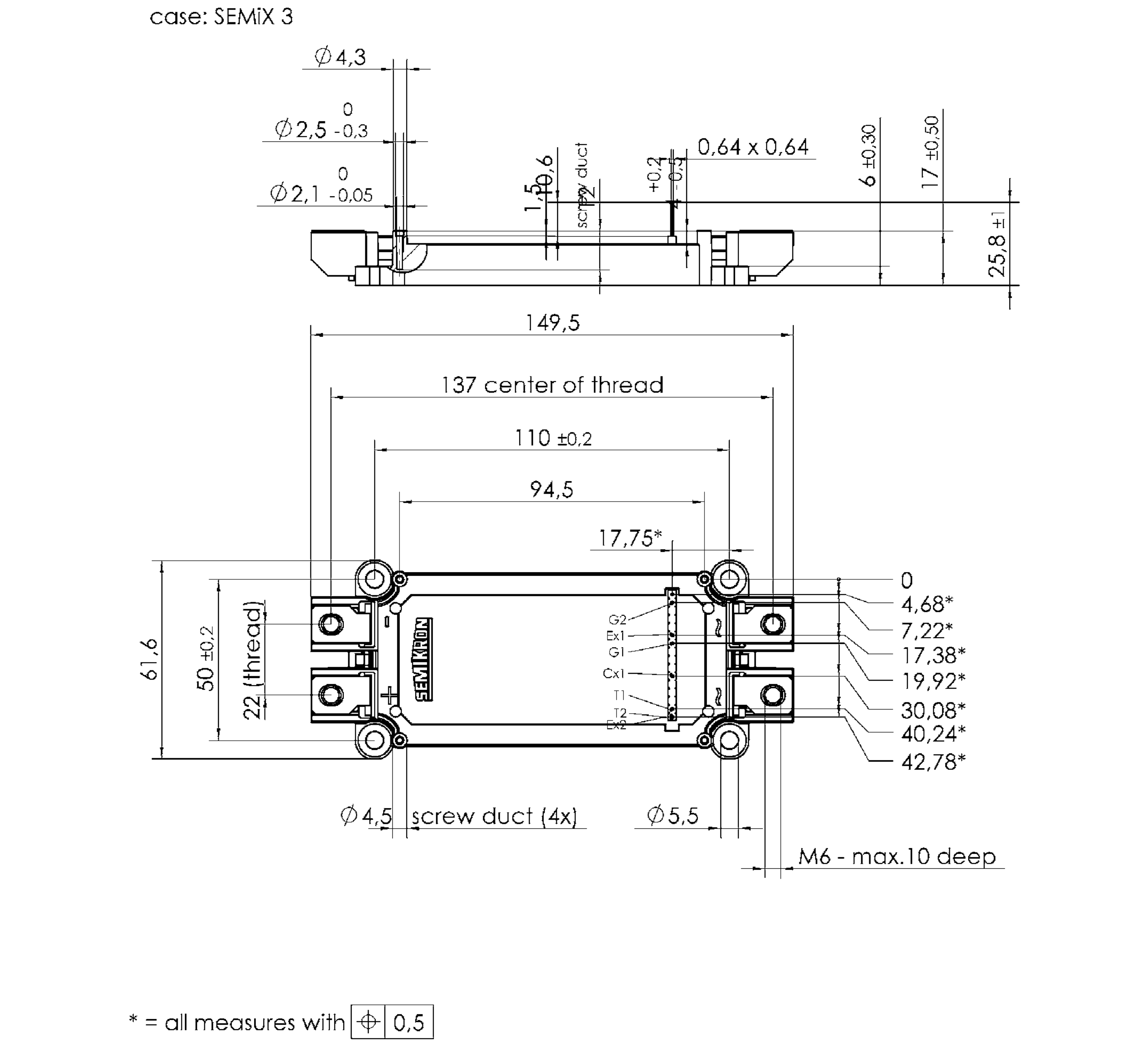
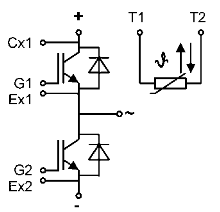


Fig. 12 Typ. CAL diode recovery charge



SEMiX 3



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

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