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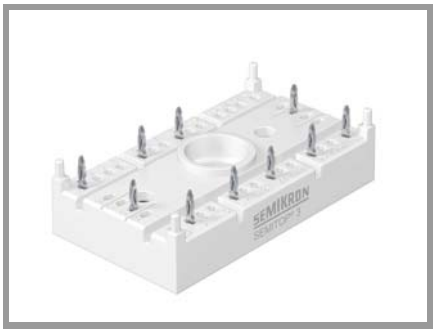

SEMITOP® 3 Press-Fit

IGBT module

SK50BGLL07F3TUFBPp

Features

- Compact design
- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminium oxide substrate
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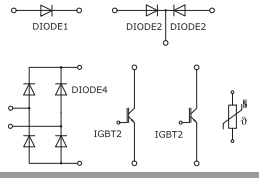
- Ultrafast technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications*

- Switching (not for linear use)
- Inverter
- Switched mode power supplier
- UPS



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT 2				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 150 °C	T_s = 25 °C	46	A
		T_s = 70 °C	34	A
I_C	T_j = 175 °C	T_s = 25 °C	51	A
		T_s = 70 °C	41	A
I_{Cnom}			50	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		150	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		1600	V
I_F	T_j = 125 °C	T_s = 25 °C	30	A
		T_s = 70 °C	20	A
I_F	T_j = 150 °C	T_s = 25 °C	35	A
		T_s = 70 °C	26	A
I_{Fnom}			25	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	220	A
		T_j = 150 °C	200	A
i^2t	10 ms, sin 180°, T_j = 150 °C		200	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 2				
V_{RRM}	T_j = 25 °C		600	V
I_F	T_j = 150 °C	T_s = 25 °C	60	A
		T_s = 70 °C	42	A
I_F	T_j = 175 °C	T_s = 25 °C	69	A
		T_s = 70 °C	52	A
I_{Fnom}			30	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		60	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	300	A
		T_j = 175 °C	300	A
T_j			-40 ... 175	°C

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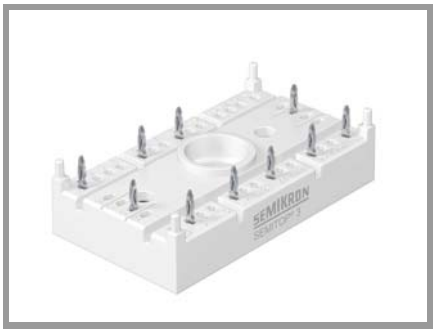

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Typical Applications*

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- Inverter
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- UPS

Absolute Maximum Ratings

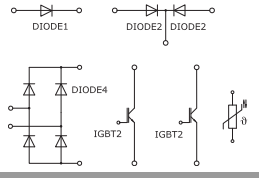
Symbol	Conditions		Values	Unit
Diode 4				
V_{RRM}			1600	V
I_F	T_j = 125 °C	T_s = 25 °C	44	A
		T_s = 70 °C	29	A
I_F	T_j = 150 °C	T_s = 25 °C	51	A
		T_s = 70 °C	38	A
I_{Fnom}			35	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	370	A
		T_j = 150 °C	270	A
I^2t	10 ms, sin 180°, T_j = 150 °C		365	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$T_{terminal}$ = 100 °C, T_S = 60°C, per pin	40	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 2						
$V_{CE(sat)}$	I_C = 50 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.22	V
		T_j = 150 °C		2.18	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		15	20	mΩ
		T_j = 150 °C		24	29	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE} V, I_C = 0.8 mA		4.2	5.1	5.6	V
I_{CES}	V_{GE} = 0 V V_{CE} = 650 V	T_j = 25 °C			0.005	mA
		T_j = 150 °C		-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		3.1		nF
C_{oes}		f = 1 MHz		0.116		nF
C_{res}		f = 1 MHz		0.09		nF
Q_G	V_{GE} = - 8 V...+ 15 V			185		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CC} = 300 V I_C = 50 A $R_{G\ on}$ = 16 Ω $R_{G\ off}$ = 16 Ω di/dt_{on} = 3077 A/µs di/dt_{off} = 3636 A/µs $V_{GE\ neg}$ = -15 V $V_{GE\ pos}$ = 15 V	T_j = 150 °C		169		ns
t_r		T_j = 150 °C		81		ns
E_{on}		T_j = 150 °C		2.79		mJ
$t_{d(off)}$		T_j = 150 °C		431		ns
t_f		T_j = 150 °C		28		ns
E_{off}		T_j = 150 °C		1.03		mJ
$R_{th(j-s)}$	per IGBT			1.1		K/W



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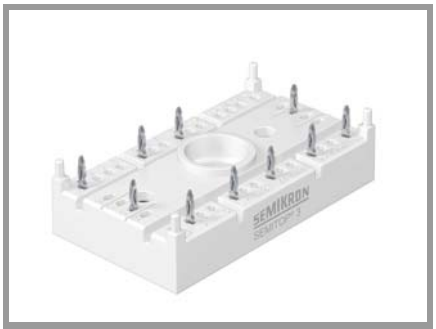

SEMITOP® 3 Press-Fit

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Typical Applications*

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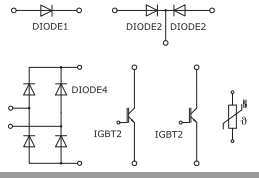
- Inverter
- Switched mode power supplier
- UPS



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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 25 A	T_j = 25 °C		1.26	1.70	V
	chiplevel	T_j = 125 °C		1.26	1.67	V
V_{F0}	chiplevel	T_j = 25 °C		0.88	0.98	V
		T_j = 125 °C		0.73	0.83	V
r_F	chip	T_j = 25 °C		15	29	mΩ
		T_j = 125 °C		21	34	mΩ
I_{RRM}	I_F = 25 A			-		A
Q_{rr}				-		µC
E_{rr}				-		mJ
$R_{th(j-s)}$				1.8		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
V_F	I_F = 30 A	T_j = 25 °C		1.85	2.35	V
	chiplevel	T_j = 150 °C		1.10	1.40	V
V_{F0}		T_j = 25 °C		1.55	2.05	V
		T_j = 150 °C		0.90	1.20	V
r_F	chiplevel	T_j = 25 °C		10	10	mΩ
		T_j = 150 °C		6.7	6.7	mΩ
I_{RRM}	I_F = 50 A	T_j = 150 °C		58		A
Q_{rr}	di/dt_{off} = 3077 A/µs	T_j = 150 °C		1.8		µC
E_{rr}	V_{GE} = -15 V V_{CC} = 300 V	T_j = 150 °C		0.46		mJ
$R_{th(j-s)}$	per Diode			1.5		K/W

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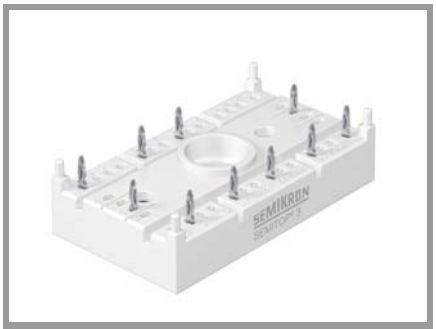

SEMITOP® 3 Press-Fit

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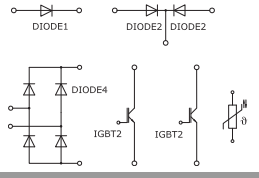

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 4						
V_F	I_F = 35 A	T_j = 25 °C		1.20	1.60	V
	chiplevel	T_j = 125 °C		1.19	1.56	V
V_{F0}	chip	T_j = 25 °C		0.88	0.98	V
		T_j = 125 °C		0.73	0.83	V
r_F	chiplevel	T_j = 25 °C		13	18	mΩ
		T_j = 125 °C		13	21	mΩ
I_{RRM}				-		A
Q_{rr}				-		µC
E_{rr}				-		mJ
$R_{th(j-s)}$	per Diode			1.3		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
M_s	to heatsink	2.25		2.5	Nm
w	weight		30		g

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

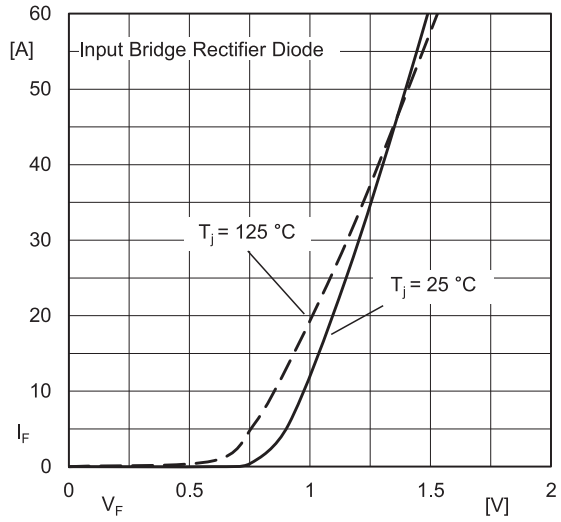


Fig. 1: Typ. Diode4 forward characteristic, incl. $R_{CC'+EE'}$

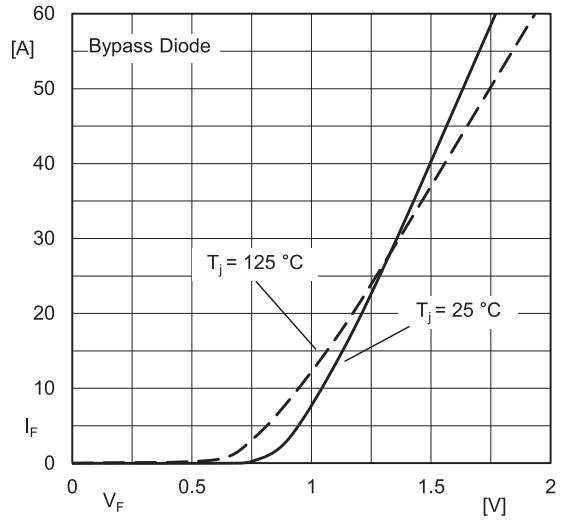


Fig. 2: Typ. Diode1 forward characteristic, incl. $R_{CC'+EE'}$

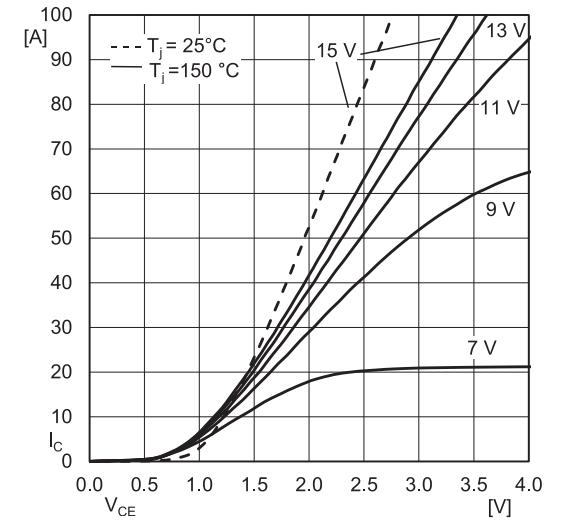


Fig. 3: Typ. IGBT output characteristic, inclusive $R_{CC'+EE'}$

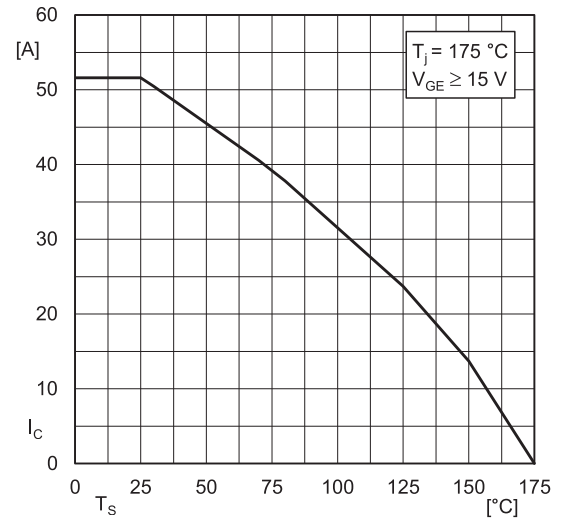


Fig. 4: Rated IGBT current vs. temperature $I_C = f(T_S)$

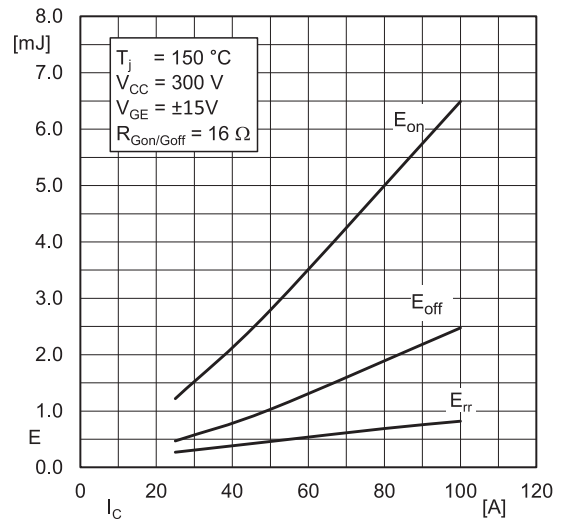


Fig. 5: Typ. turn-on /-off energy = f (I_C)

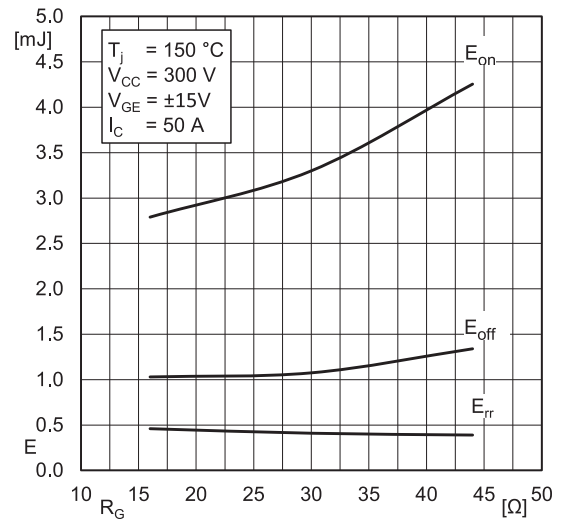


Fig. 6: Typ. turn-on /-off energy = f (R_G)

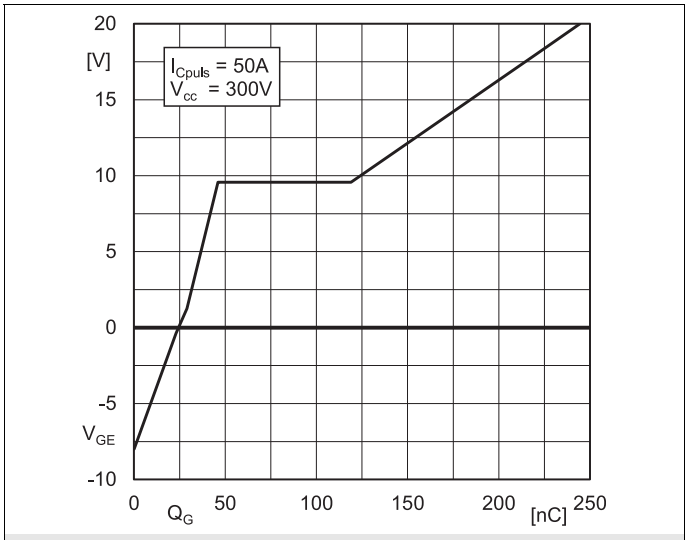


Fig. 7: Typ. gate charge characteristic

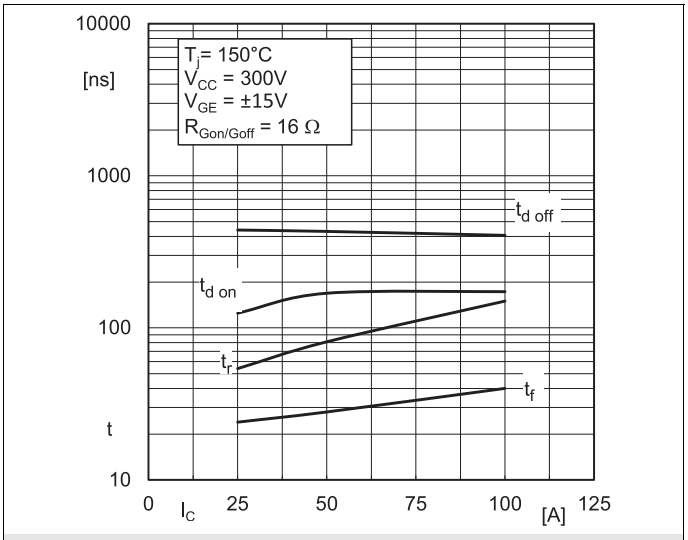


Fig. 8: Typ. switching times vs. I_C

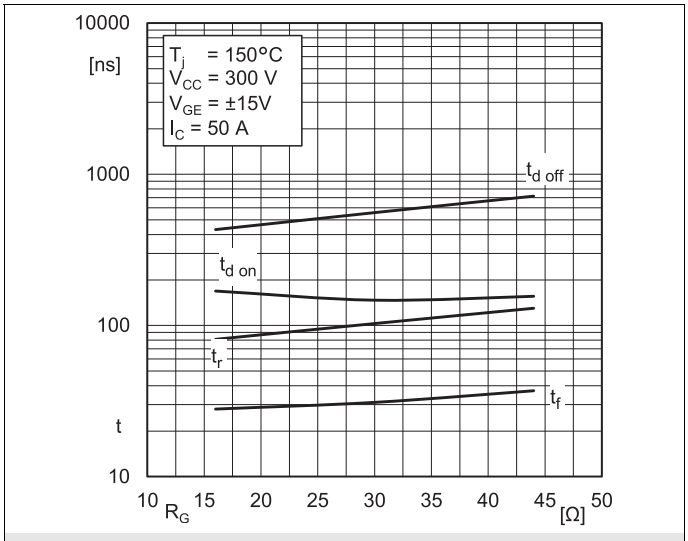


Fig. 9: Typ. switching times vs. gate resistor R_G

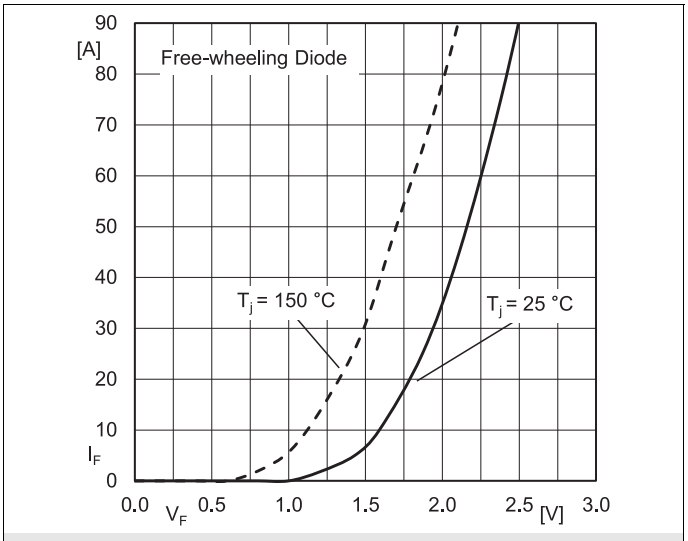
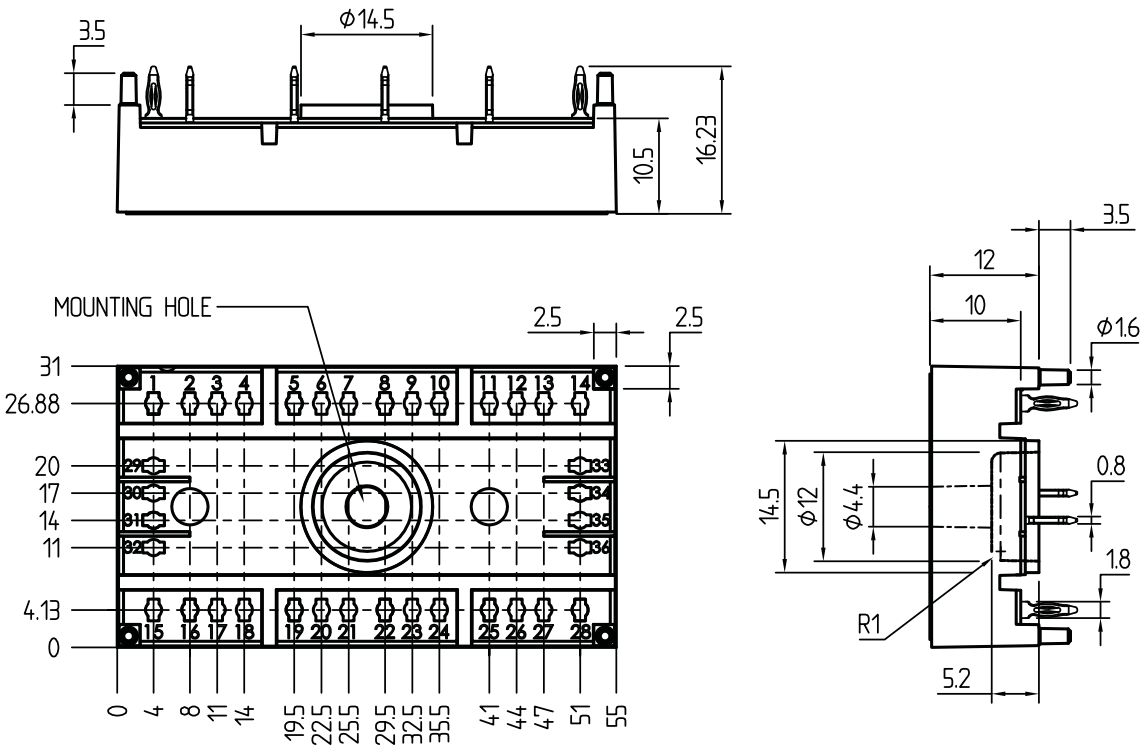


Fig. 10: Typ. Diode2 forward characteristic, incl. $R_{CC'+EE'}$

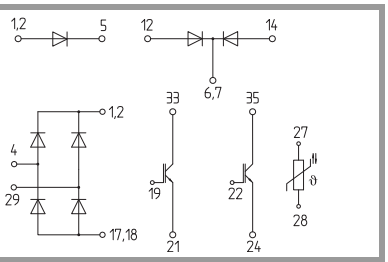
dimensions in mm
tolerance system: ISO 2768-m



Suggested drilled hole diameter for terminal pins in the circuit board:
- minimum: 1.575mm
- typical: 1.6mm
- maximum: 1.625mm

Suggested hole diameter for the mounting pins in the circuit board: 2mm

SEMITOP 3 Press-Fit



BGLL-TBP

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

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