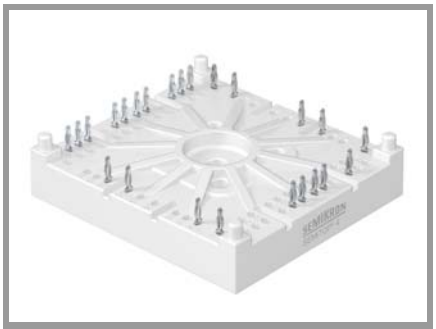
SK150DBB07F3TD1p



SEMITOP® 4 Press-Fit

IGBT module

SK150DBB07F3TD1p

Features

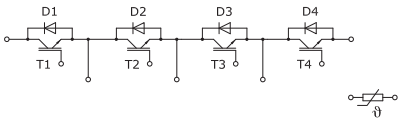
- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminum oxide substrate
- 650V Trench3 Fast IGBT technology
- 650V Rapid switching diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications*

Three-level DC-DC converter

Remarks*

- Recommended Tjop= -40 ... +150°C
- IGBT1: outer IGBTs T1 & T4
- IGBT2: inner IGBTs T2 & T3
- Diode1: outer diodes D1 & D4
- Diode2: inner diodes D2 & D3



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT1				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 175 °C	T_s = 25 °C	74	A
		T_s = 70 °C	59	A
I_{Cnom}			75	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		225	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 400 V, V_{GE} ≤ 15 V, T_j = 150 °C, V_{CES} ≤ 650 V		5	µs
T_j			-40 ... 175	°C
IGBT2				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 175 °C	T_s = 25 °C	151	A
		T_s = 70 °C	120	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} ≤ 15 V, T_j = 150 °C, V_{CES} ≤ 650 V		5	µs
T_j			-40 ... 175	°C
Diode1				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 175 °C	T_s = 25 °C	108	A
		T_s = 70 °C	85	A
I_{Fnom}			100	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		200	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		540	A
T_j			-40 ... 175	°C
Diode2				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 175 °C	T_s = 25 °C	67	A
		T_s = 70 °C	54	A
I_{Fnom}			50	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		100	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		300	A
T_j			-40 ... 175	°C
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

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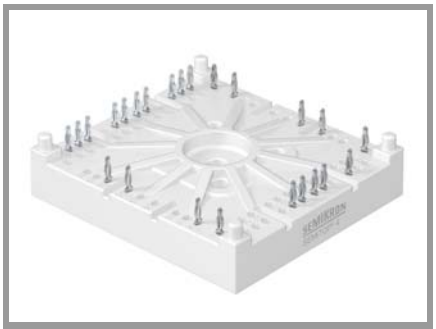


SEMITOP® 4 Press-Fit

IGBT module

SK150DBB07F3TD1p

Features

- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminum oxide substrate
- 650V Trench3 Fast IGBT technology
- 650V Rapid switching diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

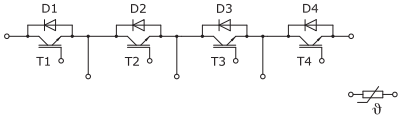
Three-level DC-DC converter

Remarks*

- Recommended Tjop= -40 ... +150°C
- IGBT1: outer IGBTs T1 & T4
- IGBT2: inner IGBTs T2 & T3
- Diode1: outer diodes D1 & D4
- Diode2: inner diodes D2 & D3

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT1						
$V_{CE(sat)}$	I_C = 75 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		10	14	mΩ
		T_j = 150 °C		16	19	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 1.2 mA		4.2	5.1	5.6	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 650 V, T_j = 25 °C				0.1	mA
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V	f = 1 MHz		4.62		nF
C_{oes}		f = 1 MHz		240		nF
C_{res}		f = 1 MHz		0.137		nF
Q_G	V_{GE} = -15V...+15V			750		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CE} = 300 V, I_C = 75 A, V_{GE} = +15/-15 V, $R_{G\,on}$ = 6.2 Ω, $R_{G\,off}$ = 6.2 Ω, di/dt_{on} = 3013 A/µs, di/dt_{off} = 3012 A/µs	T_j = 150 °C		131		ns
t_r		T_j = 150 °C		27		ns
E_{on}		T_j = 150 °C		1.52		mJ
$t_{d(off)}$		T_j = 150 °C		161		ns
t_f		T_j = 150 °C		23		ns
E_{off}		T_j = 150 °C		0.65		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.78		K/W
IGBT2						
$V_{CE(sat)}$	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				0.15	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} = -15V...+15V			1500		nC
R_{Gint}	T_j = 25 °C			2.4		Ω
$t_{d(on)}$	V_{CE} = 300 V, I_C = 150 A, V_{GE} = +15/-15 V, $R_{G\,on}$ = 6.2 Ω, $R_{G\,off}$ = 6.2 Ω, di/dt_{on} = 2010 A/µs, di/dt_{off} = 5989 A/µs	T_j = 150 °C		288		ns
t_r		T_j = 150 °C		69		ns
E_{on}		T_j = 150 °C		6.9		mJ
$t_{d(off)}$		T_j = 150 °C		503		ns
t_f		T_j = 150 °C		24		ns
E_{off}		T_j = 150 °C		2.34		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.38		K/W



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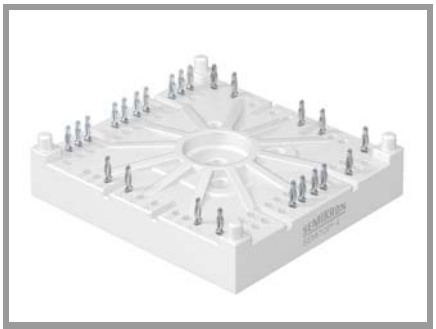


SEMITOP® 4 Press-Fit

IGBT module

SK150DBB07F3TD1p

Features

- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminum oxide substrate
- 650V Trench3 Fast IGBT technology
- 650V Rapid switching diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

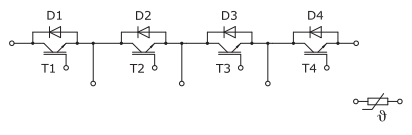
Typical Applications*

Three-level DC-DC converter

Remarks*

- Recommended Tjop= -40 ... +150°C
- IGBT1: outer IGBTs T1 & T4
- IGBT2: inner IGBTs T2 & T3
- Diode1: outer diodes D1 & D4
- Diode2: inner diodes D2 & D3

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode1						
$V_F = V_{EC}$	I_F = 100 A	T_j = 25 °C		1.35	1.92	V
	chiplevel	T_j = 150 °C		1.29	1.89	V
V_{F0}	chiplevel	T_j = 25 °C		0.90	1.10	V
		T_j = 150 °C		0.71	0.94	V
r_F	chiplevel	T_j = 25 °C		4.5	8.2	mΩ
		T_j = 150 °C		5.8	9.5	mΩ
I_{RRM}	I_F = 100 A di/dt_{off} = 1876 A/µs V_R = 300 V V_{GE} = +15/-15 V	T_j = 150 °C		55		A
Q_{rr}		T_j = 150 °C		6.3		µC
E_{rr}		T_j = 150 °C		0.9		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.71		K/W
Diode2						
$V_F = V_{EC}$	I_F = 50 A	T_j = 25 °C		1.35	1.92	V
	chiplevel	T_j = 150 °C		1.29	1.89	V
V_{F0}	chiplevel	T_j = 25 °C		0.90	1.10	V
		T_j = 150 °C		0.71	0.94	V
r_F	chiplevel	T_j = 25 °C		9.0	16	mΩ
		T_j = 150 °C		12	19	mΩ
I_{RRM}	I_F = 50 A di/dt_{off} = 3267 A/µs V_R = 300 V V_{GE} = +15/-15 V	T_j = 150 °C		60		A
Q_{rr}		T_j = 150 °C		3.7		µC
E_{rr}		T_j = 150 °C		0.68		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1		K/W
Module						
L_{sCE1}				-		nH
L_{CE}				-		nH
$R_{CC'+EE'}$		T_s = 25 °C		-		mΩ
		T_s = 125 °C		-		mΩ
M_s	to heatsink		2.5		2.75	Nm
w				60		g
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



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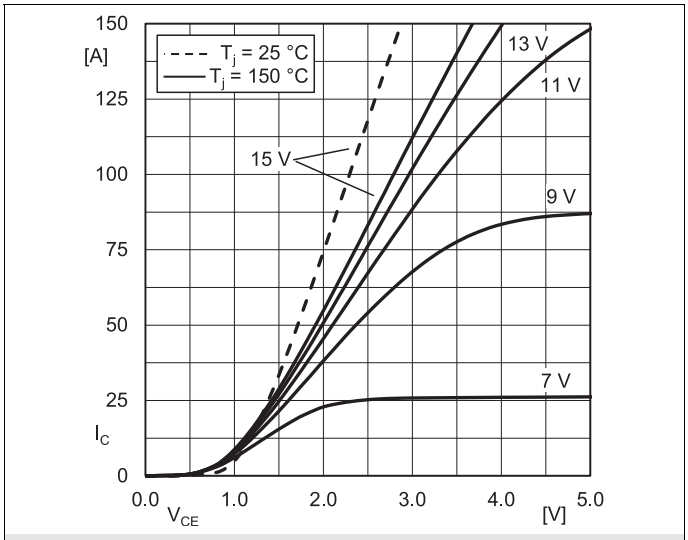


Fig. 1: Typ. IGBT1 output characteristic, incl. $R_{CC'+EE'}$

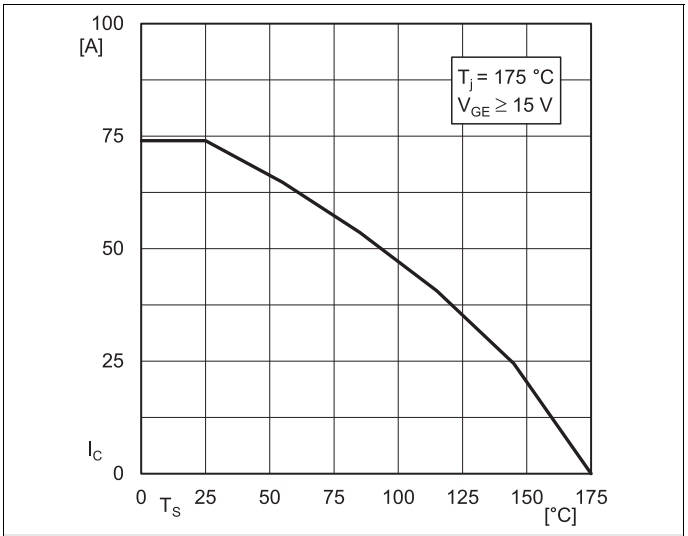


Fig. 2: IGBT1 rated current vs. Temperature $I_c=f(T_s)$

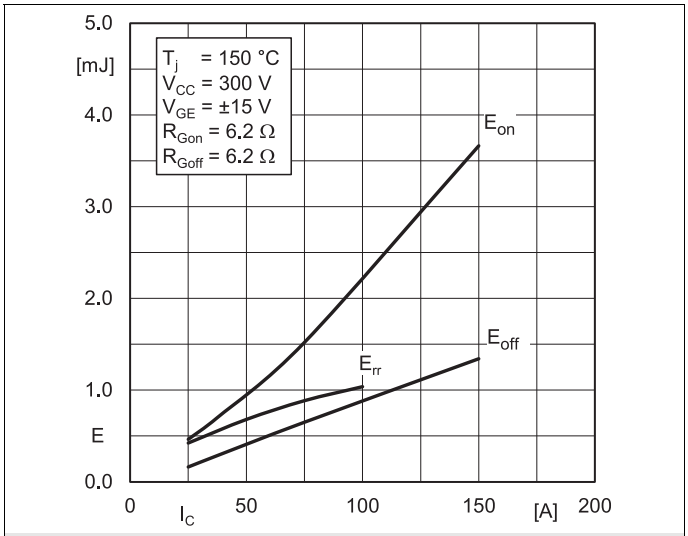


Fig. 3: Typ. IGBT1 & Diode2 turn-on /-off energy = f (I_C)

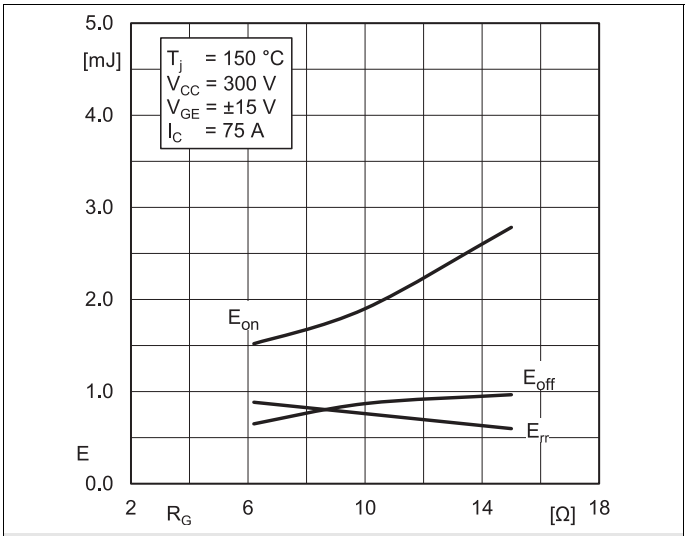


Fig. 4: Typ. IGBT1 & Diode2 turn-on /-off energy = f(R_G)

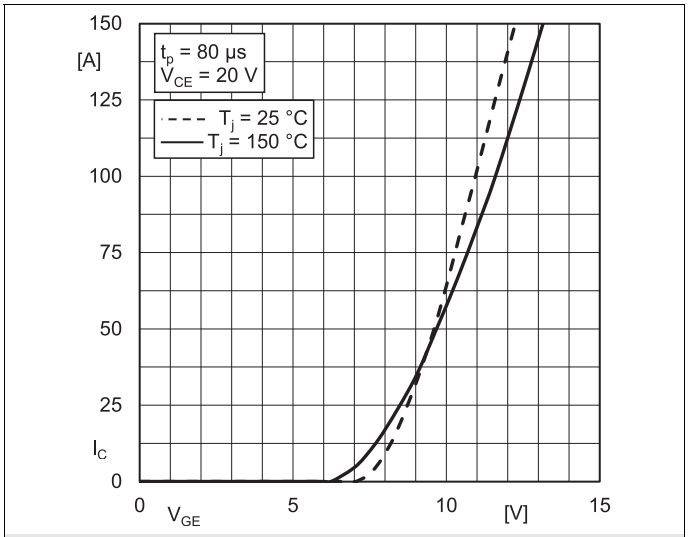


Fig. 5: Typ. IGBT1 transfer characteristic

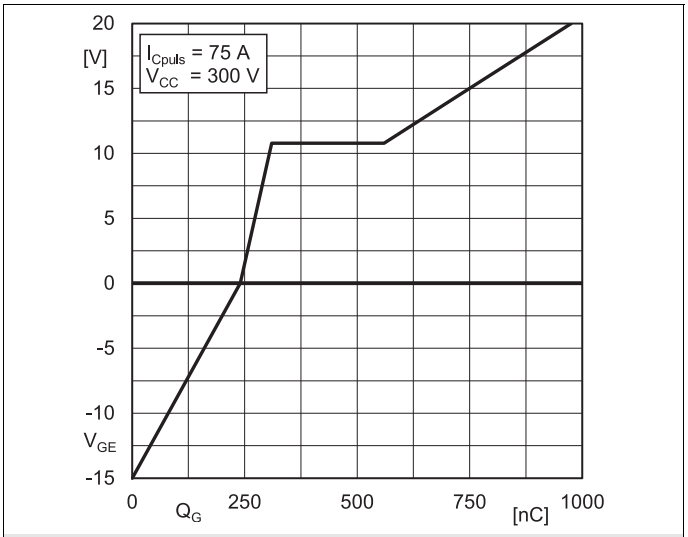


Fig. 6: Typ. IGBT1 gate charge characteristic

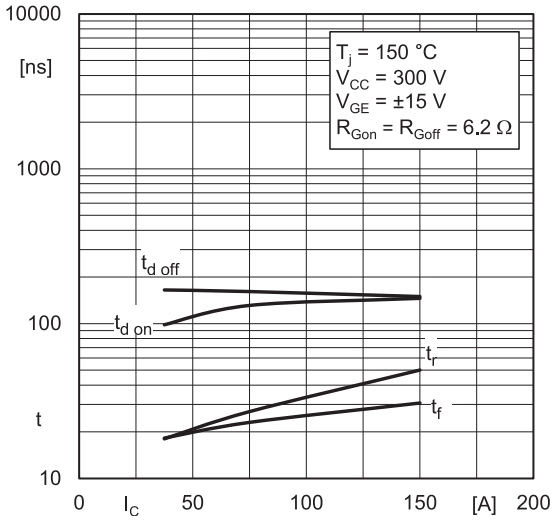


Fig. 7: Typ. IGBT1 switching times vs. I_C

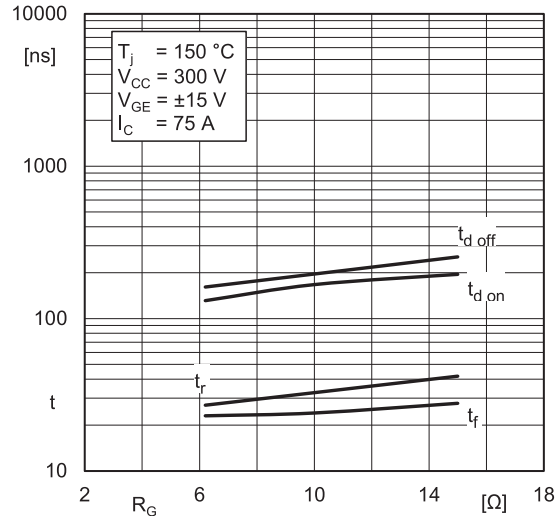


Fig. 8: Typ. IGBT1 switching times vs. gate resistor R_G

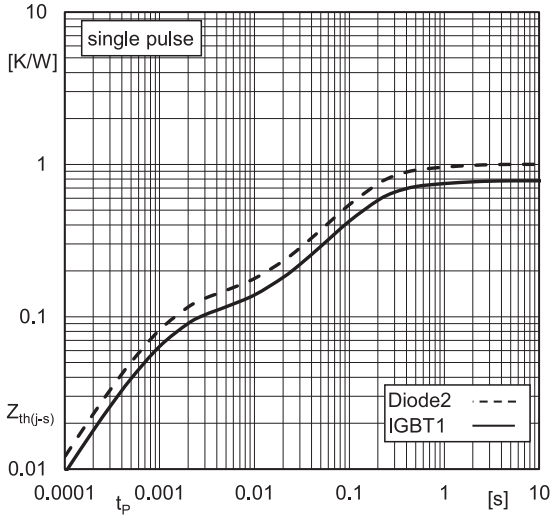


Fig. 9: Transient thermal impedance of IGBT1 & Diode2

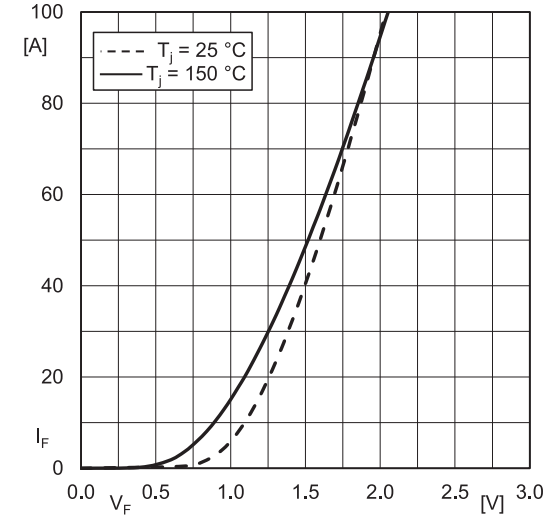


Fig. 10: Typ. Diode2 forward characteristic, incl. $R_{CC'+EE'}$

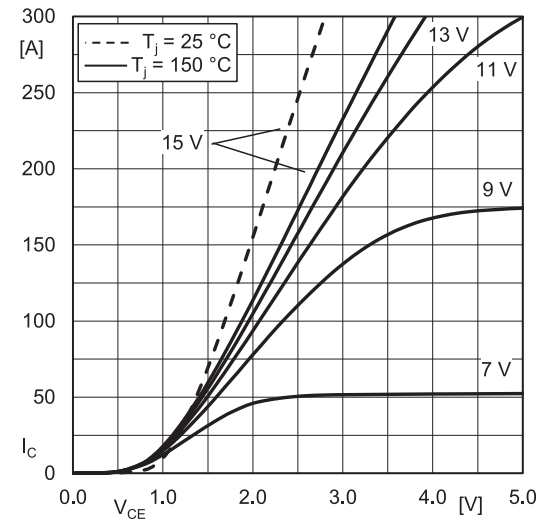


Fig. 13: Typ. IGBT2 output characteristic, incl. $R_{CC'+EE'}$

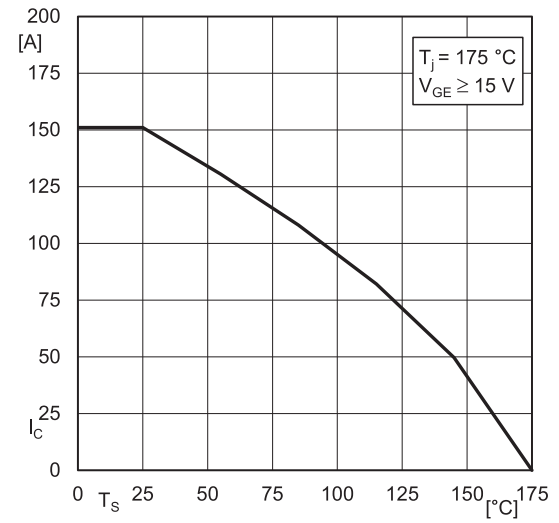


Fig. 14: IGBT2 Rated current vs. Temperature I_c= f (T_s)

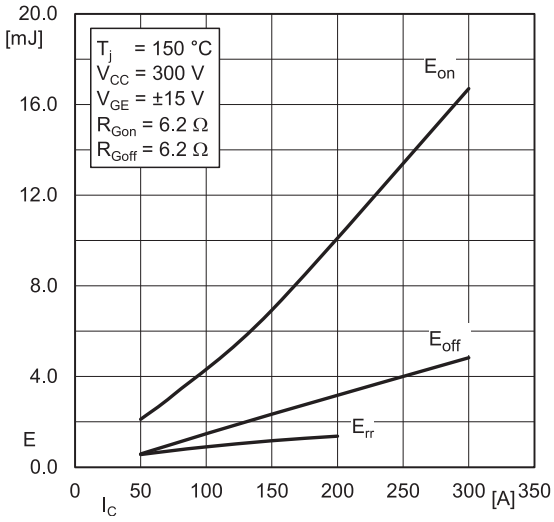


Fig. 15: Typ. IGBT2 & Diode1 turn-on /-off energy = f (I_C)

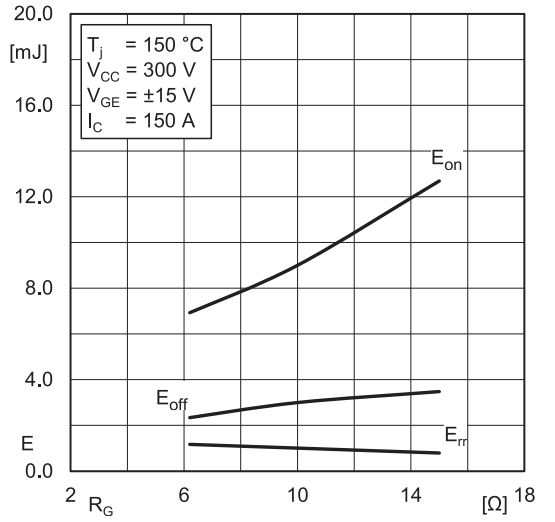


Fig. 16: Typ. IGBT2 & Diode1 turn-on / -off energy = f(R_G)

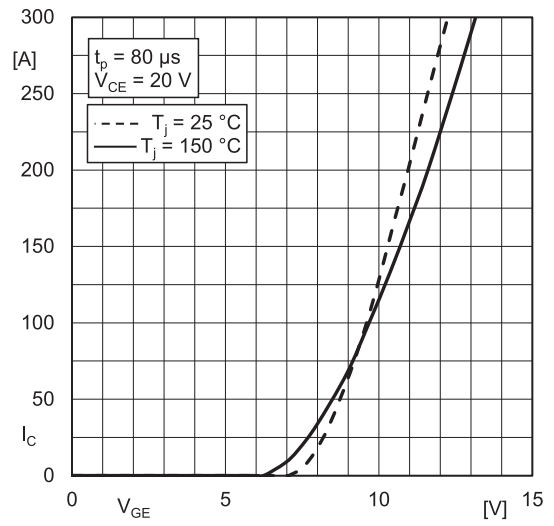


Fig. 17: Typ. IGBT2 transfer characteristic

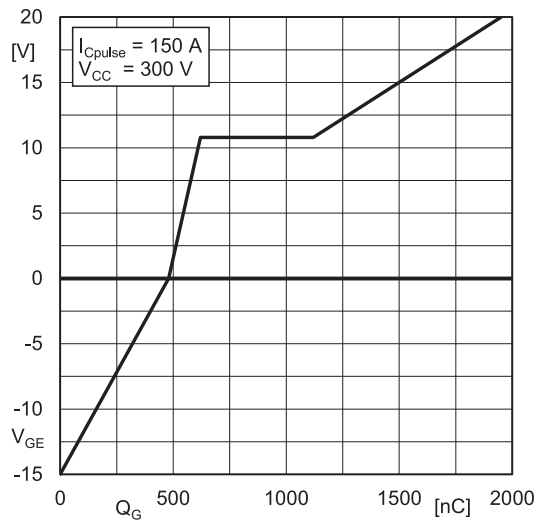


Fig. 18: Typ. IGBT2 gate charge characteristic

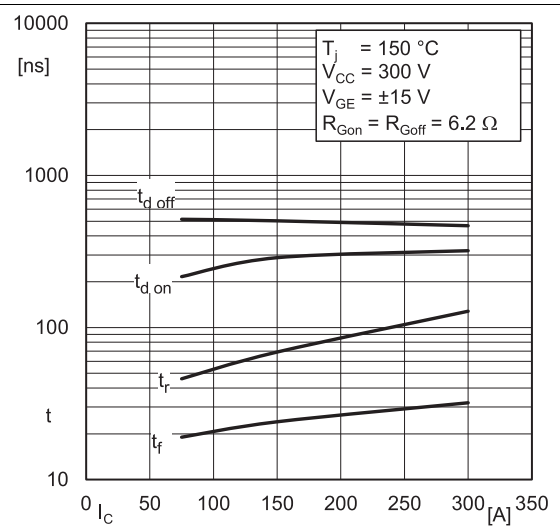


Fig. 19: Typ. IGBT2 switching times vs. I_C

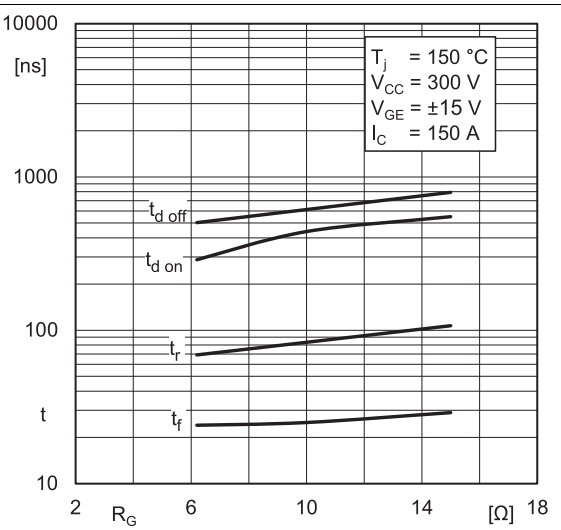


Fig. 20: Typ. IGBT2 switching times vs. gate resistor R_G

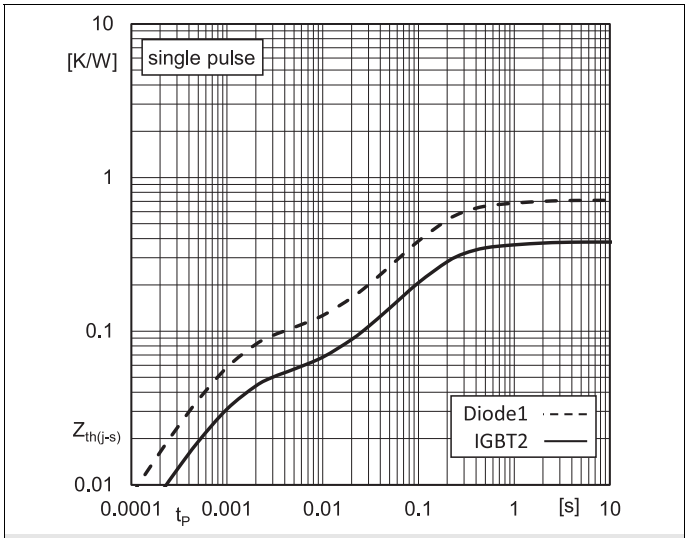


Fig. 21: Transient thermal impedance of IGBT2 & Diode1

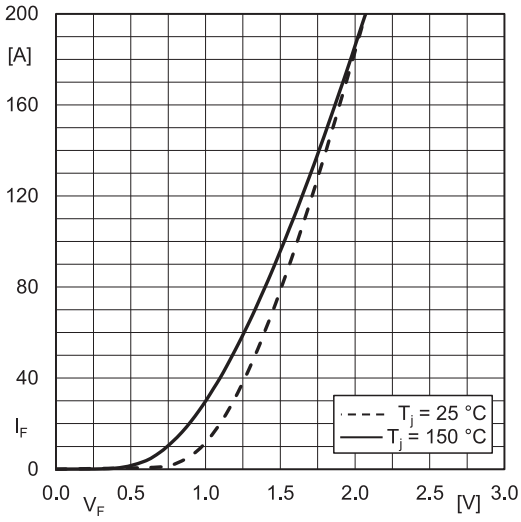
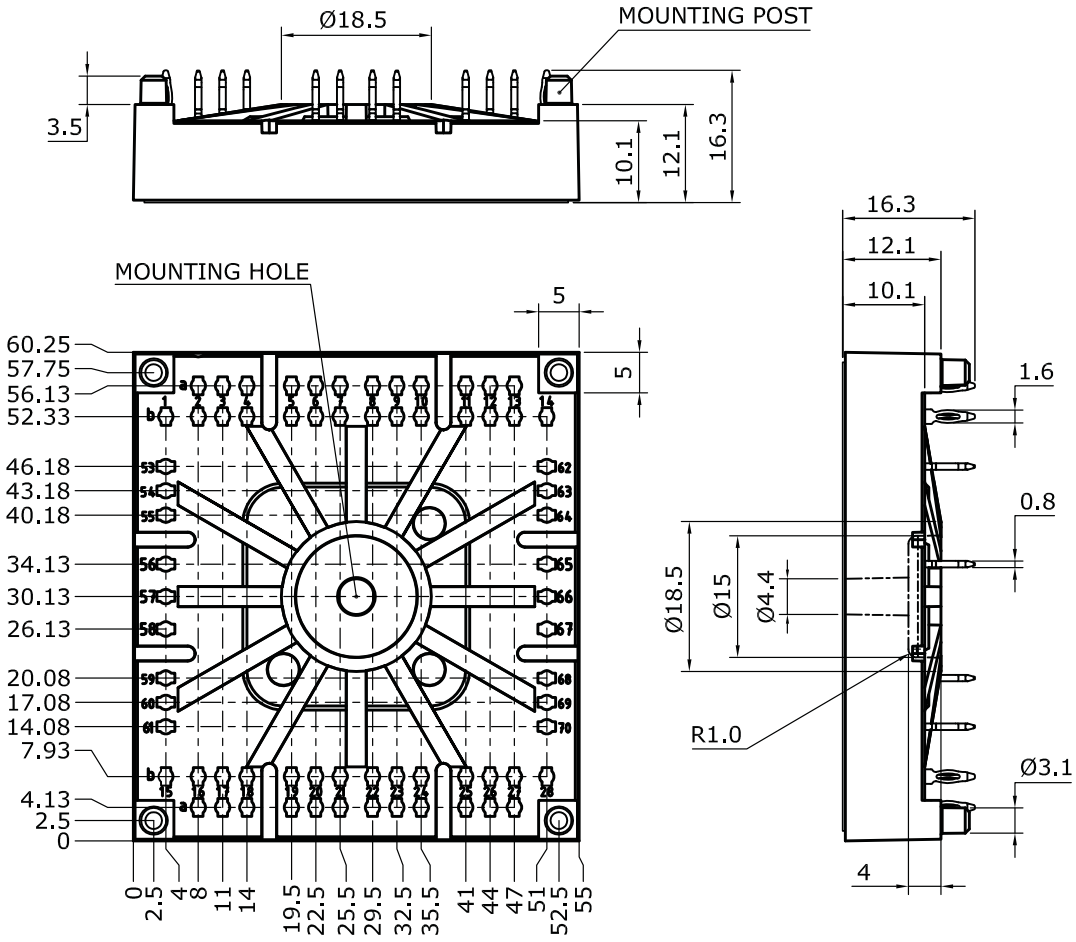


Fig. 22: Typ. Diode1 forward characteristic, incl. $R_{CC'+EE'}$

Dimensions: mm
Tolerance system: ISO 2768-m



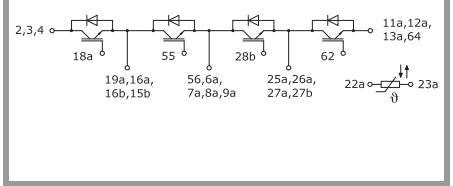
Suggested drilled hole diameter for terminal pins in the circuit board:

- minimum: 1.575 mm
- typical: 1.6 mm
- maximum: 1.625 mm

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

- 3.6 mm

SEMITOP 4 Press-Fit



DBB-T

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

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