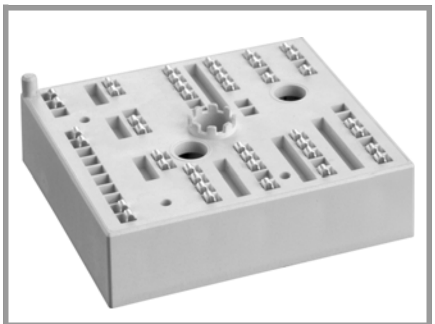


MiniSKiiP® 2

IGBT module

Evaluation Sample

SKiiP25AC12F4V19

Target Data

Features

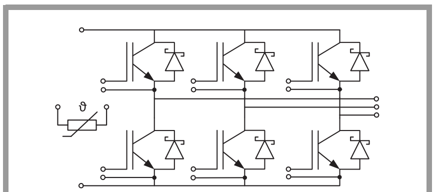
- Fast switching Trench 4 IGBT
- SiC Schottky Diode
- Highly reliable spring contacts for electrical connections

Typical Applications*

- High frequency inverters
- Power supplies
- High efficiency inverters
- Solar inverters

Remarks

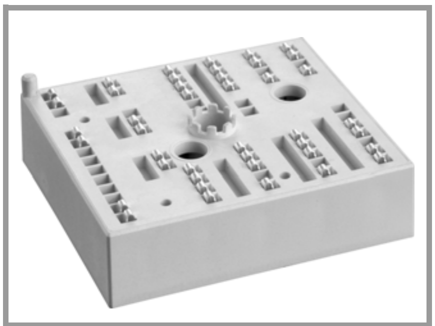
Max. case temperature limited to T_C= 125°C
Recommended $T_{j,op}$=-40...+150°C



AC

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	61	A
	T_j = 175 °C	T_s = 70 °C	49	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	72	A
	T_j = 175 °C	T_s = 70 °C	58	A
I_{Cnom}			50	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		150	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse - Diode				
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	45	A
	T_j = 175 °C	T_s = 70 °C	37	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	50	A
	T_j = 175 °C	T_s = 70 °C	40	A
I_{Fnom}			30	A
I_{FRM}			85	A
I_{FSM}	t_p = 8.3 ms, sin 180°, T_j = 25 °C		127	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 20 A per spring		100	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 50 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.05	2.42	V
		T_j = 150 °C		2.59	2.96	V
V_{CE0}	chiplevel	T_j = 25 °C		1.10	1.28	V
		T_j = 150 °C		0.95	1.13	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		19	23	mΩ
		T_j = 150 °C		33	37	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.7 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C			0.1	0.6	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		2.77		nF
C_{oes}		f = 1 MHz		0.21		nF
C_{res}		f = 1 MHz		0.16		nF
Q_G	V_{GE} = - 8 V...+ 15 V			283		nC
R_{Gint}	T_j = 25 °C			4.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 50 A $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt$_{on}$ = 5090 A/µs di/dt$_{off}$ = 1050 A/µs V_{GE} = +15/-15 V	T_j = 150 °C		46		ns
t_r		T_j = 150 °C		7		ns
E_{on}		T_j = 150 °C		0.6		mJ
$t_{d(off)}$		T_j = 150 °C		217		ns
t_f		T_j = 150 °C		51		ns
E_{off}		T_j = 150 °C		3.1		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.7		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.53		K/W



MiniSKiiP® 2

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Remarks

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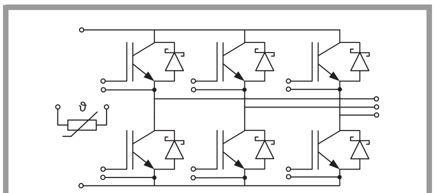
Recommended $T_{j,op}$=-40...+150°C

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse - Diode						
$V_F = V_{EC}$	I_F = 30 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.40	1.60	V
		T_j = 150 °C		1.80	2.10	V
V_{F0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.80	0.90	V
r_F	chiplevel	T_j = 25 °C		15	18	mΩ
		T_j = 150 °C		33	40	mΩ
C_j	V_R = 800 V, f = 1 MHz, T_j = 25 °C			0.063		nF
Q_c	V_R = 800 V, di/dt_{off} = 500 A/µs, T_j = 25 °C			0.10		µC
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.15		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.98		K/W
Module						
L_{CE}				-		nH
M_s	to heat sink		2		2.5	Nm
w				55		g
Temperature Sensor						
R_{100}	T_r=100°C (R_{25}=1000Ω)			1670 ± 3%		Ω
R(T)	$R(T)=1000\Omega[1+A(T-25°C)+B(T-25°C)^2]$, $A = 7.635 \cdot 10^{-3}$ °C^{-1}, $B = 1.731 \cdot 10^{-5}$ °C^{-2}					



AC

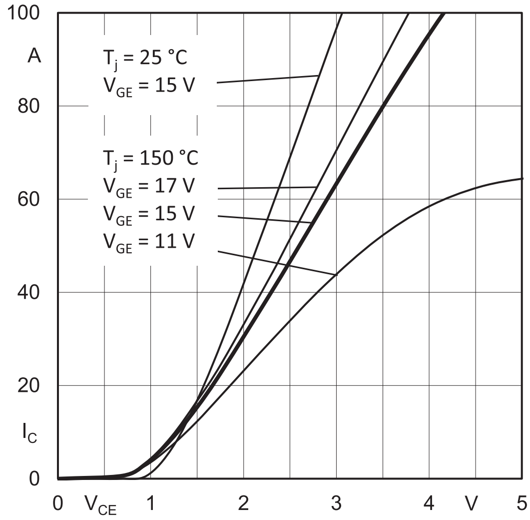


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

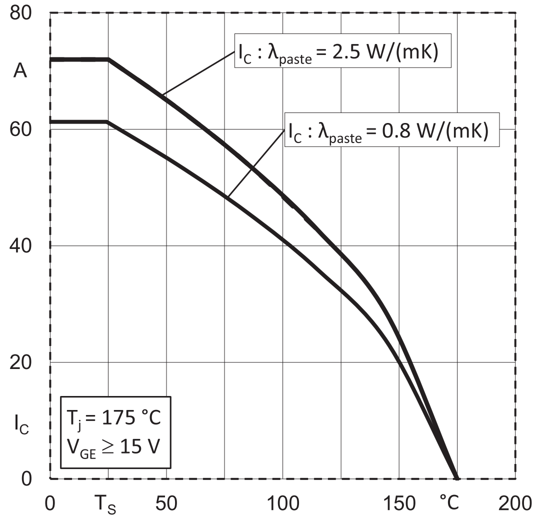


Fig. 2: Rated current vs. temperature $I_C = f (T_S)$

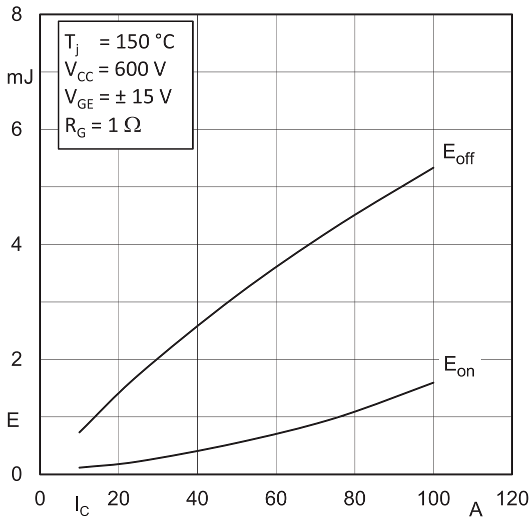


Fig. 3: Typ. turn-on /-off energy = f (I_C)

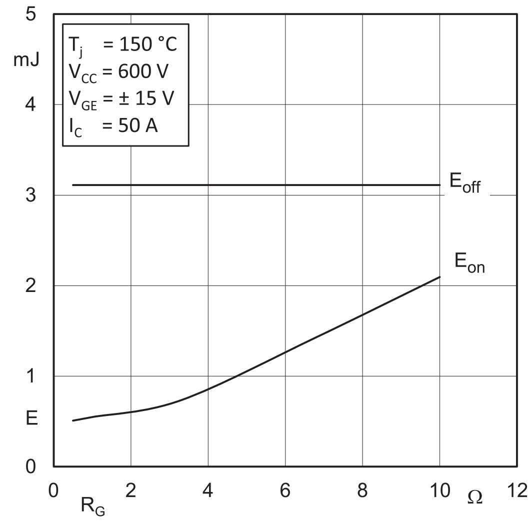


Fig. 4: Typ. turn-on /-off energy = f (R_G)

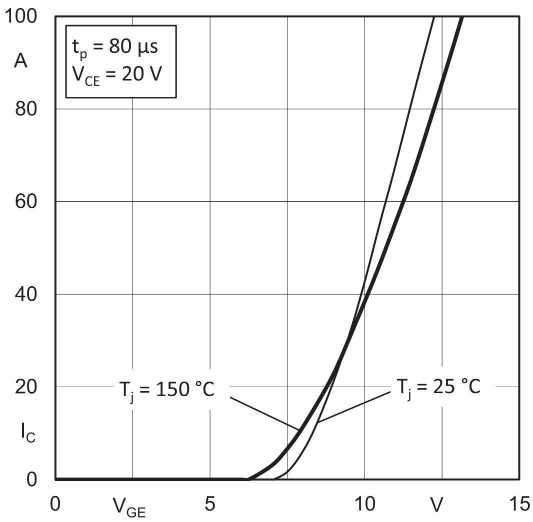


Fig. 5: Typ. transfer characteristic

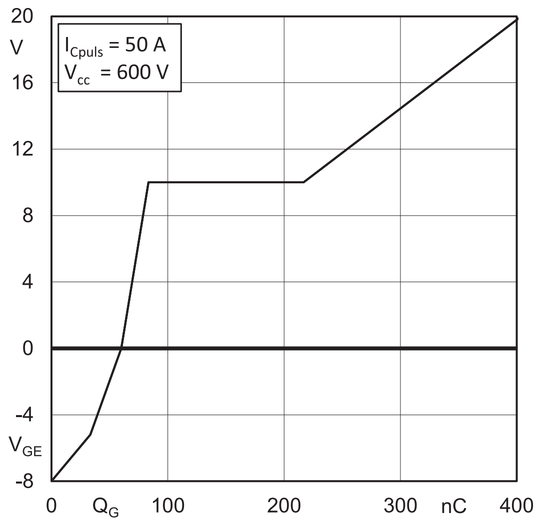


Fig. 6: Typ. gate charge characteristic

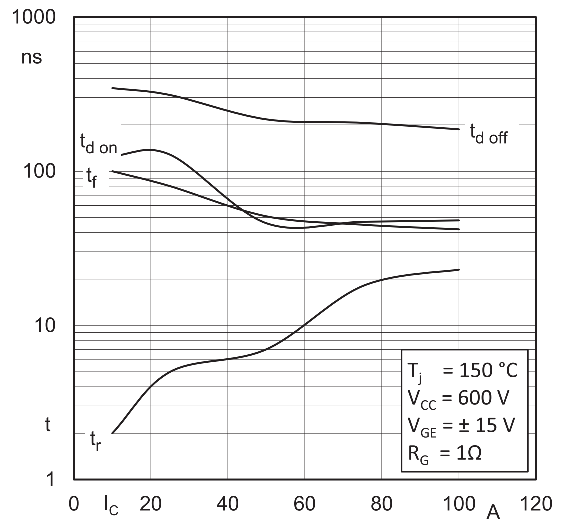


Fig. 7: Typ. switching times vs. I_C

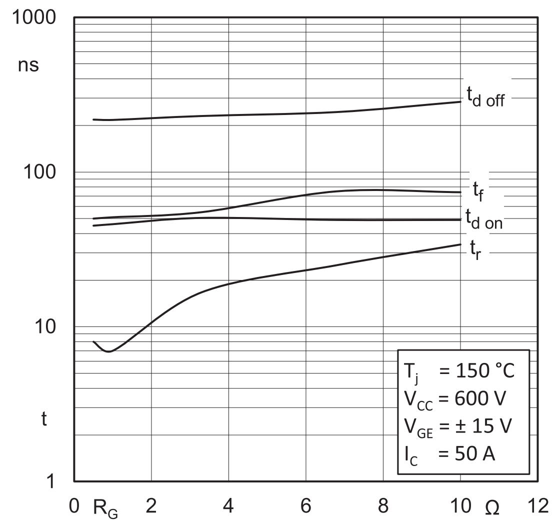


Fig. 8: Typ. switching times vs. gate resistor R_G

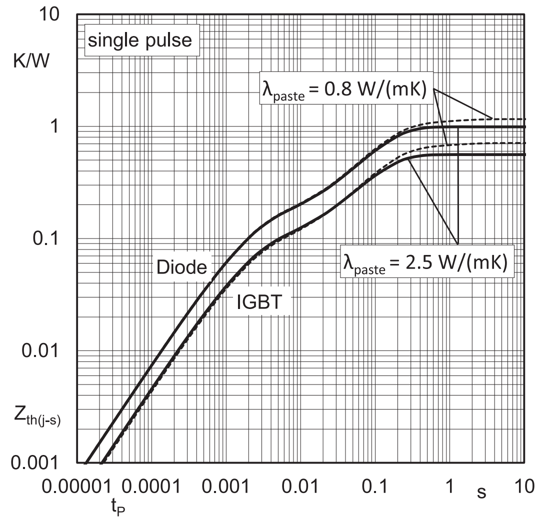


Fig. 9: Transient thermal impedance of IGBT and Diode

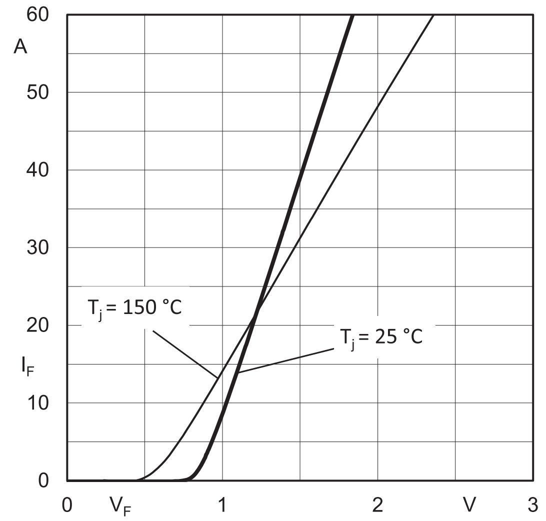
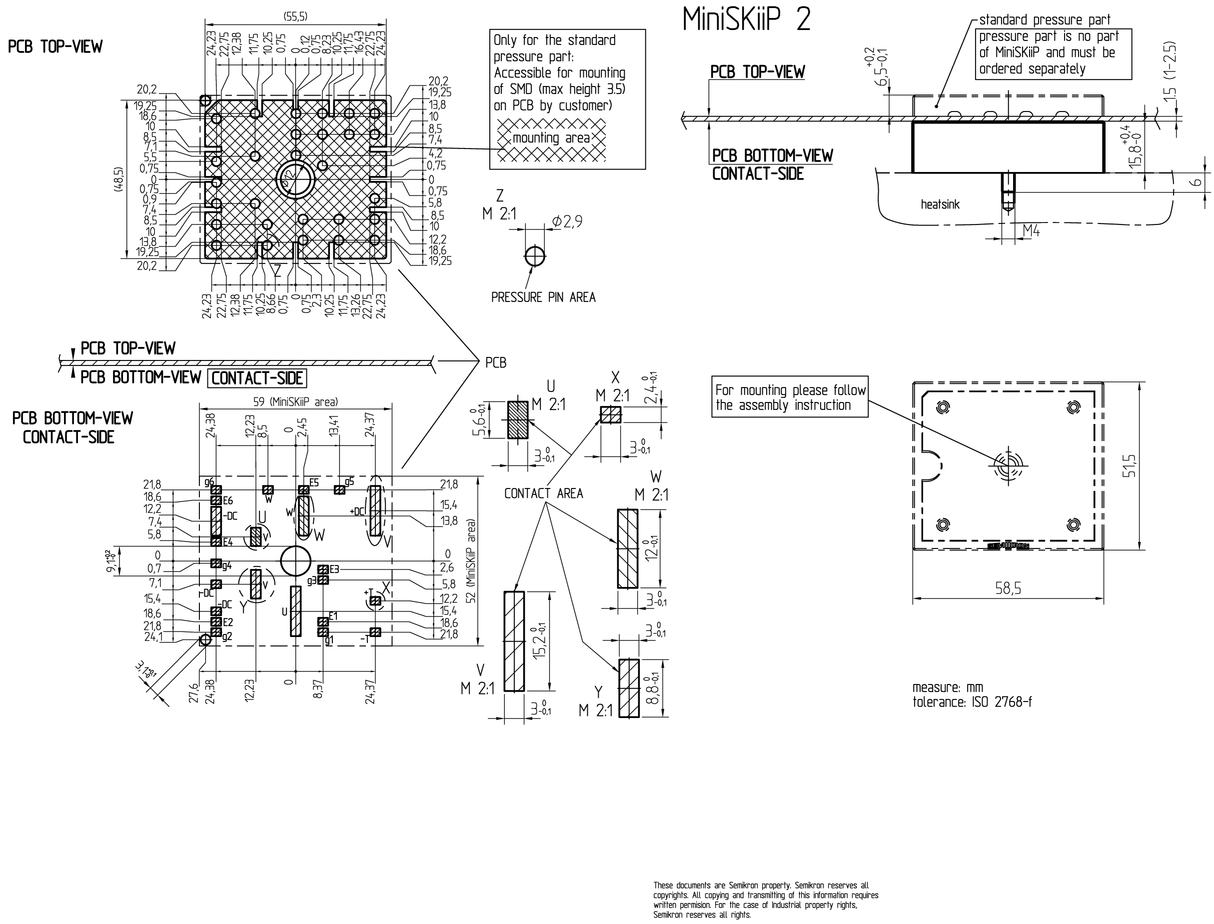


Fig. 10: Typ. Diode forward charact., incl. $R_{CC'+EE'}$



pinout, dimensions

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

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