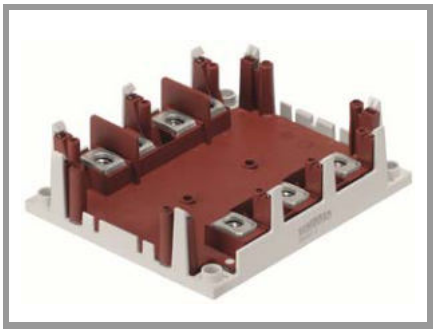
SKiM400GD126DM



SKiM® 4

Trench IGBT Modules

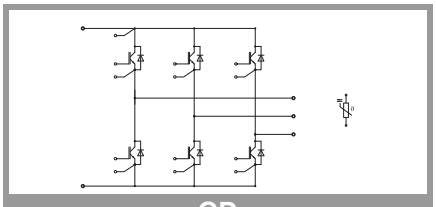
SKiM400GD126DM

Features

- Trench gate IGBT with field stop layer
- Low inductance case
- Fast & soft inverse CAL diodes
- Isolated by AIN DCB (Direct Copper Bonded) ceramic plate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- Integrated temperature sensor

Typical Applications*

- Switched mode power supplies
- Three phase inverters for AC motor speed control
- Switching (not for linear use)



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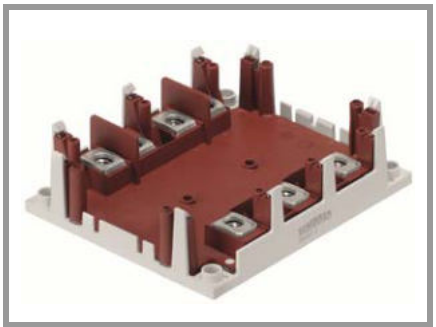
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V_{CES}			1200	V
I_C	T_j = 150 °C	T_s = 25 °C	330	A
		T_s = 70 °C	256	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} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 125 °C	10	µs
T_j			-40 ... 150	°C
Inverse diode				
I_F	T_j = 150 °C	T_s = 25 °C	300	A
		T_s = 70 °C	197	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		2592	A
T_j			-40 ... 150	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C		400	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	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		1.70	2.10	V
		T_j = 125 °C		2.00	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		1.00	1.20	V
		T_j = 125 °C		0.90	1.10	V
r_{CE}	V_{GE} = 15 V chiplevel	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
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		21.53		nF
C_{oes}		f = 1 MHz		1.13		nF
C_{res}		f = 1 MHz		0.98		nF
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				5	mA
Q_G	V_{GE} = - 8 V...+ 15 V			2400		nC
R_{Gint}	T_j = 25 °C			2.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 300 A $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt$_{on}$ = 11000 A/µs di/dt$_{off}$ = 2700 A/µs	T_j = 125 °C		285		ns
t_r		T_j = 125 °C		45		ns
E_{on}		T_j = 125 °C		25		mJ
$t_{d(off)}$		T_j = 125 °C		580		ns
t_f		T_j = 125 °C		95		ns
E_{off}		T_j = 125 °C		36.2		mJ
$R_{th(j-s)}$					0.134	K/W



SKiM® 4

SKiM400GD126DM

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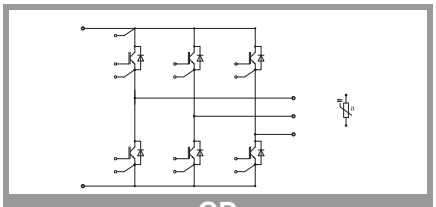

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.92	2.40	V
		T_j = 125 °C		1.71	2.20	V
V_{F0}	chiplevel	T_j = 25 °C		1.1	1.45	V
		T_j = 125 °C		0.85	1.20	V
r_F	chiplevel	T_j = 25 °C		4.1	4.8	mΩ
		T_j = 125 °C		4.3	5.0	mΩ
I_{RRM}	I_F = 300 A di/dt_{off} = 11000 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		450		A
Q_{rr}		T_j = 125 °C		46.5		µC
E_{rr}		T_j = 125 °C		22		mJ
$R_{th(j-s)}$	per diode				0.19	K/W
Module						
L_{CE}				10		nH
$R_{CC'+EE'}$	measured per switch	T_s = 25 °C		1.35		mΩ
		T_s = 125 °C		1.75		mΩ
M_s	to heat sink (M5)		2		3	Nm
M_t		to terminals M6	4		5	Nm
						Nm
w					317	g

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	T_r=100°C (R_{25}=1000Ω)		1670 ± 3%		Ω
R(T)	$R(T)=1000\Omega[1+A(T-25°C)+B(T-25°C)^2]$, $A = 7.635*10^{-3}$ °C^{-1}, $B = 1.731*10^{-5}$ °C^{-2}				

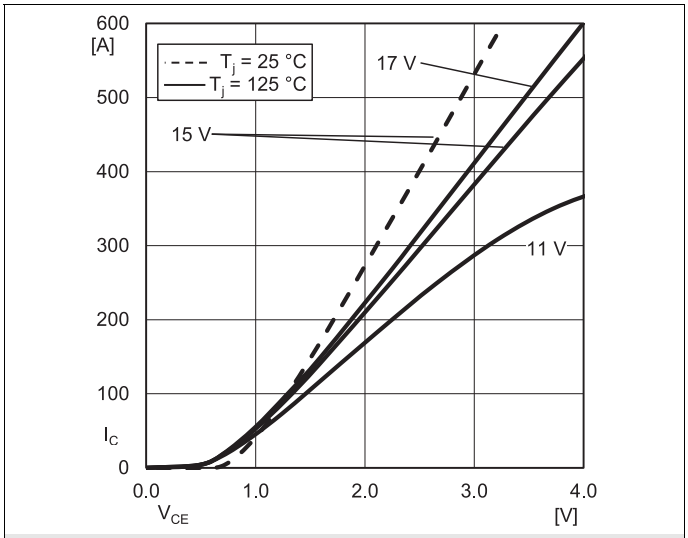


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

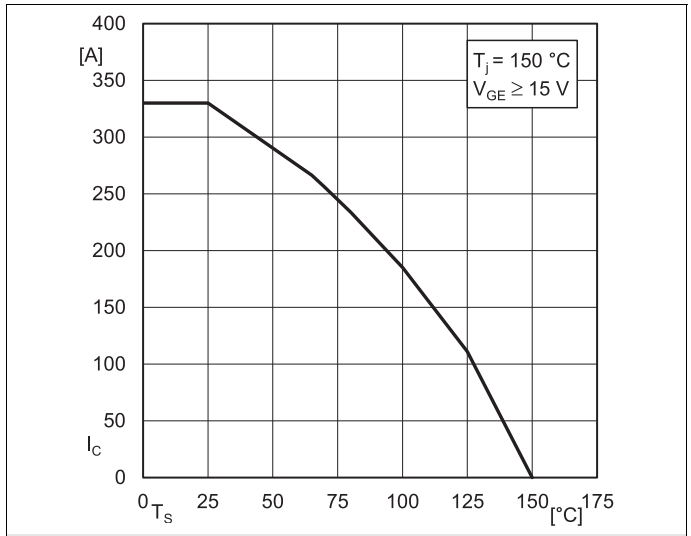


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

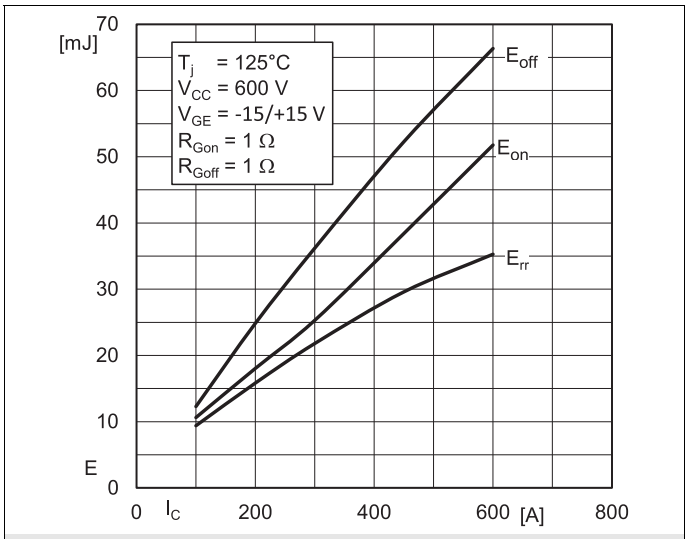


Fig. 3: Typ. turn-on /-off energy = f (I_C)

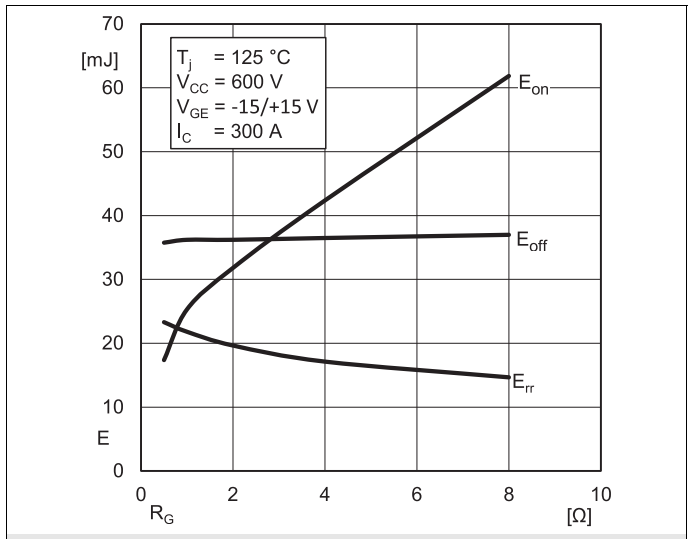


Fig. 4: Typ. turn-on /-off energy = f (R_G)

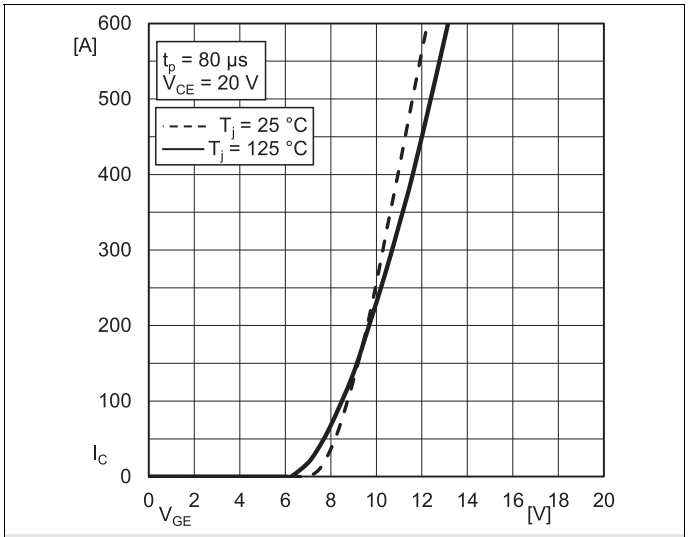


Fig. 5: Typ. transfer characteristic

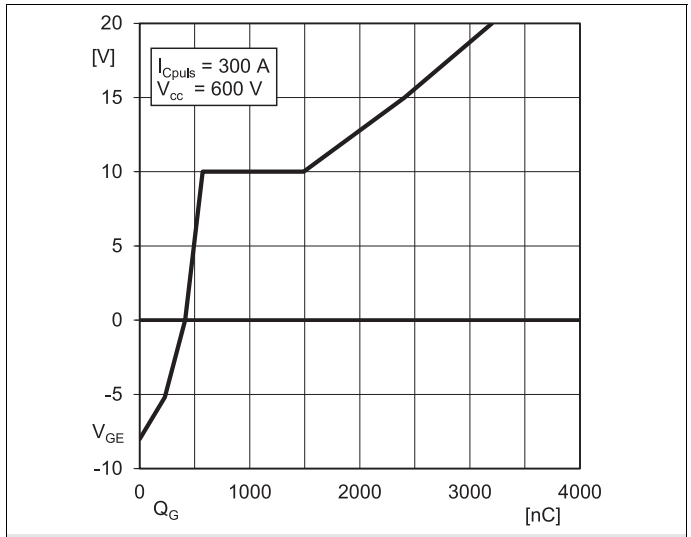


Fig. 6: Typ. gate charge characteristic

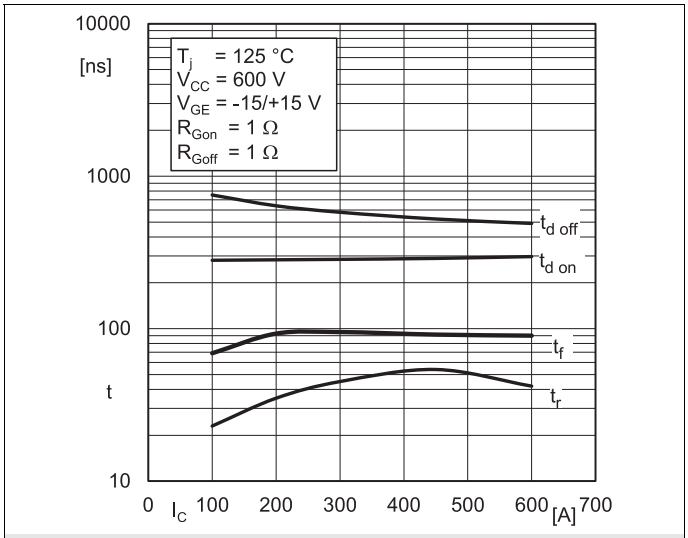


Fig. 7: Typ. switching times vs. I_C

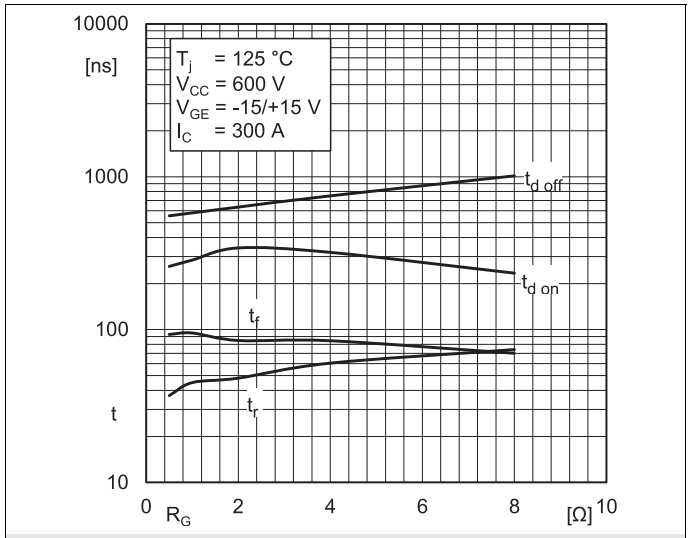


Fig. 8: Typ. switching times vs. gate resistor R_G

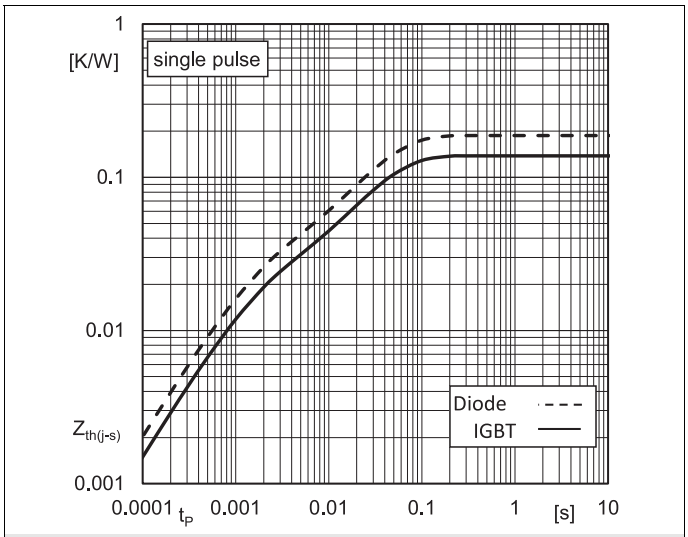


Fig. 9: Typ. transient thermal impedance

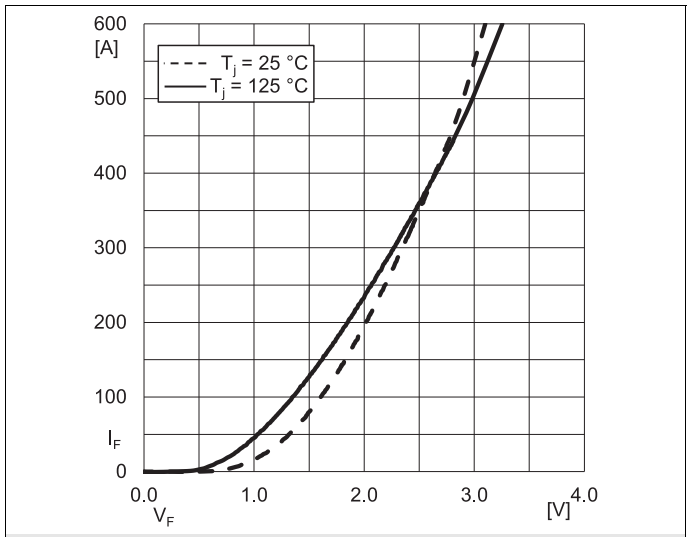
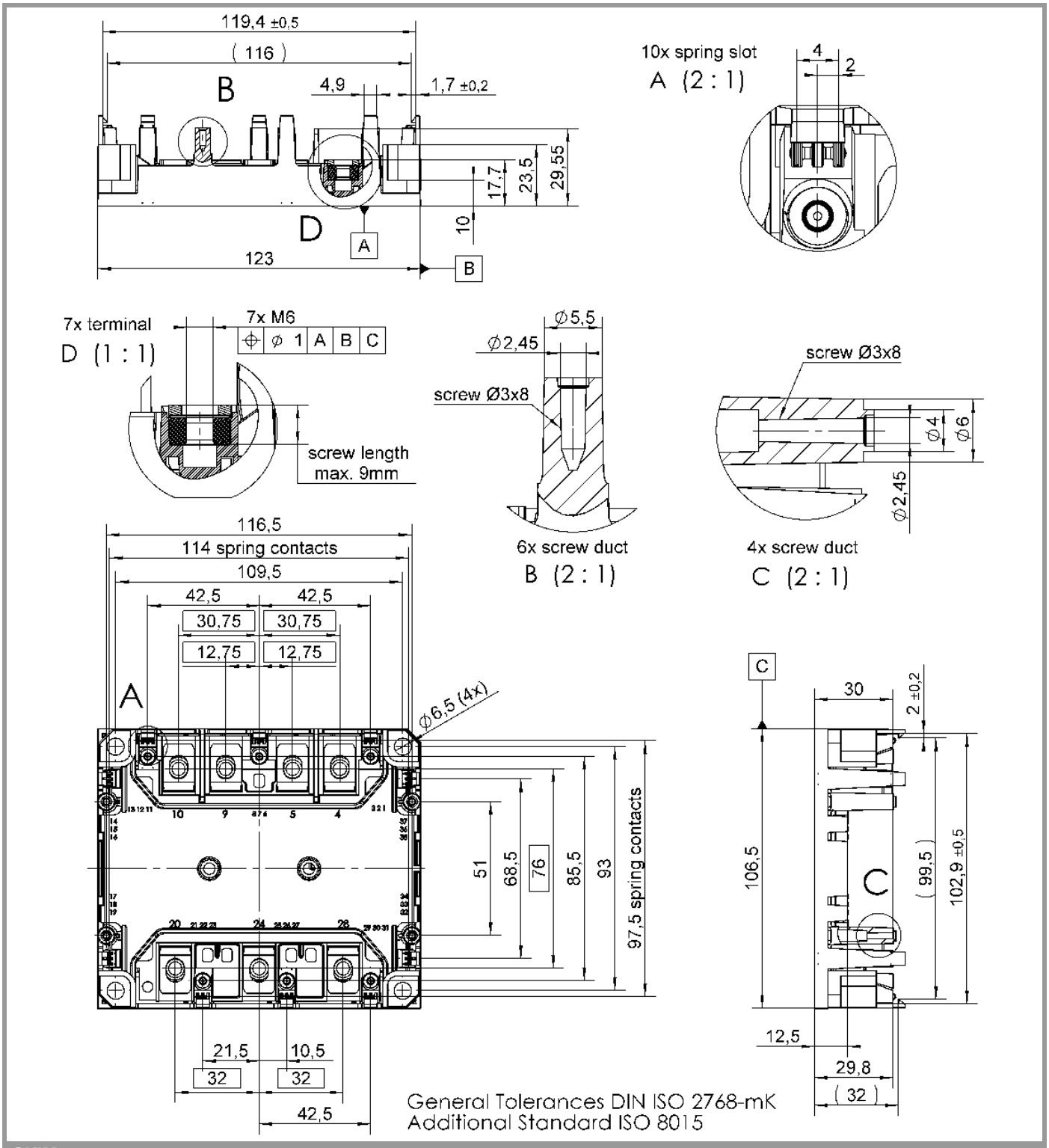


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$



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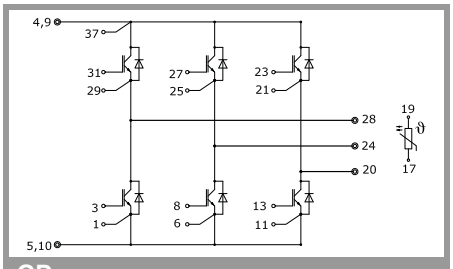

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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