SEMiX205BT07F3SC4

SEMiX® 5

T-Type Bridge Rectifier

SEMiX205BT07F3SC4

Features*

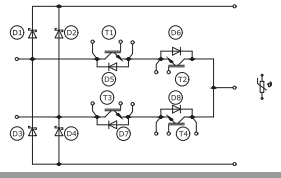
- Solderless assembling solution with PressFIT signal pins and screw power terminals
- IGBT 3 High Speed Trench Technology
- Silicon Carbide (SiC) Free-wheeling Schottky diodes : Diode 1 (D1…D4)
- Silicon anti-parallel diodes , Diode 2 (D5…D8)
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Reliable mechanical design with injection moulded terminals and reliable internal connections
- UL recognized file no. E63532
- NTC temperature sensor inside

Typical Applications

- High Frequency Resonant Converter
- Interleaved Active Rectifier
- UPS

Remarks

- Case temperature limited to T_C=125°C max.
- Product reliability results are valid for T_{jop}=150°C
- For storage and case temperature with TIM see document “TP(HALA P8) SEMiX 5p”



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT 1				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 175 °C	T_c = 25 °C	223	A
		T_c = 80 °C	167	A
I_{Cnom}			200	A
I_{CRM}			400	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 400 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 650 V	T_j = 150 °C	5	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 1				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	161	A
		T_c = 80 °C	123	A
I_{FRM}			280	A
I_{FSM}	8.3 ms sin 180°	T_j = 25 °C	729	A
		T_j = 150 °C	-	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 2				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 175 °C	T_c = 25 °C	250	A
		T_c = 80 °C	183	A
I_{FRM}			400	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	1476	A
		T_j = 150 °C	1224	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	**Conditions**	**Values**	**Unit**
Module			
$I_{t(RMS)}$		300	A
T_{stg}	module without TIM	-40 ... 125	°C
V_{isol}	AC sinus 50Hz, t = 1 min	4000	V

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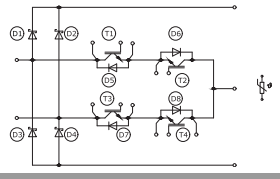

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.22	V
		T_j = 150 °C		2.25	2.55	V
V_{CE0}	chiplevel	T_j = 25 °C		1.10	1.20	V
		T_j = 150 °C		1.00	1.10	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		3.8	5.1	mΩ
		T_j = 150 °C		6.3	7.3	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 3.2 mA		4.2	5.1	5.6	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 650 V, T_j = 25 °C				0.2	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		12.2		nF
C_{oes}		f = 1 MHz		0.76		nF
C_{res}		f = 1 MHz		0.36		nF
Q_G	V_{GE} = - 7 V...+ 15 V			1500		nC
R_{Gint}	T_j = 25 °C			1.0		Ω
$t_{d(on)}$	V_{CC} = 300 V I_C = 200 A $R_{G\ on}$ = 15 Ω $R_{G\ off}$ = 15 Ω di/dt$_{on}$ = 1000 A/µs di/dt$_{off}$ = 2100 A/µs V_{GE} = +15/-7 V dv/dt = 2000 V/µs	T_j = 150 °C		125		ns
t_r		T_j = 150 °C		155		ns
E_{on}		T_j = 150 °C		11		mJ
$t_{d(off)}$		T_j = 150 °C		1100		ns
t_f		T_j = 150 °C		77		ns
E_{off}		T_j = 150 °C		7.9		mJ
$R_{th(j-c)}$	per IGBT				0.24	K/W
$R_{th(c-s)}$	per IGBT (λgrease=0.81 W/(m*K))			0.03		K/W
$R_{th(c-s)}$	per IGBT, pre-applied phase change material			0.018		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 120 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.45	1.75	V
		T_j = 150 °C		1.85	2.20	V
V_{F0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.82	0.92	V
r_F	chiplevel	T_j = 25 °C		4.2	5.8	mΩ
		T_j = 150 °C		8.6	11	mΩ
I_R	V_R = V_{RRM}, T_j = 25 °C				5	mA
C_j	V_R = 800 V, f = 0.1 MHz, T_j = 25 °C			507		nF
Q_c	V_R = 800 V, , T_j = 25 °C			0.66		µC
$R_{th(j-c)}$	per diode				0.31	K/W
$R_{th(c-s)}$	per diode (λgrease=0.81 W/(m*K))			0.061		K/W
$R_{th(c-s)}$	per diode, pre-applied phase change material			0.04		K/W

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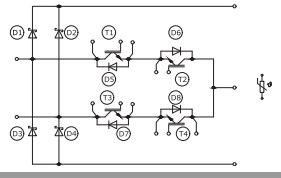

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.40	1.76	V
		T_j = 150 °C		1.38	1.77	V
V_{F0}	chiplevel	T_j = 25 °C		1.04	1.24	V
		T_j = 150 °C		0.85	0.99	V
r_F	chiplevel	T_j = 25 °C		1.78	2.6	mΩ
		T_j = 150 °C		2.7	3.9	mΩ
I_{RRM}	I_F = 200 A V_{GE} = -7 V V_R = 300 V	T_j = 150 °C		-		A
Q_{rr}		T_j = 150 °C		-		µC
E_{rr}		T_j = 150 °C		-		mJ
$R_{th(j-c)}$	per diode				0.32	K/W
$R_{th(c-s)}$	per diode (λgrease=0.81 W/(m*K))			0.012		K/W
$R_{th(c-s)}$	per diode, pre-applied phase change material			0.008		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Module						
L+	measured between + to M			30		nH
L-	measured between M to -			36		nH
$R_{CC'+EE'}$	measured between terminal 4 and 1	T_C = 25 °C		1.2		mΩ
		T_C = 125 °C		1.65		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling			0.0019		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.003		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, pre-applied phase change material			0.002		K/W
M_s	to heat sink (M5)		3		6	Nm
M_t	to terminals (M6)		3		6	Nm
w				398		g

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	T_c=100°C (R_{25}=5 kΩ)		493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];		3550 ±2%		K

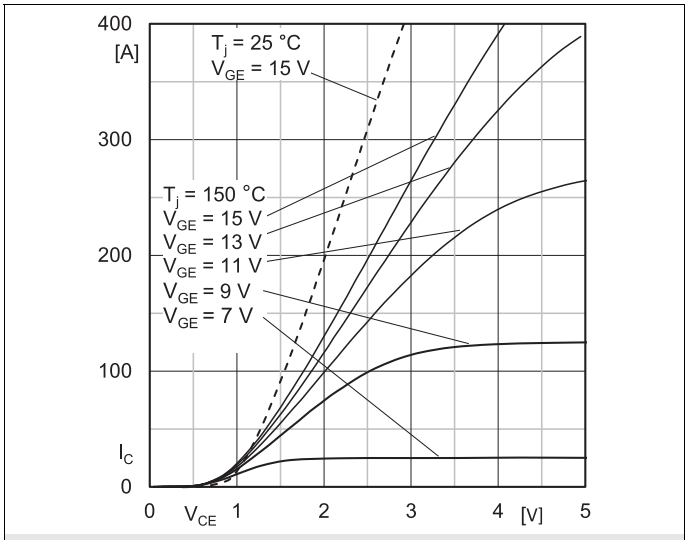


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

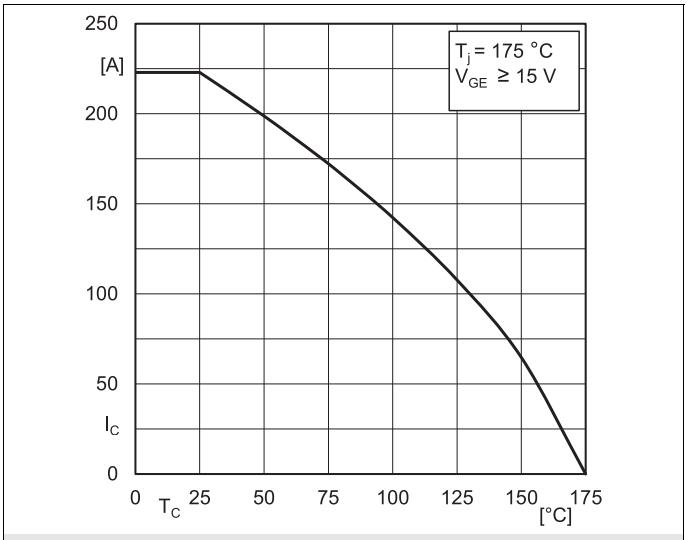


Fig. 2: Typ. Rated current vs. temperature $I_c=f(T_c)$

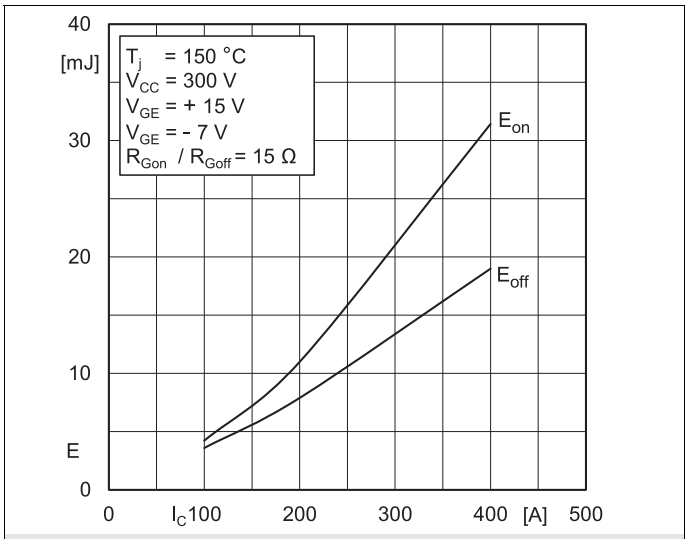


Fig. 3: Typ. turn-on /-off energy = f (I_C)

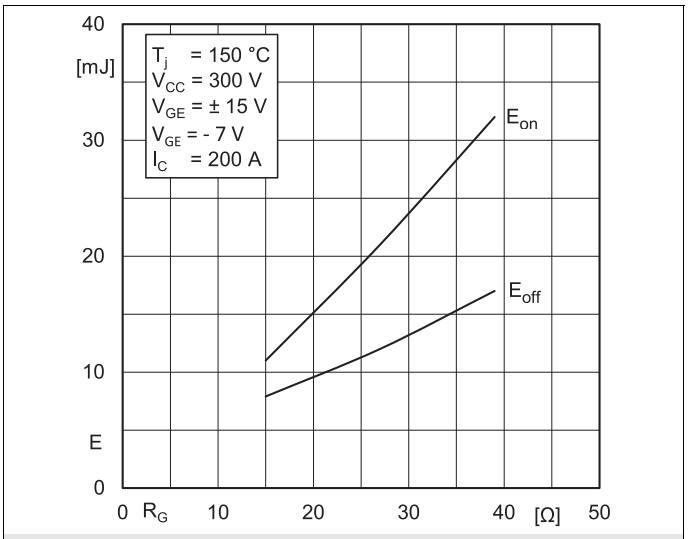


Fig. 4: Typ. turn-on /-off energy = f (R_G)

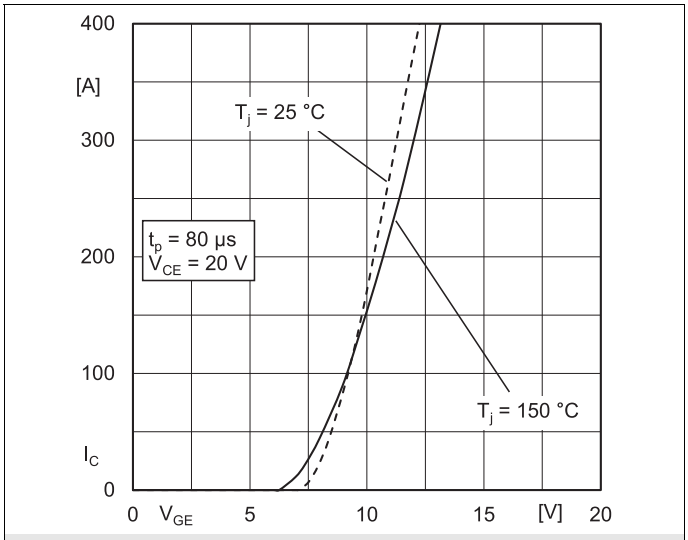


Fig. 5: Typ. transfer characteristic

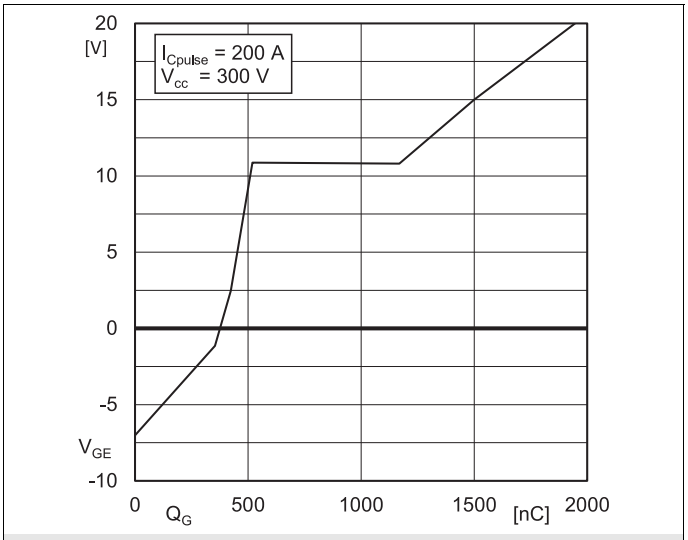


Fig. 6: Typ. gate charge characteristic

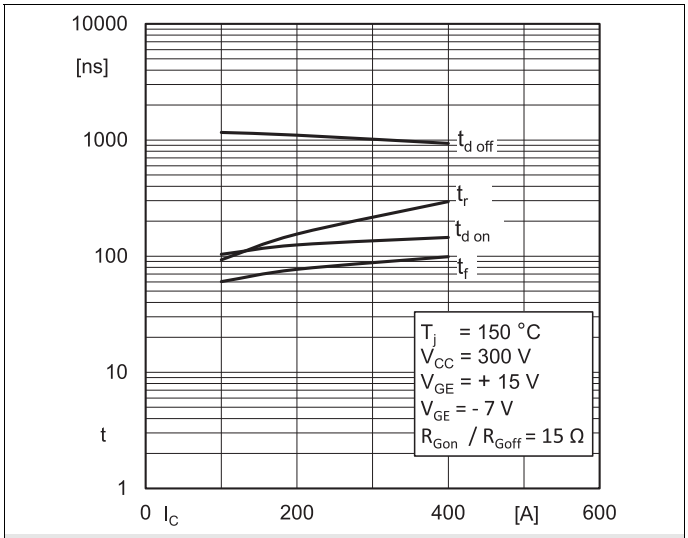


Fig. 7: Typ. switching times vs. I_C

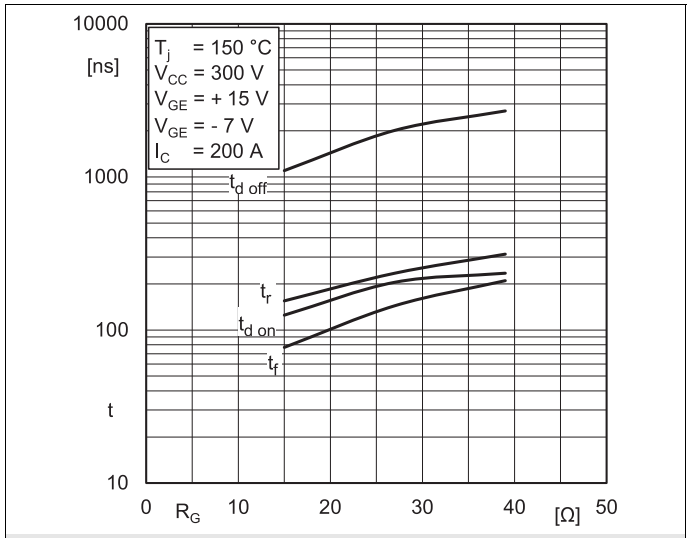


Fig. 8: Typ. switching times vs. gate resistor R_G

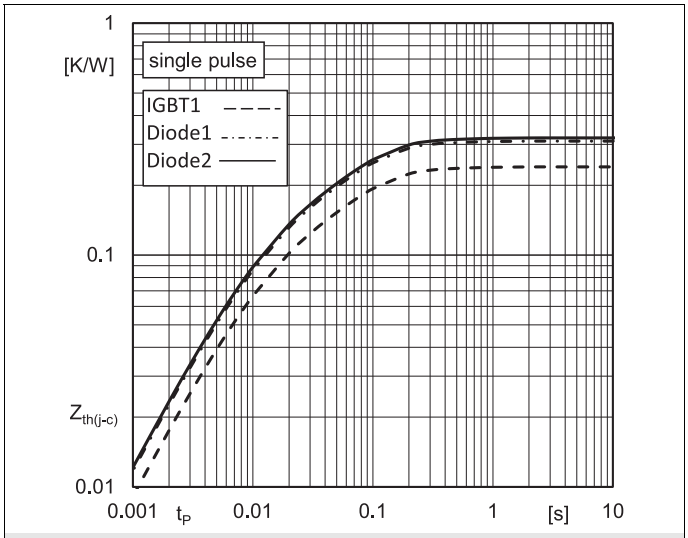


Fig. 9: Transient thermal impedance

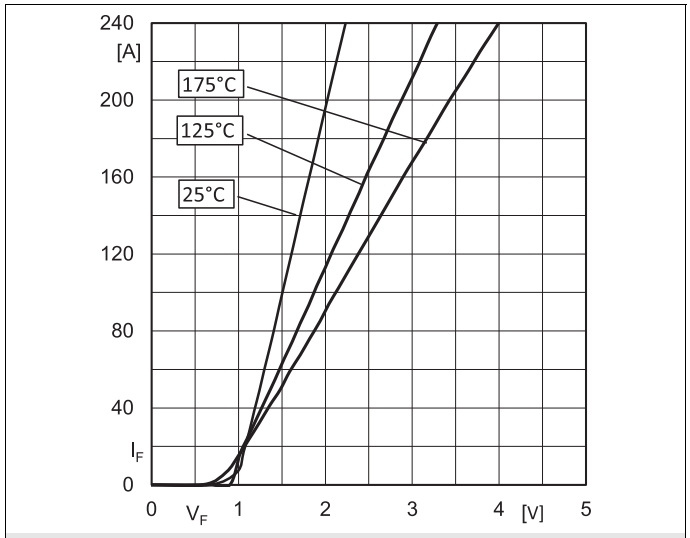


Fig. 10: Typ. Diode1 forward characteristic, incl. $R_{CC'+EE'}$

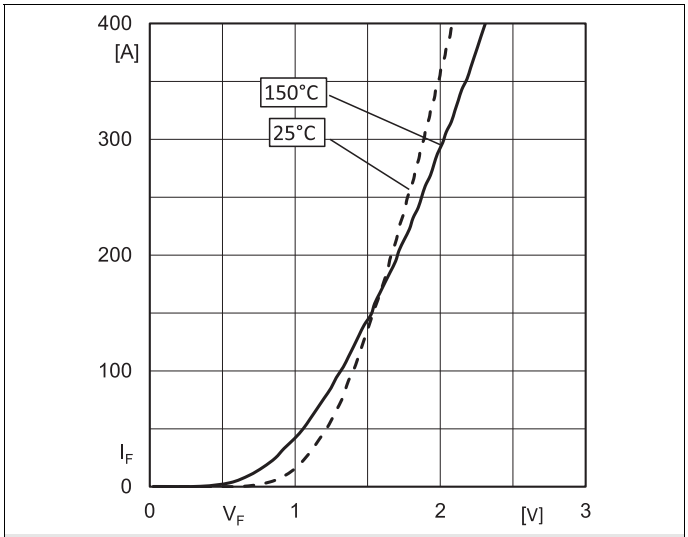
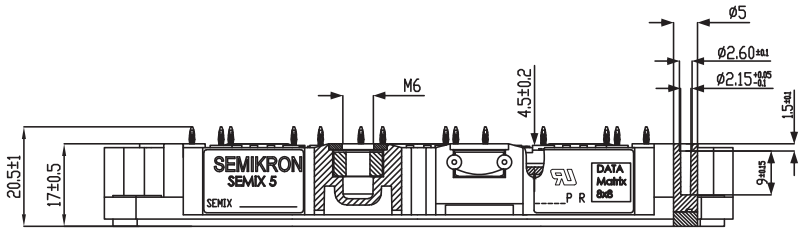
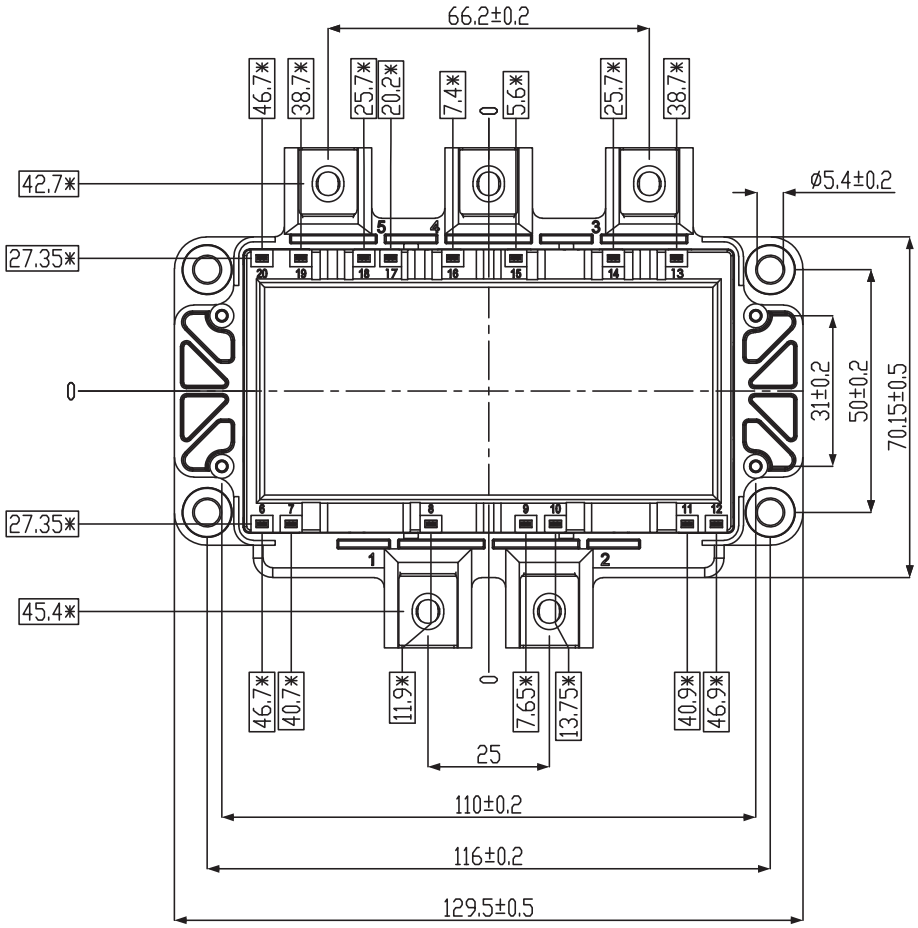


Fig. 11: Typ. Diode2 forward charact., incl. $R_{CC'+EE'}$

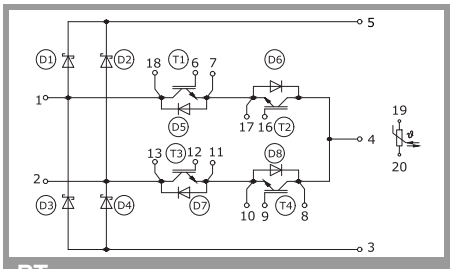




* = Dimensions in mm with tolerance of ⌖ | Ø 0.4

For technical details please refer
to SEMiX(R)5 Mounting Instruction

SEMiX5p



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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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