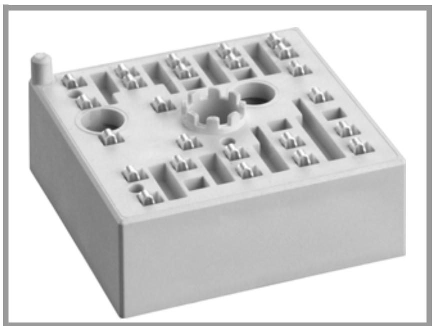
SKiiP 11ACC12T4V10



MiniSKiiP® 1

SKiiP 11ACC12T4V10

Features

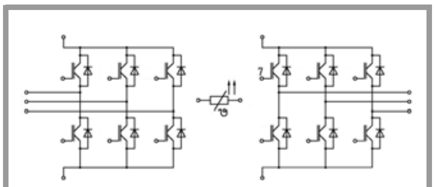
- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

- 4Q inverters

Remarks

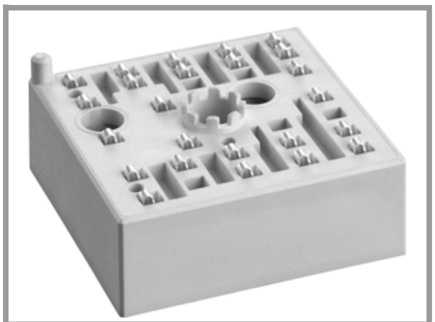
- Case temperature limited to T_C= 125°C max.; $T_C = T_S$ (for baseplateless modules)
- Recommended T_{op}=-40...+125°C
- Short circuit behaviour of one leg must be verified in the final application



ACC

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT 1 - 6				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_s = 25 °C	6	A
		T_s = 70 °C	6	A
I_C	T_j = 175 °C	T_s = 25 °C	6	A
		T_s = 70 °C	6	A
I_{Cnom}			4	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		12	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
IGBT 7 - 12				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_s = 25 °C	12	A
		T_s = 70 °C	12	A
I_C	T_j = 175 °C	T_s = 25 °C	12	A
		T_s = 70 °C	12	A
I_{Cnom}			8	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		24	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Diode 1 - 6				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 125 °C	T_s = 25 °C	7.5	A
		T_s = 70 °C	7.5	A
I_F	T_j = 150 °C	T_s = 25 °C	7.5	A
		T_s = 70 °C	7.5	A
I_{Fnom}			5	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		10	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		55	A
T_j			-40 ... 150	°C
Diode 7 - 12				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 150 °C	T_s = 25 °C	14	A
		T_s = 70 °C	11	A
I_F	T_j = 175 °C	T_s = 25 °C	15	A
		T_s = 70 °C	12	A
I_{Fnom}			8	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		24	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		36	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	20A per spring		20	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50Hz, 1 min		2500	V



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SKiiP 11ACC12T4V10

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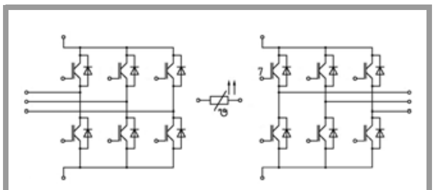
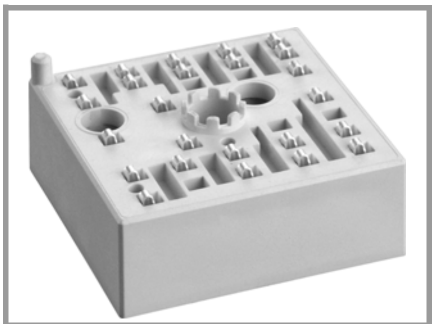


ACC

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT 1 - 6						
$V_{CE(sat)}$	I_C = 4 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.25	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		0.8	0.9	V
		T_j = 150 °C		0.7	0.8	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		263	300	mΩ
		T_j = 150 °C		388	413	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE} V, I_C = 1 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C		0.1	0.3	mA
						mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		0.25		nF
C_{oes}		f = 1 MHz		0.03		nF
C_{res}		f = 1 MHz		0.01		nF
Q_G	V_{GE} = - 8 V...+ 15 V			23		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 4 A $R_{G\,on}$ = 62 Ω $R_{G\,off}$ = 62 Ω di/dt$_{on}$ = 190 A/µs di/dt$_{off}$ = 58 A/µs V_{GE} = +15/-15 V	T_j = 125 °C		31		ns
t_r		T_j = 125 °C		20		ns
E_{on}		T_j = 125 °C		0.5		mJ
$t_{d(off)}$		T_j = 125 °C		135		ns
t_f		T_j = 125 °C		170		ns
E_{off}		T_j = 125 °C		0.3		mJ
$R_{th(j-s)}$	per IGBT			2.49		K/W
IGBT 7 - 12						
$V_{CE(sat)}$	I_C = 8 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.25	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		0.8	0.9	V
		T_j = 150 °C		0.7	0.8	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		131	150	mΩ
		T_j = 150 °C		194	206	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE} V, I_C = 1 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C		0.1	0.3	mA
						mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		0.49		nF
C_{oes}		f = 1 MHz		0.05		nF
C_{res}		f = 1 MHz		0.03		nF
Q_G	V_{GE} = - 8 V...+ 15 V			45		nC
R_{Gint}	T_j = 25 °C			0.00		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 8 A $R_{G\,on}$ = 47 Ω $R_{G\,off}$ = 47 Ω di/dt$_{on}$ = 220 A/µs di/dt$_{off}$ = 100 A/µs V_{GE} = +15/-15 V	T_j = 150 °C		31		ns
t_r		T_j = 150 °C		31		ns
E_{on}		T_j = 150 °C		0.9		mJ
$t_{d(off)}$		T_j = 150 °C		285		ns
t_f		T_j = 150 °C		70		ns
E_{off}		T_j = 150 °C		0.7		mJ
$R_{th(j-s)}$	per IGBT			1.84		K/W



MiniSKiiP® 1

SKiiP 11ACC12T4V10

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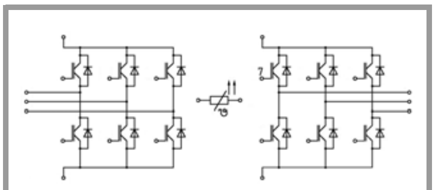
Remarks

- Case temperature limited to T_C= 125°C max.; T_C = T_S (for baseplateless modules)
- Recommended T_{op}=-40...+125°C
- Short circuit behaviour of one leg must be verified in the final application

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 1 - 6						
V_F = V_{EC}	I_F = 5 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.6	1.8	V
		T_j = 125 °C		1.6	1.8	V
V_{F0}	chiplevel	T_j = 25 °C		1.0	1.1	V
		T_j = 125 °C		0.8	0.9	V
r_F	chiplevel	T_j = 25 °C		120	140	mΩ
		T_j = 125 °C		160	180	mΩ
I_{RRM}	I_F = 4 A di/dt$_{off}$ = 260 A/µs V_{GE} = -15 V V_R = 600 V	T_j = 125 °C		5.5		A
Q_{rr}		T_j = 125 °C		1.1		µC
E_{rr}		T_j = 125 °C		0.4		mJ
$R_{th(j-s)}$	per Diode			2.5		K/W
Diode 7 - 12						
V_F = V_{EC}	I_F = 8 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.3	2.6	V
		T_j = 150 °C		2.4	2.7	V
V_{F0}	chiplevel	T_j = 25 °C		1.3	1.5	V
		T_j = 150 °C		0.9	1.1	V
r_F	chiplevel	T_j = 25 °C		129	144	mΩ
		T_j = 150 °C		181	198	mΩ
I_{RRM}	I_F = 8 A di/dt$_{off}$ = 380 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		8.3		A
Q_{rr}		T_j = 150 °C		1.4		µC
E_{rr}		T_j = 150 °C		0.6		mJ
$R_{th(j-s)}$	per Diode			2.53		K/W
Module						
M_s	to heat sink		2		2.5	Nm
w				30		g
Temperature Sensor						
R_{100}	T_r=100°C (R_{25}=1000Ω)			1670 ± 3%		Ω
R(T)	R(T)=1000Ω[1+A(T-25°C)+B(T-25°C)^2], A = 7.635*10^{-3} °C^{-1}, B = 1.731*10^{-5} °C^{-2}					



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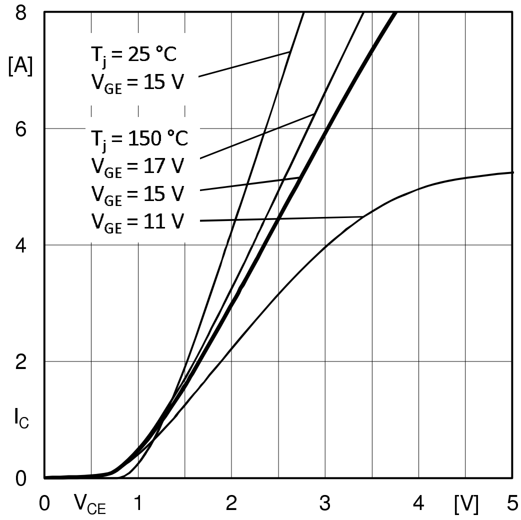
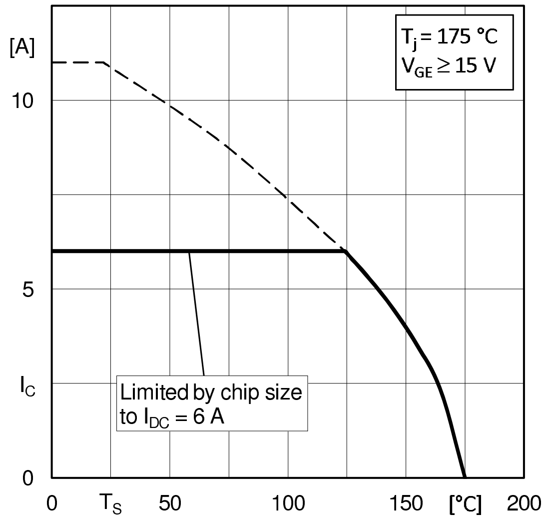
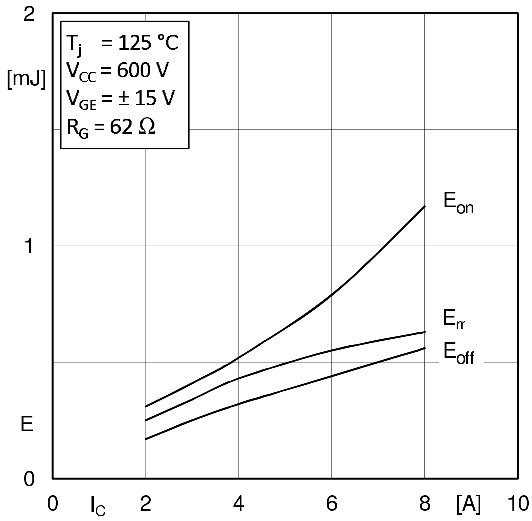


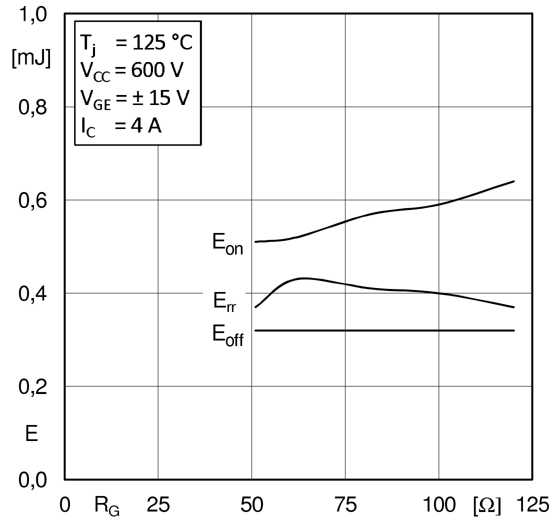
IGBT 1-6 - Fig. 1:
Typ. output characteristic



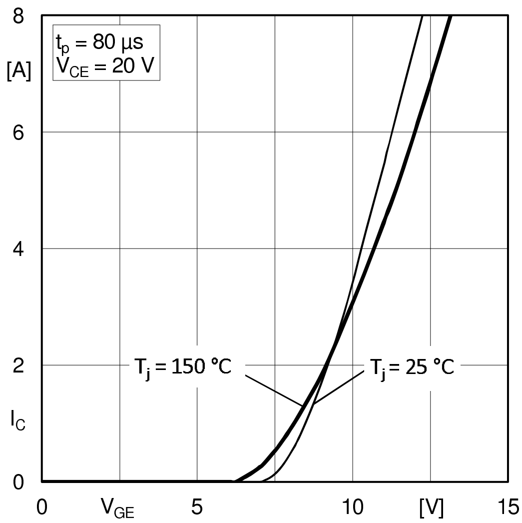
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



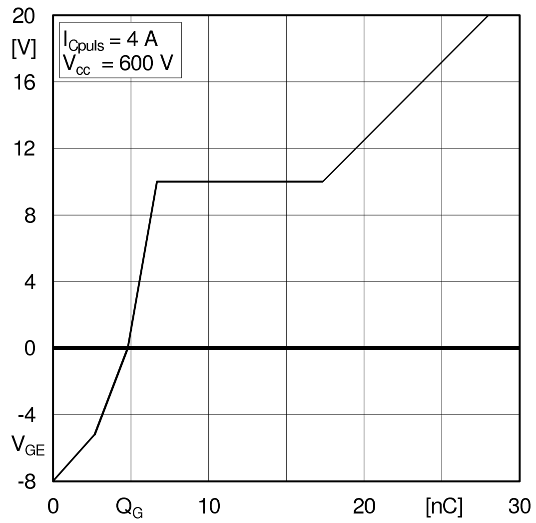
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



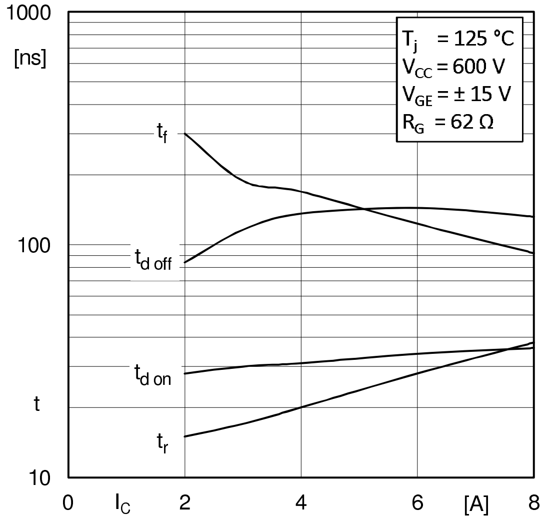
IGBT 1-6 - Fig. 4:
Typ. turn-on /-off energy = $f(R_G)$



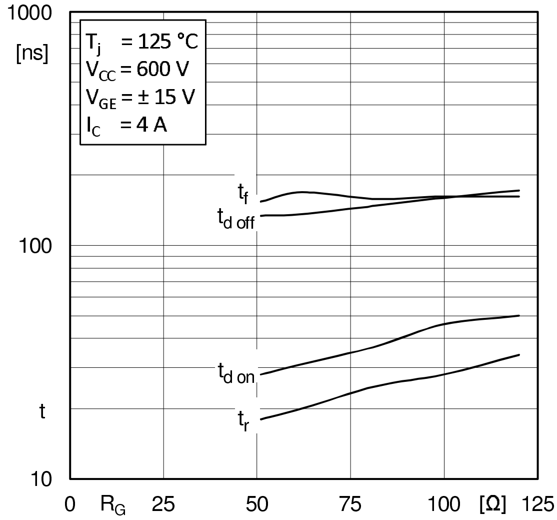
IGBT 1-6 - Fig. 5:
Typ. transfer characteristic



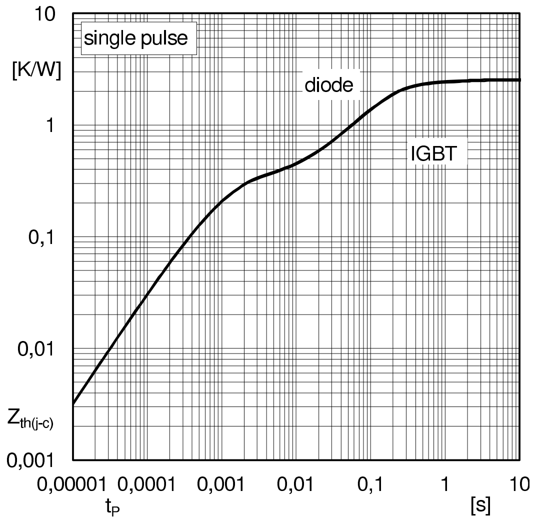
IGBT 1-6 - Fig. 6:
Typ. gate charge characteristic



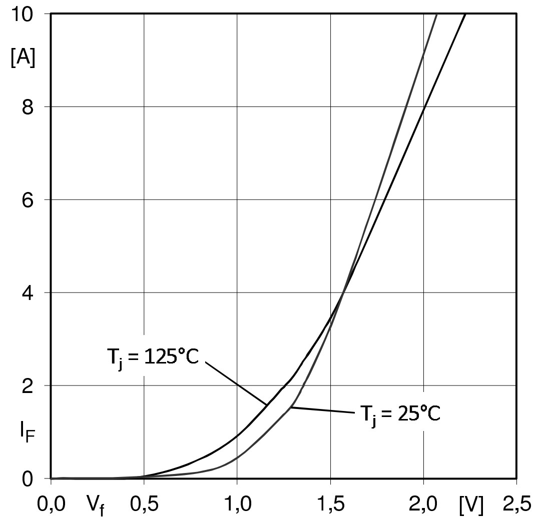
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



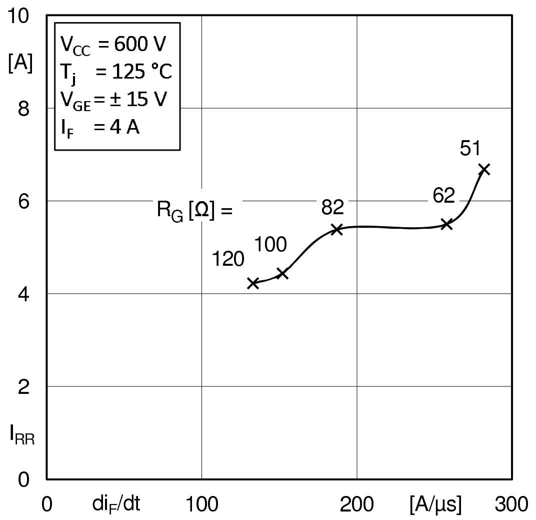
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



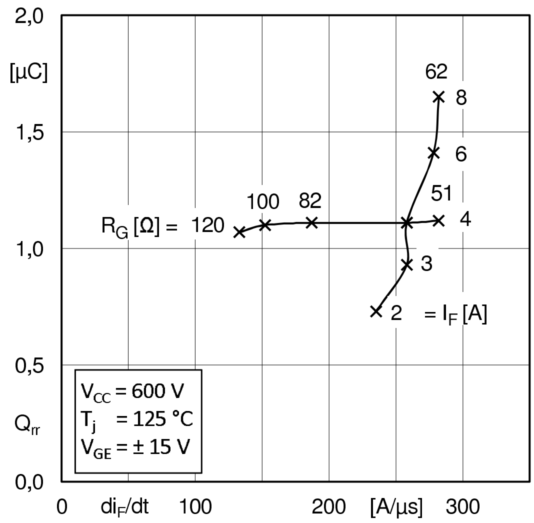
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



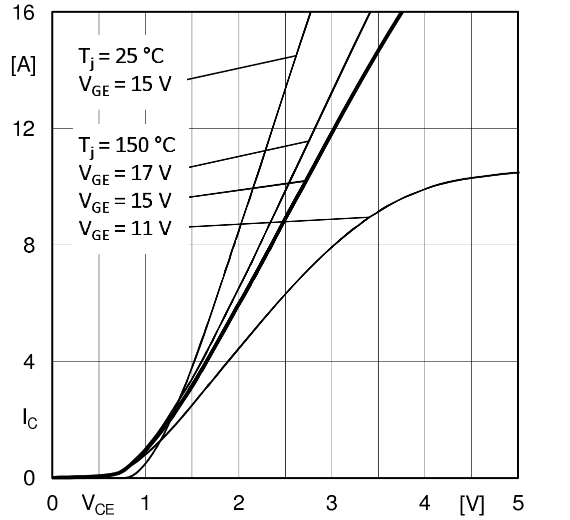
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



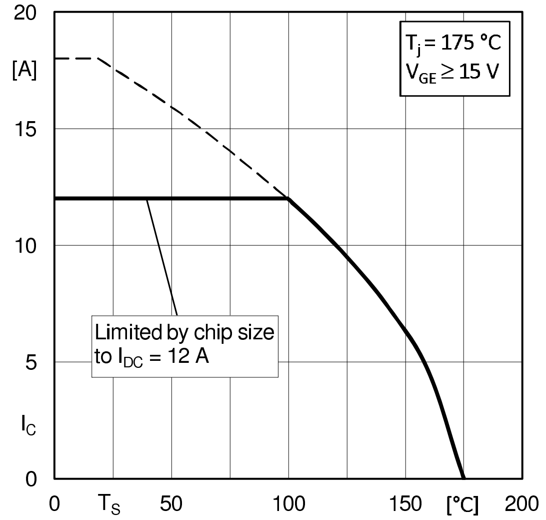
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



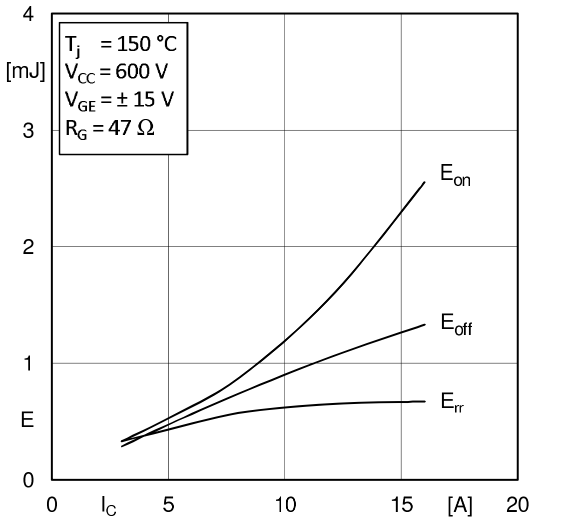
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



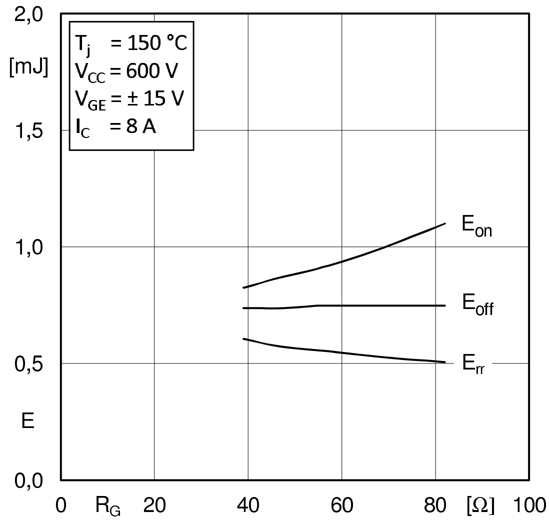
IGBT 7-12 - Fig. 1:
Typ. output characteristic



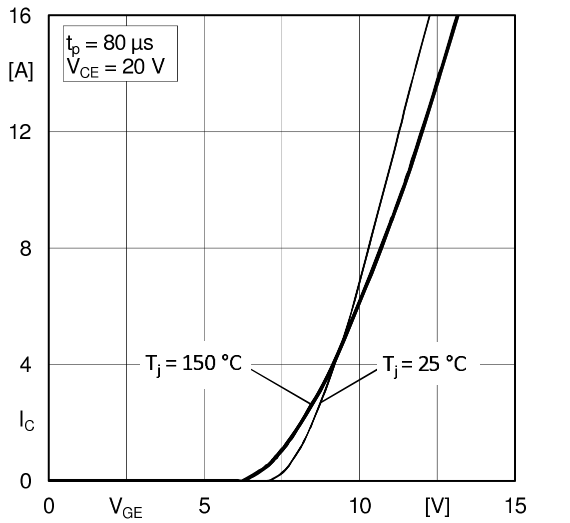
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



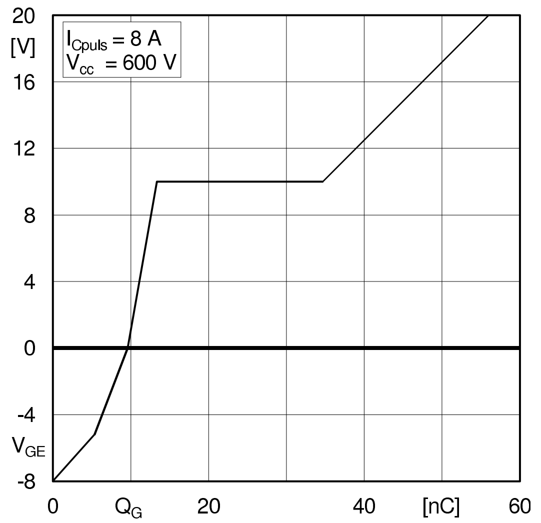
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



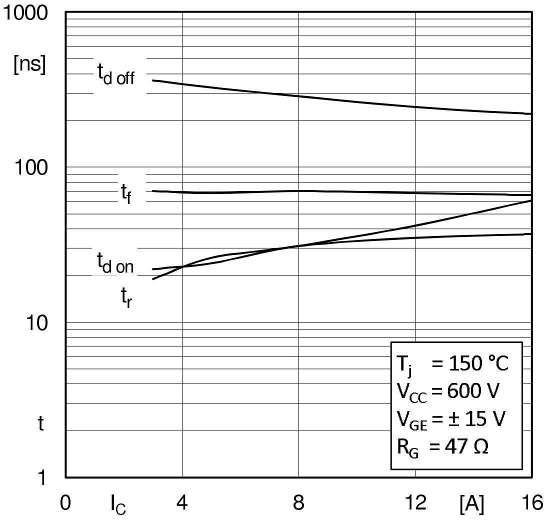
IGBT 7-12 - Fig. 4:
Typ. turn-on / -off energy = $f(R_G)$



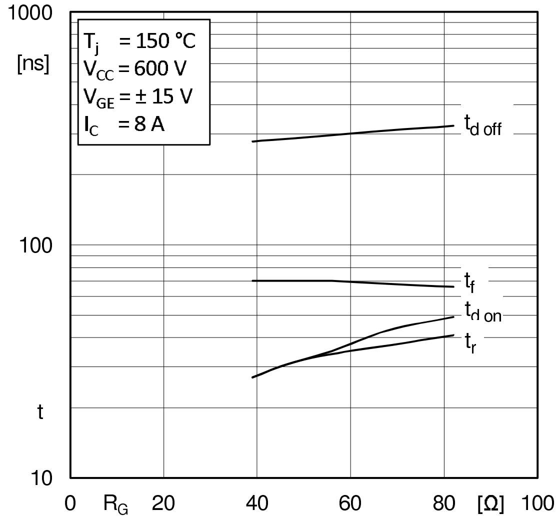
IGBT 7-12 - Fig. 5:
Typ. transfer characteristic



IGBT 7-12 - Fig. 6:
Typ. gate charge characteristic



IGBT 7-12 - Fig. 7:
Typ. switching times vs. I_C



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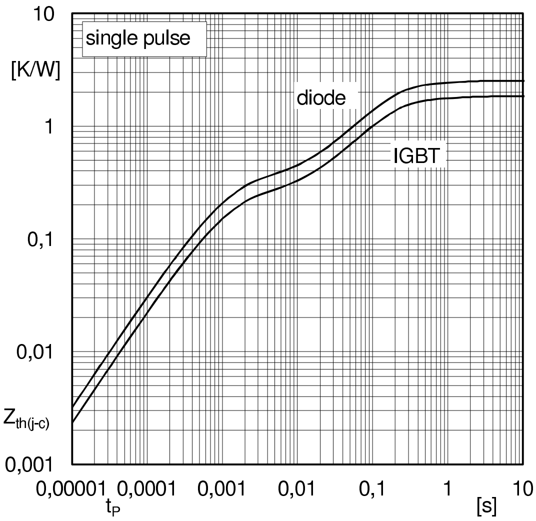

IGBT 7-12 - Fig. 9:
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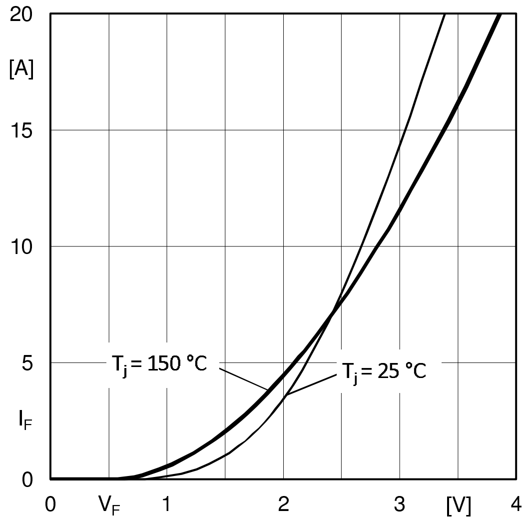
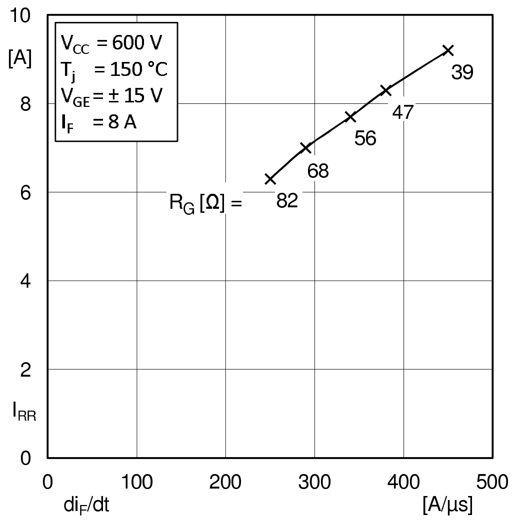
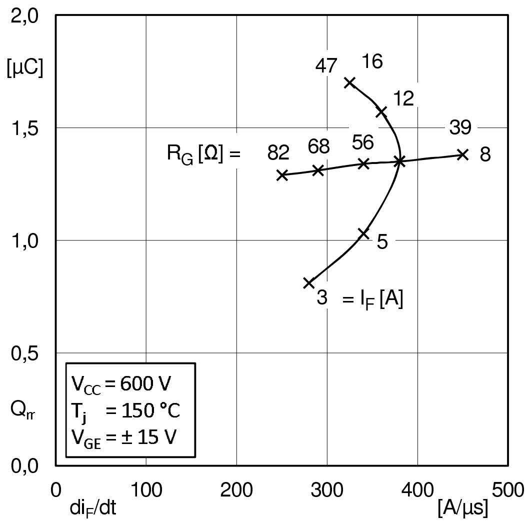


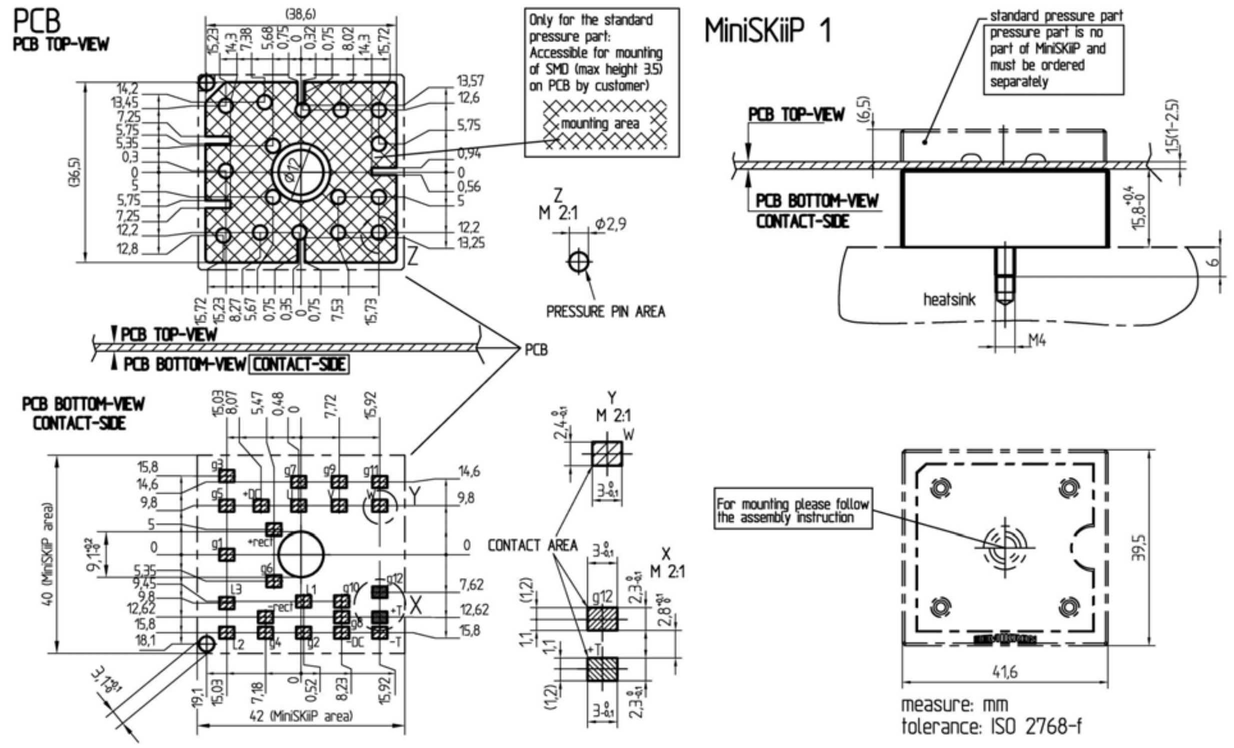
IGBT 7-12 - Fig. 10:
CAL diode forward characteristic



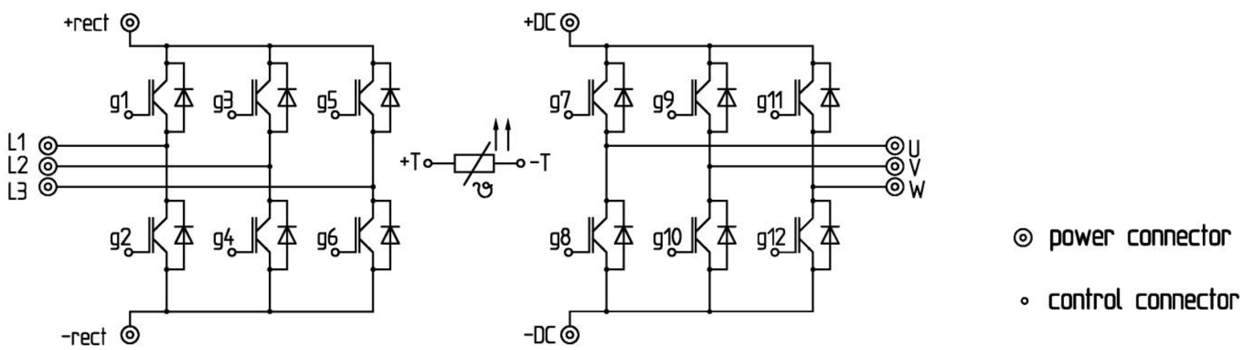
IGBT 7-12 - Fig. 11:
Typ. CAL diode peak reverse recovery current



IGBT 7-12 - 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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.