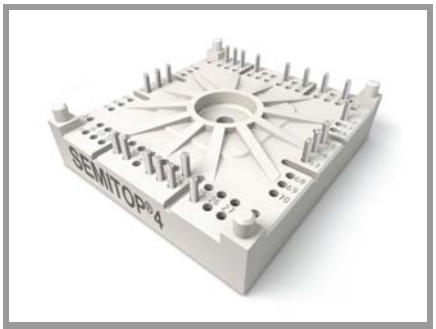
SK80BTAGL07F3T



SEMITOP® 4

IGBT module

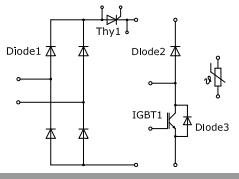
SK80BTAGL07F3T

Features

- One screw mounting module
- Optimum heat transfer and insulation through direct copper bonding aluminum oxide ceramic (DBC)
- 650V Trench 3 Fast IGBT technology
- 650V CAL4F Diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications*

- Motor drives



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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 = 150 °C	T_s = 25 °C	118	A
		T_s = 70 °C	88	A
I_C	T_j = 175 °C	T_s = 25 °C	133	A
		T_s = 70 °C	106	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		450	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**
Thyristor 1			
V_{RRM}		1200	V
$I_{T(AV)}$	T_j = 130 °C, T_s = 70 °C	96	A
I_{TSM}	tp = 10 ms, sin 180°, T_j = 130 °C	1800	A
i^2t	tp = 10 ms, sin 180°, T_j = 130 °C	16200	A^2s
T_j		-40 ... 130	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Rectifier				
V_{RSM}	T_j = 25 °C		1300	V
V_{RRM}	T_j = 25 °C		1200	V
I_D	sin 180°	T_s = 25 °C	174	A
	T_j = 150 °C	T_s = 70 °C	132	A
I_{FSM}	sin 180°	T_j = 25 °C	1000	A
	10 ms	T_j = 150 °C	890	A
i^2t	sin 180°	T_j = 25 °C	5000	A^2s
	10 ms	T_j = 150 °C	3960	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 2				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 150 °C	T_s = 25 °C	130	A
		T_s = 70 °C	94	A
I_F	T_j = 175 °C	T_s = 25 °C	148	A
		T_s = 70 °C	115	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		300	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		1100	A
T_j			-40 ... 175	°C

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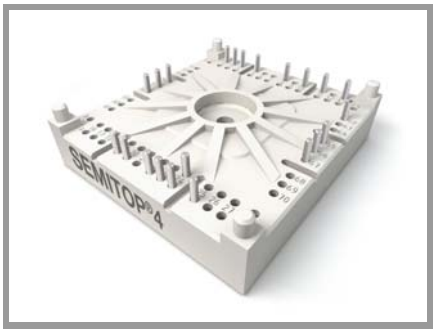

SEMITOP® 4

IGBT module

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Features

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Typical Applications*

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Absolute Maximum Ratings

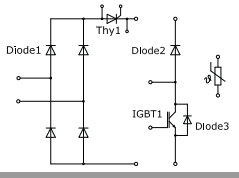
Symbol	Conditions		Values	Unit
Diode 3				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 150 °C	T_s = 25 °C	130	A
		T_s = 70 °C	94	A
I_F	T_j = 175 °C	T_s = 25 °C	148	A
		T_s = 70 °C	115	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		300	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		1100	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings

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

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 150 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		5.0	6.8	mΩ
		T_j = 150 °C		7.9	9.7	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 2.4 mA		4.2	5.1	5.6	V
I_{CES}	V_{GE} = 0 V V_{CE} = 650 V	T_j = 25 °C			0.25	mA
				-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		9.24		nF
C_{oes}		f = 1 MHz		480		nF
C_{res}		f = 1 MHz		0.274		nF
Q_G	V_{GE} = -7V ... +15V			1100		nC
R_{Gint}	T_j = 25 °C			2.4		Ω
$t_{d(on)}$	V_{CC} = 300 V I_C = 150 A $V_{GE\,neg}$ = -7 V $V_{GE\,pos}$ = 15 V $R_{G\,on}$ = 0.5 Ω $R_{G\,off}$ = 1 Ω di/dt_{on} = 1150 A/µs di/dt_{off} = 3800 A/µs	T_j = 150 °C		106		ns
t_r		T_j = 150 °C		106		ns
E_{on}		T_j = 150 °C		9.9		mJ
$t_{d(off)}$		T_j = 150 °C		380		ns
t_f		T_j = 150 °C		28		ns
E_{off}		T_j = 150 °C		2.5		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.46		K/W



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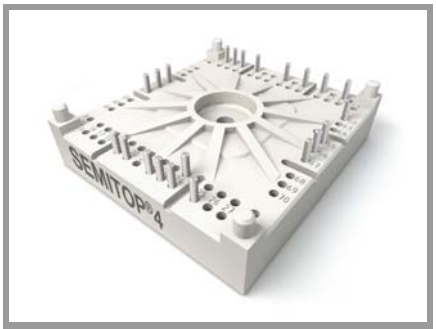

SEMITOP® 4

IGBT module

SK80BTAGL07F3T

Features

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- 650V Trench 3 Fast IGBT technology
- 650V CAL4F Diode
- Integrated NTC temperature sensor
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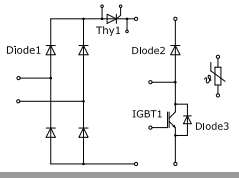

BTAGL-T

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Thyristor 1						
V_T	I_T = 150 A	T_j = 25 °C			1.26	V
	chiplevel	T_j = 130 °C		1.12	1.19	V
$V_{T(TO)}$	T_j = 130 °C			0.84	0.85	V
r_T	T_j = 130 °C			1.85	2.3	mΩ
V_{GT}	T_j = 25 °C		2			V
I_{GT}	T_j = 25 °C		100			mA
I_H	T_j = 25 °C		220			mA
I_L	T_j = 25 °C		550			mA
dv/dt_{cr}	T_j = 130 °C				1000	V/µs
di/dt_{cr}	T_j = 130 °C				100	A/µs
$R_{th(j-s)}$	per Thyristor, λ_{paste}=0.8 W/(mK)			0.45		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Rectifier						
V_F	I_F = 45 A	T_j = 25 °C		1.00	1.21	V
	chiplevel	T_j = 125 °C		0.90	1.10	V
V_{F0}	chiplevel	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		2.7	5.1	mΩ
		T_j = 125 °C		3.8	6.0	mΩ
I_R	T_j = 145 °C, V_{RRM}				2	mA
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.68		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
V_F	I_F = 150 A	T_j = 25 °C		1.40	1.76	V
	chiplevel	T_j = 150 °C		1.39	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		2.4	3.5	mΩ
		T_j = 150 °C		3.6	5.2	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C		64		A
Q_{rr}	di/dt_{off} = 970 A/µs	T_j = 150 °C		14		µC
E_{rr}	V_{GE} = 15 V V_{CC} = 300 V	T_j = 150 °C		2.3		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.6		K/W

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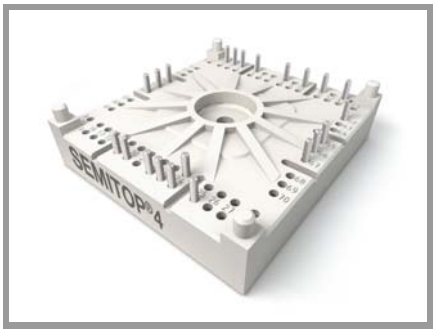

SEMITOP® 4

IGBT module

SK80BTAGL07F3T

Features

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- 650V Trench 3 Fast IGBT technology
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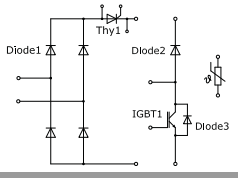
Typical Applications*

- Motor drives



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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 3						
V_F	I_F = 150 A	T_j = 25 °C		1.40	1.76	V
	chiplevel	T_j = 150 °C		1.39	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		2.4	3.5	mΩ
		T_j = 150 °C		3.6	5.2	mΩ
I_{RRM}	I_F = 150 A			-		A
Q_{rr}				-		µC
E_{rr}				-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.6		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
M_s	to heatsink	2.5		2.75	Nm
w	weight		60		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

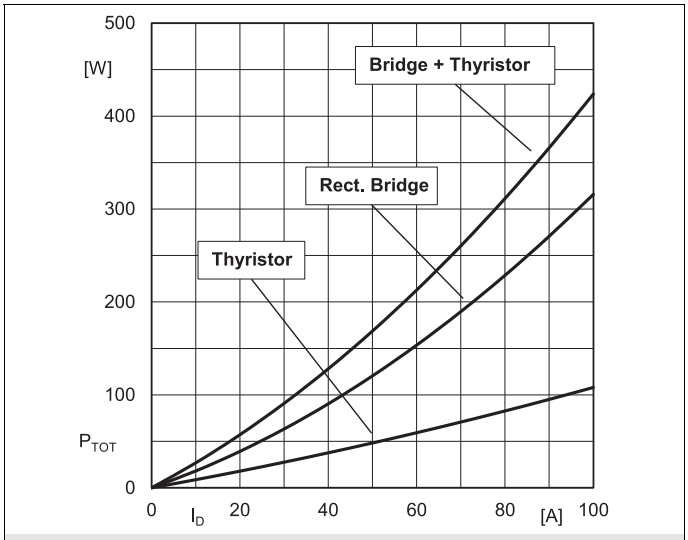


Fig. 1: Power dissipation vs. bridge output current

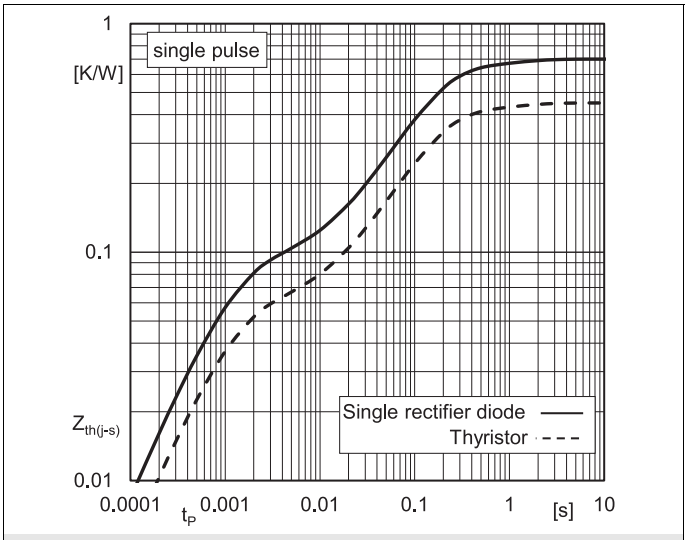


Fig. 2: Transient thermal impedance vs. time

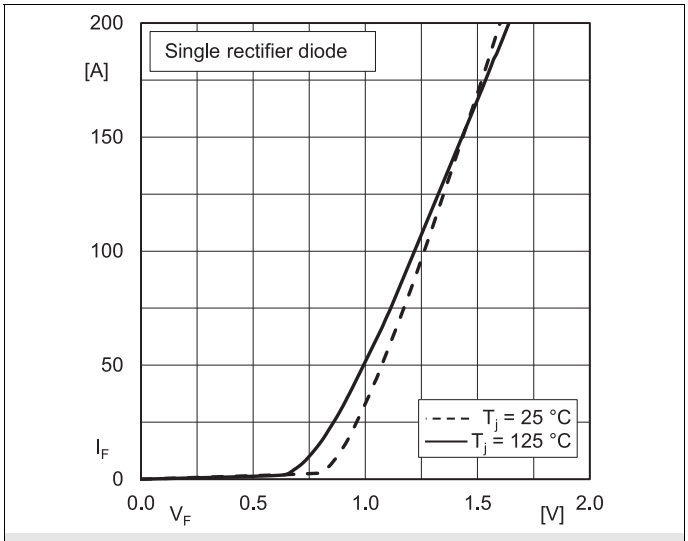


Fig. 3: Typ. forward characteristic of Diode1, incl. $R_{CC'+EE'}$

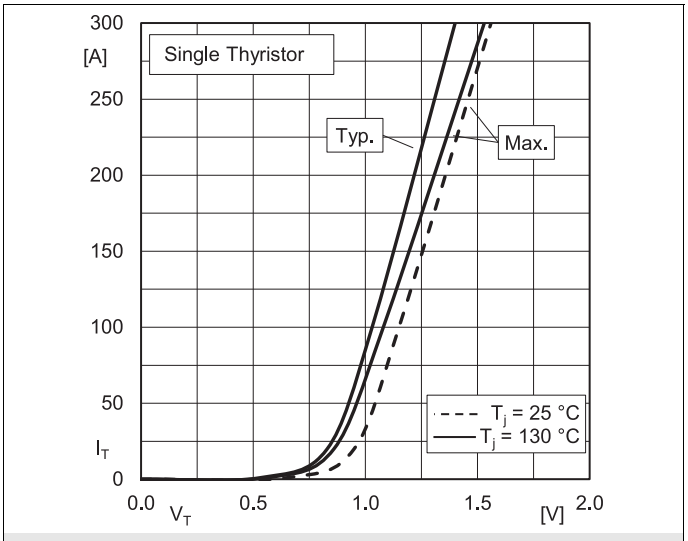


Fig. 4: On-state characteristics

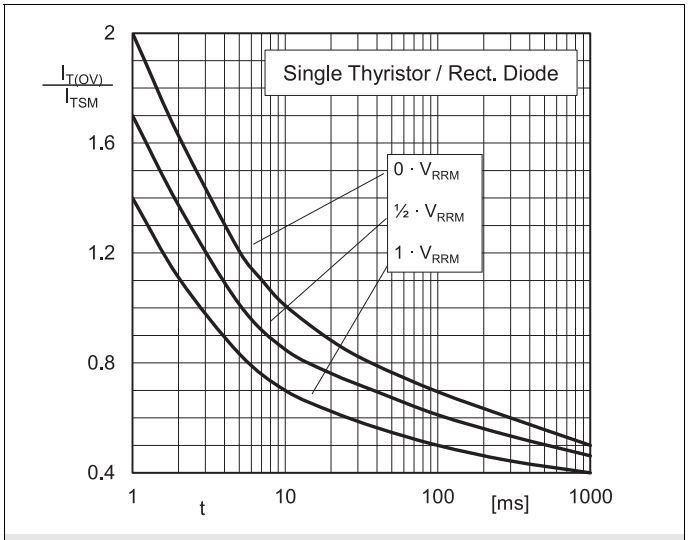


Fig. 5: Surge overload current vs. time

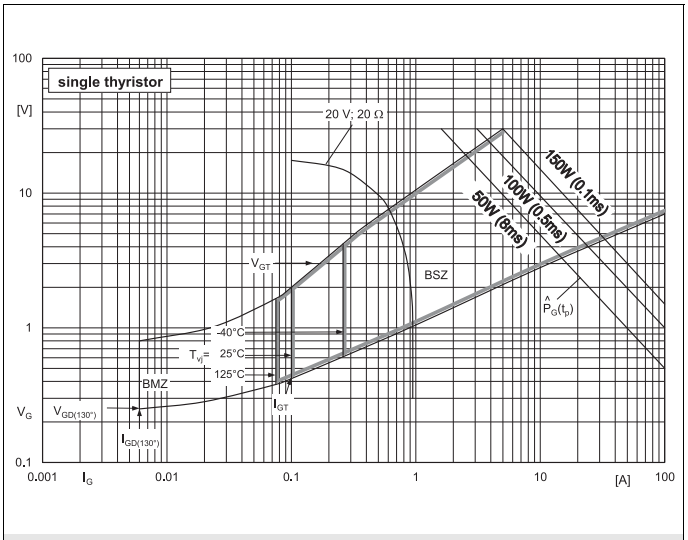


Fig. 6: Gate trigger characteristic

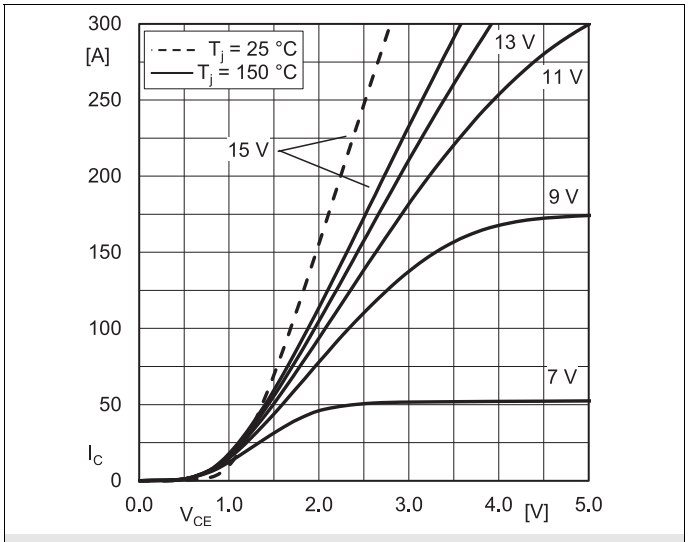


Fig. 7: Typ. IGBT1 output characteristic, incl. $R_{CC'+EE'}$

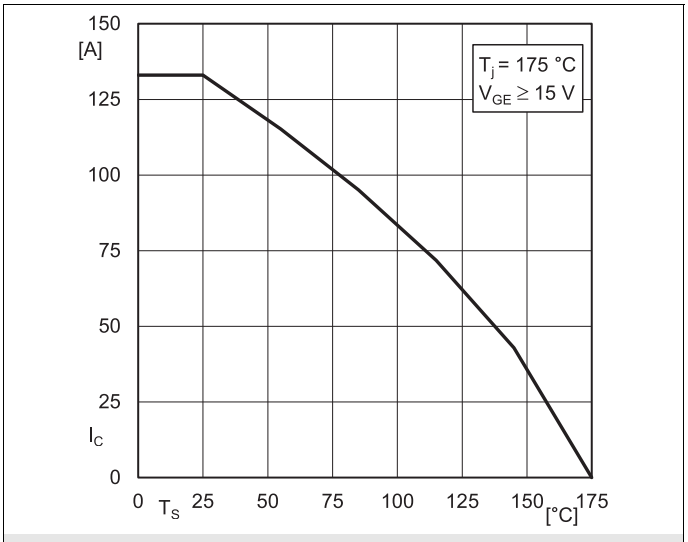


Fig. 8: IGBT1 rated current vs. Temperature $I_C=f(T_S)$

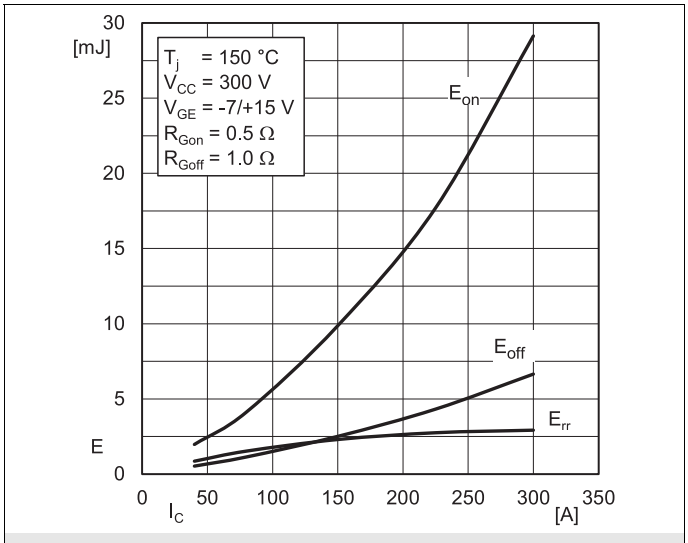


Fig. 9: Typ. turn-on / -off energy = $f(I_C)$

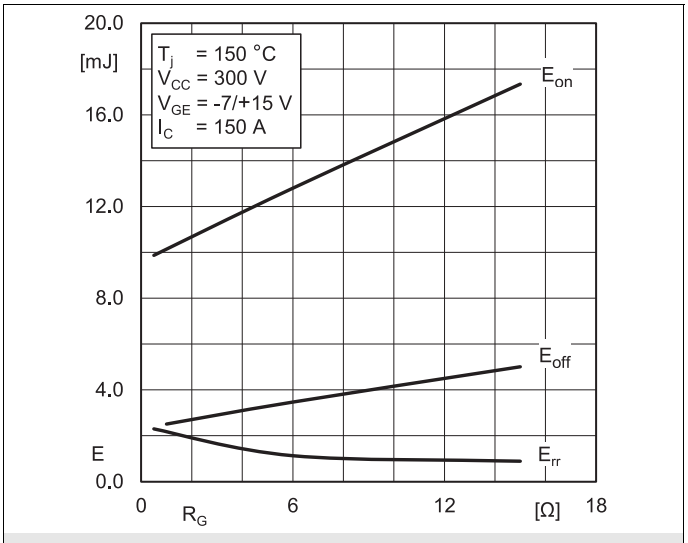


Fig. 10: Typ. turn-on / -off energy = f (R_G)

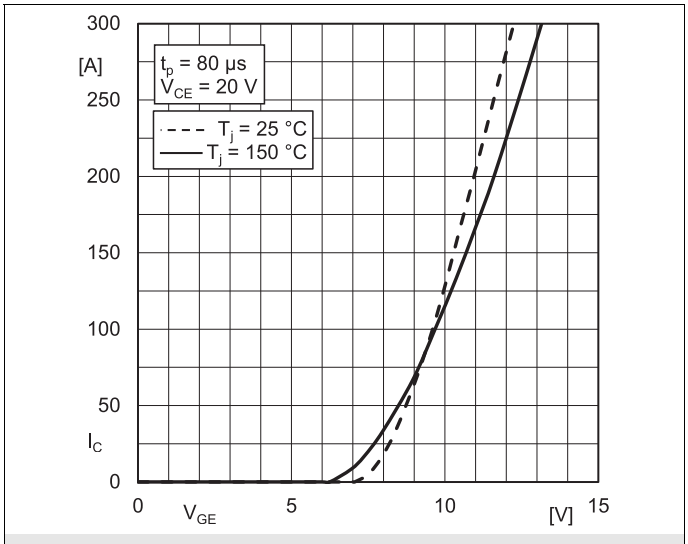


Fig.11: Typ. IGBT1 transfer characteristic

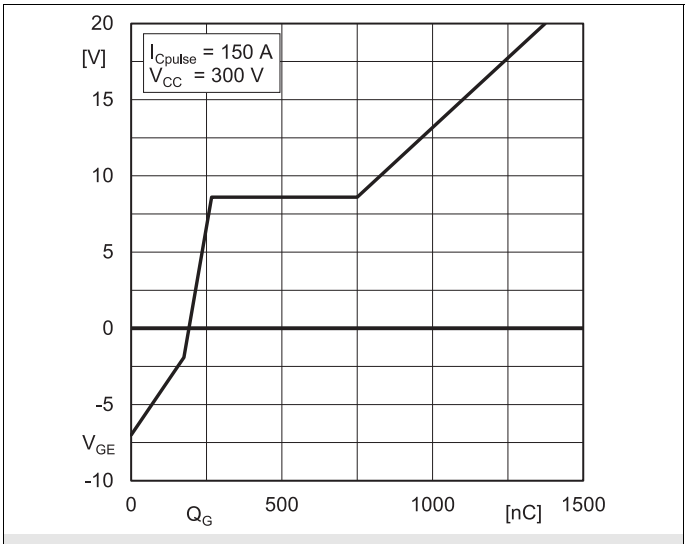


Fig.12: Typ IGBT1 gate charge characteristic

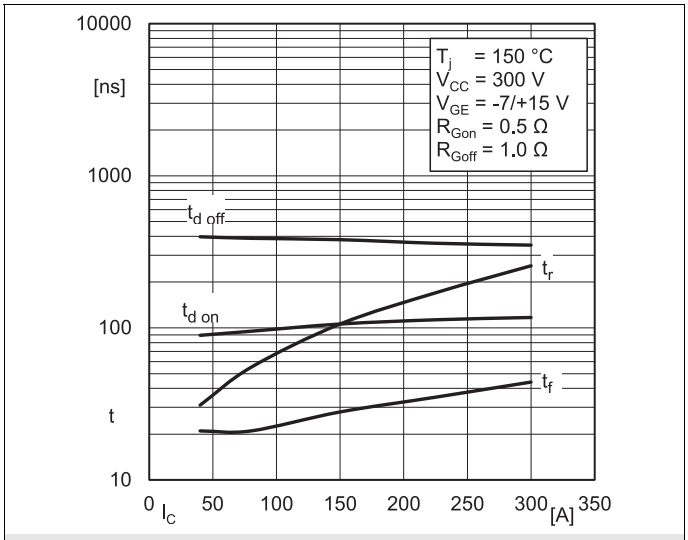


Fig. 13: Typ. IGBT1 switching times vs. I_C

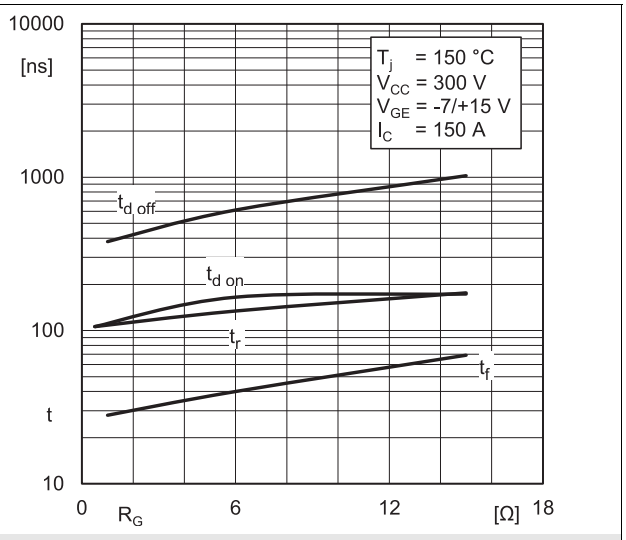


Fig. 14: Typ. IGBT1 switching times vs. R_G

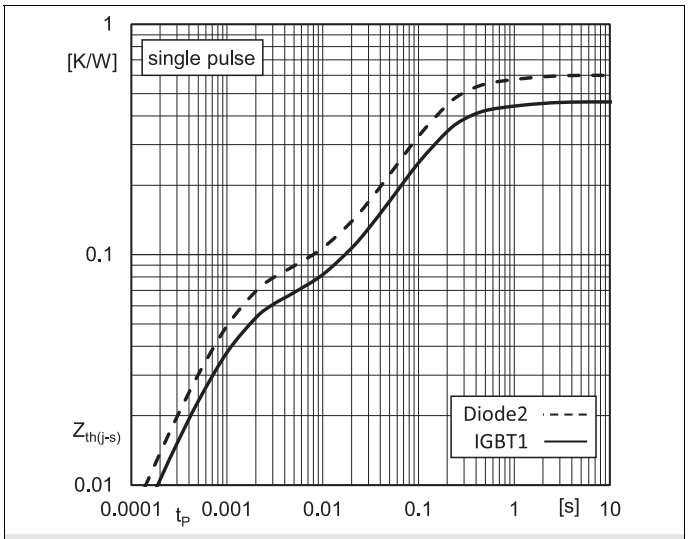


Fig. 15: Transient thermal impedances

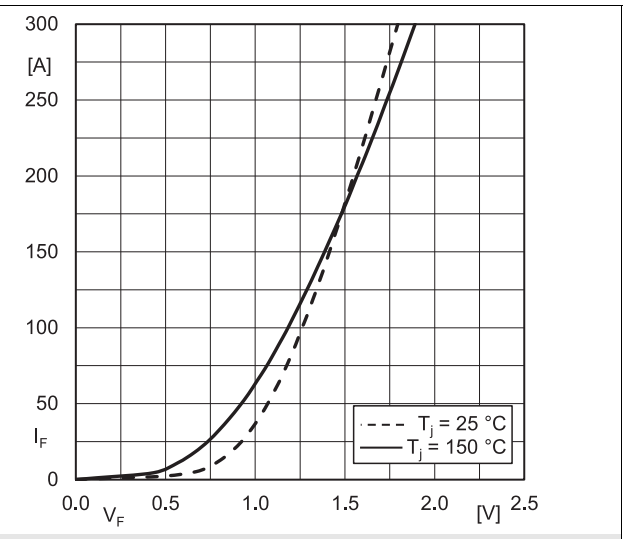
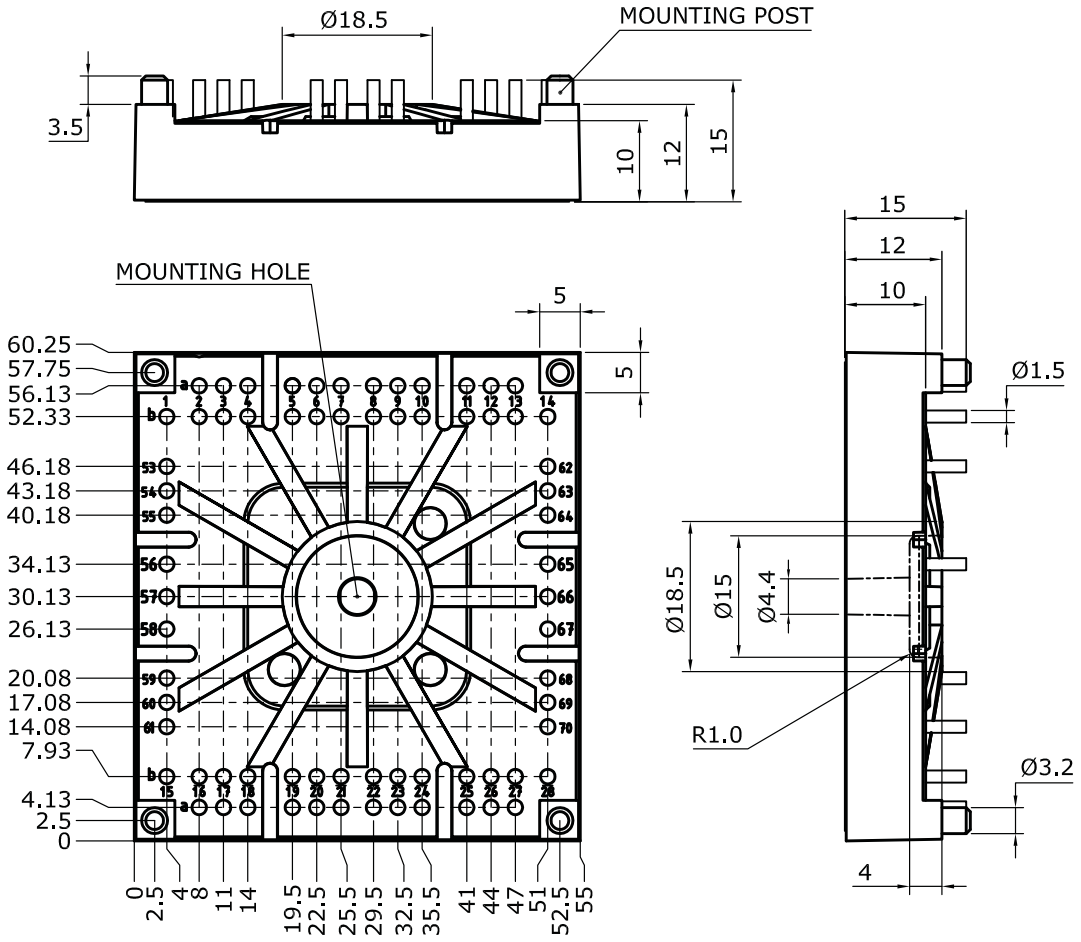


Fig. 16: Typ. CAL diode forward characteristic, incl. $R_{CC'+EE'}$

Dimensions: mm
Tolerance system: ISO 2768-m



Suggested hole diameter for solder pins in the circuit board:

- 2.0 mm

Suggested hole diameter for the mounting post in the circuit board:

- 3.6 mm

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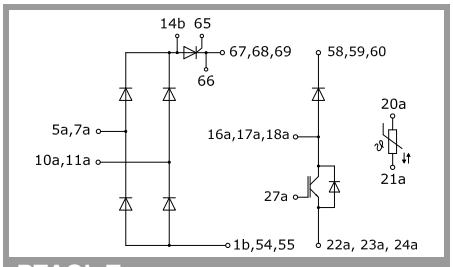

BTAGL-T

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

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