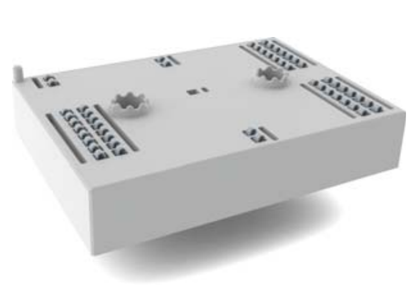
SKiiP39GB12E4V1



MiniSKiiP® 3 Dual

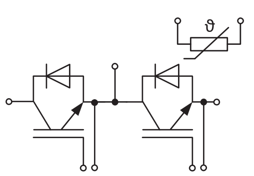
SKiiP39GB12E4V1

Features

- Trench 4 IGBT´s
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Remarks

- Case temp. limited to T_C= 125°C max. (for baseplateless modules $T_C = T_S$)
- product rel. results valid for Tj≤150 (recomm. Top = -40 ... +150°C)



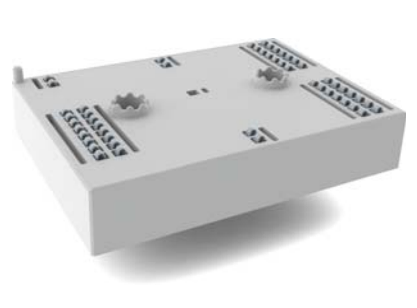
GB

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	388	A
	T_j = 175 °C	T_s = 70 °C	312	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	580	A
	T_j = 175 °C	T_s = 70 °C	473	A
I_{Cnom}			400	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		1200	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	363	A
	T_j = 175 °C	T_s = 70 °C	287	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	422	A
	T_j = 175 °C	T_s = 70 °C	335	A
I_{Fnom}			400	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		1200	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		1980	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 20 A per spring		280	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 = 400 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.80	2.05	V
		T_j = 150 °C		2.20	2.40	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V	T_j = 25 °C		2.5	2.9	mΩ
	chiplevel	T_j = 150 °C		3.8	4.0	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 15.2 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V	T_j = 25 °C		0.1	0.3	mA
	V_{CE} = 1200 V			-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		24.60		nF
C_{oes}		f = 1 MHz		1.62		nF
C_{res}		f = 1 MHz		1.38		nF
Q_G	- 8 V...+ 15 V			2260		nC
R_{Gint}	T_j = 25 °C			1.9		Ω
$t_{d(on)}$	V_{CC} = 600 V	T_j = 150 °C		183		ns
t_r	I_C = 400 A	T_j = 150 °C		62		ns
E_{on}	$R_{G\,on}$ = 1.5 Ω $R_{G\,off}$ = 1.5 Ω	T_j = 150 °C		20.8		mJ
$t_{d(off)}$	di/dt_{on} = 6940 A/µs	T_j = 150 °C		520		ns
t_f	di/dt_{off} = 2930 A/µs	T_j = 150 °C		118		ns
E_{off}	V_{GE} = +15/-15 V L_s = 25 nH	T_j = 150 °C		49.7		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.16		K/W



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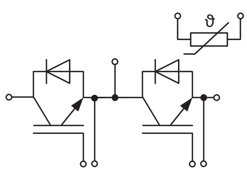


GB

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverter - IGBT						
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.08		K/W
Inverse - Diode						
$V_F = V_{EC}$	I_F = 400 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.20	2.52	V
		T_j = 150 °C		2.15	2.47	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		2.3	2.6	mΩ
		T_j = 150 °C		3.1	3.4	mΩ
I_{RRM}	I_F = 400 A di/dt$_{off}$ = 6840 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		425		A
Q_{rr}		T_j = 150 °C		63.2		µC
E_{rr}		T_j = 150 °C		30.2		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.19		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.15		K/W
Module						
L_{CE}				15		nH
M_s	to heat sink		2		2.5	Nm
w				76		g
Temperature Sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ)			493 ± 5%		Ω
$B_{25/85}$	$R_{(T)}=R_{25}$*exp[$B_{25/85}$*(1/T-1/298)], [T]=K			3420		K

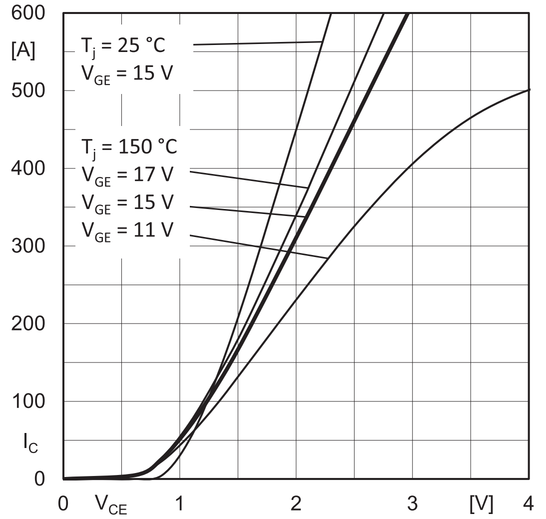


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

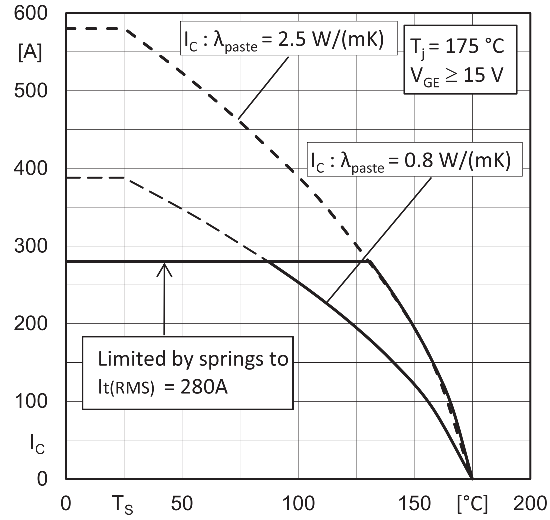


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

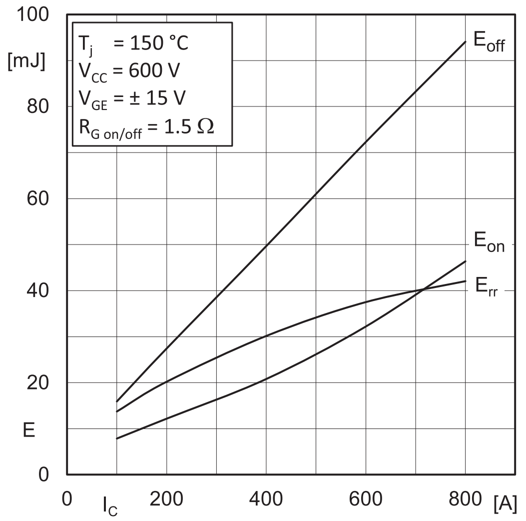


Fig. 3: Typ. turn-on /-off energy = f (I_C)

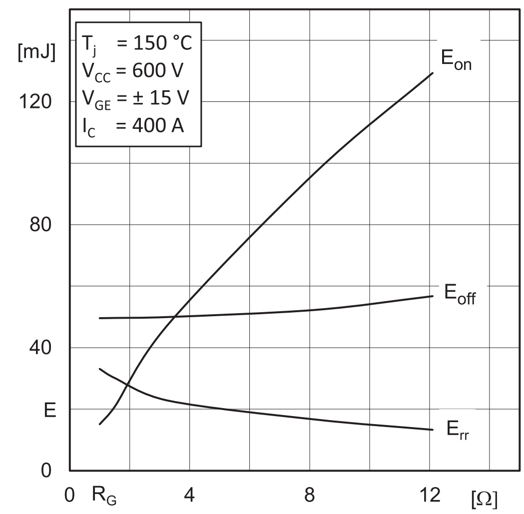


Fig. 4: Typ. turn-on /-off energy = f (R_G)

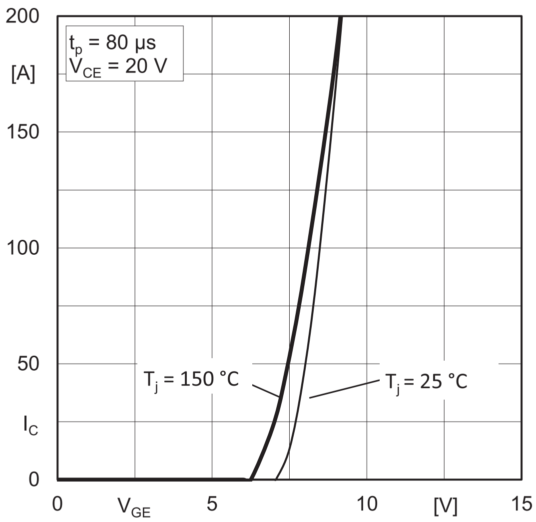


Fig. 5: Typ. transfer characteristic

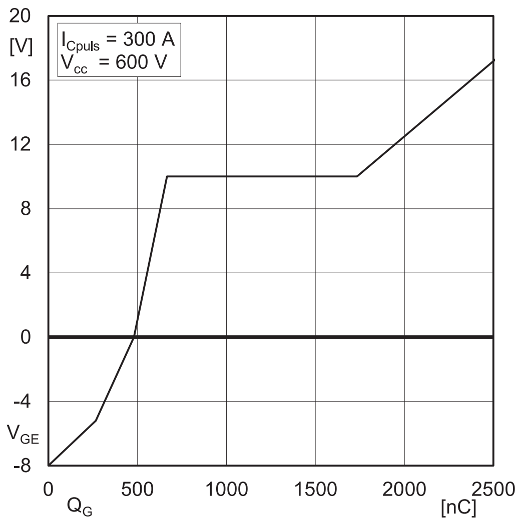


Fig. 6: Typ. gate charge characteristic

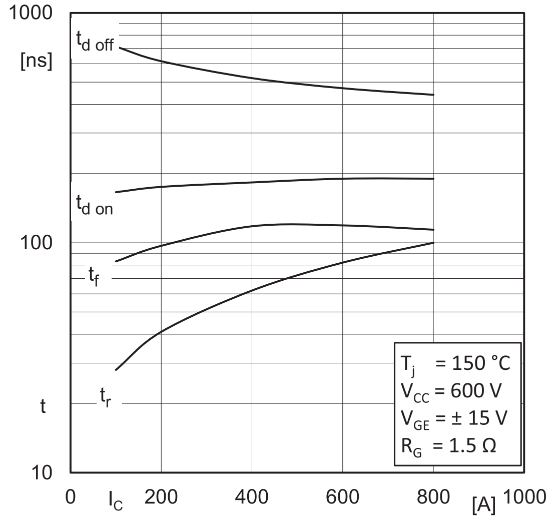


Fig. 7: Typ. switching times vs. I_C

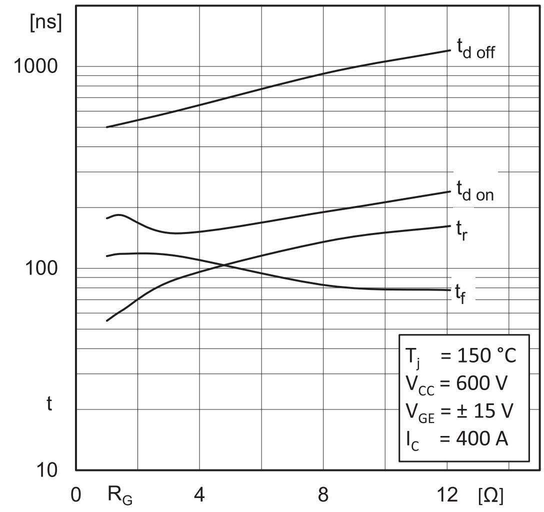


Fig. 8: Typ. switching times vs. gate resistor R_G

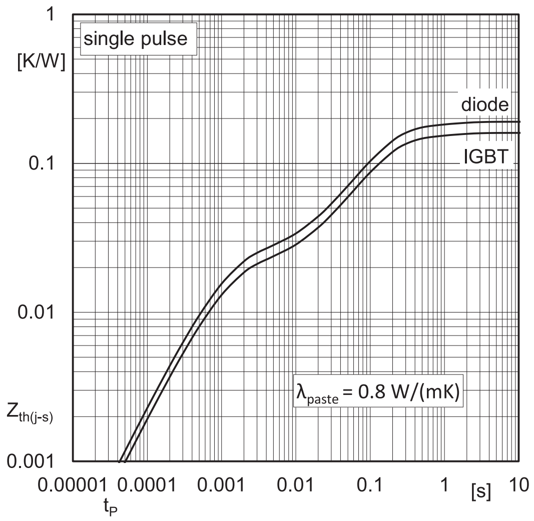


Fig. 9: Transient thermal impedance of IGBT and Diode

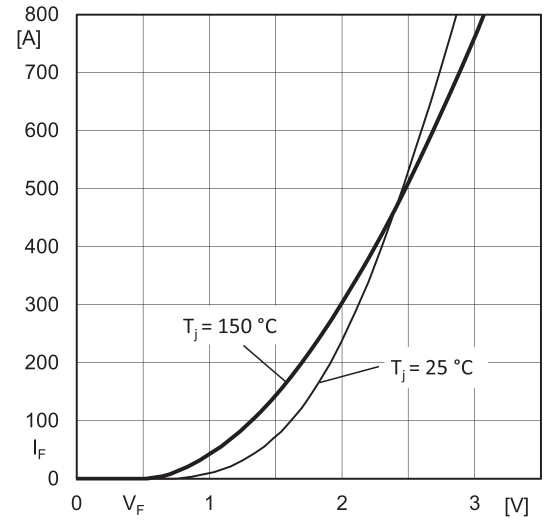


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

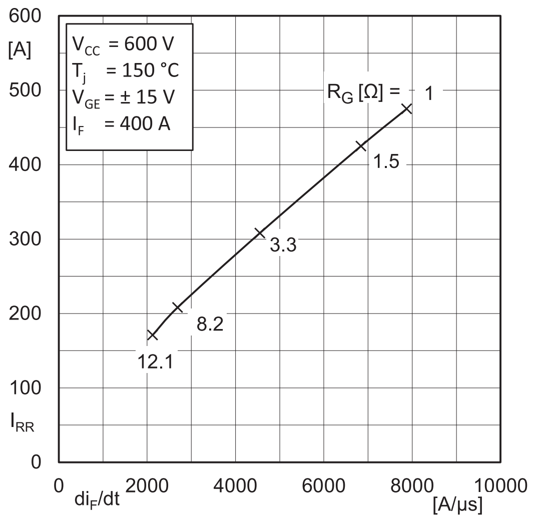


Fig. 11: Typ. CAL diode peak reverse recovery current

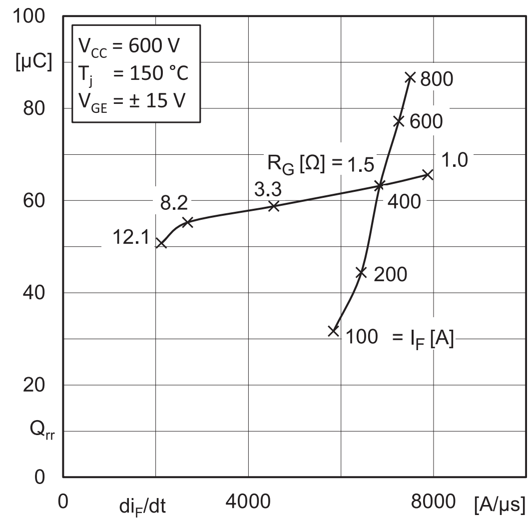
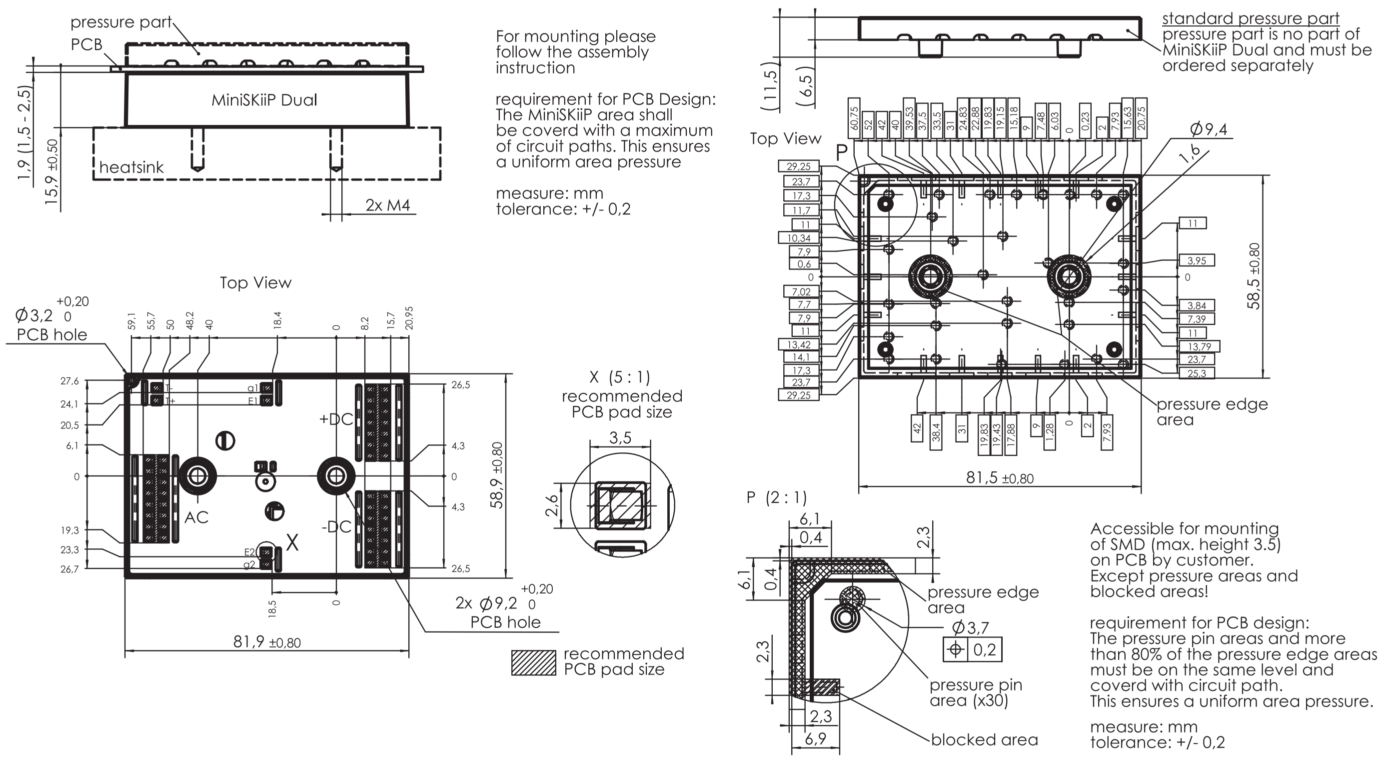
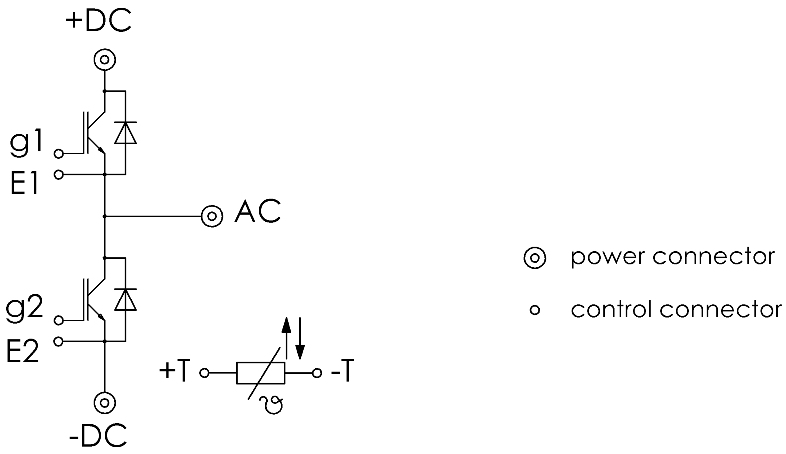


Fig. 12: Typ. CAL diode recovery charge



pinout, dimensions



pinout

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

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