

SKiiP 11ACC12T4V10



MiniSKiiP® 1

SKiiP 11ACC12T4V10

Features

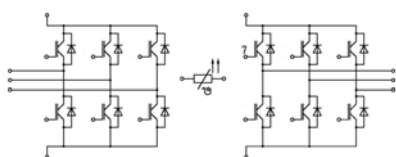
- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

- 4Q inverters

Remarks

- Case temperature limited to $T_C = 125^\circ\text{C}$ max.; $T_C = T_S$ (for baseplateless modules)
- Recommended $T_{op} = -40 \dots +125^\circ\text{C}$
- 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} ≤ 15 V V _{CES} ≤ 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} ≤ 15 V V _{CES} ≤ 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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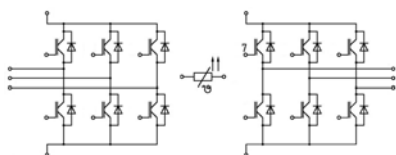
Typical Applications*

- 4Q inverters

Remarks

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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1 - 6						
V _{CE(sat)}	I _C = 4 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chiplevel	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	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		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	T _j = 125 °C		31		ns
t _r	I _C = 4 A	T _j = 125 °C		20		ns
E _{on}	R _{G on} = 62 Ω	T _j = 125 °C		0.5		mJ
	R _{G off} = 62 Ω	T _j = 125 °C				
t _{d(off)}	di/dt _{on} = 190 A/μs			135		ns
t _f	di/dt _{off} = 58 A/μs	T _j = 125 °C		170		ns
E _{off}	V _{GE} = +15/-15 V	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	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chiplevel	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	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		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	T _j = 150 °C		31		ns
t _r	I _C = 8 A	T _j = 150 °C		31		ns
E _{on}	R _{G on} = 47 Ω	T _j = 150 °C		0.9		mJ
	R _{G off} = 47 Ω	T _j = 150 °C				
t _{d(off)}	di/dt _{on} = 220 A/μs			285		ns
t _f	di/dt _{off} = 100 A/μs	T _j = 150 °C		70		ns
E _{off}	V _{GE} = +15/-15 V	T _j = 150 °C		0.7		mJ
R _{th(j-s)}	per IGBT			1.84		K/W



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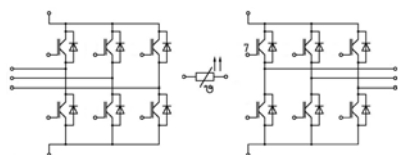
Typical Applications*

- 4Q inverters

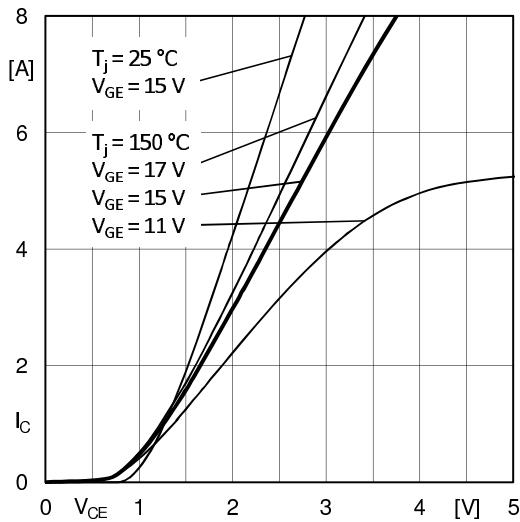
Remarks

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

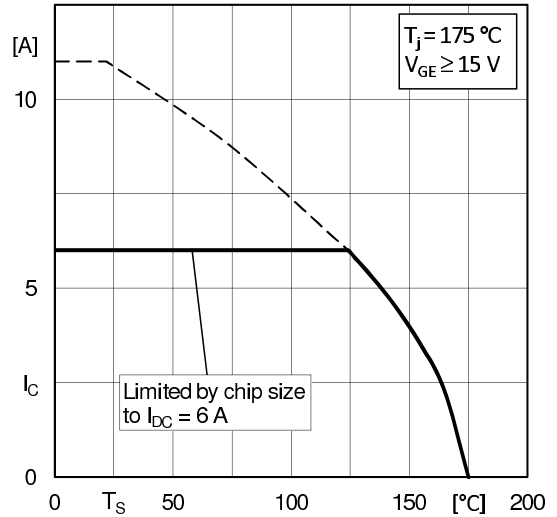
Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1 - 6						
V _F = V _{EC}	I _F = 5 A	T _j = 25 °C		1.6	1.8	V
	V _{GE} = 0 V chipelevel	T _j = 125 °C		1.6	1.8	V
V _{F0}	chipelevel	T _j = 25 °C		1.0	1.1	V
		T _j = 125 °C		0.8	0.9	V
r _F	chipelevel	T _j = 25 °C		120	140	mΩ
		T _j = 125 °C		160	180	mΩ
I _{RRM}	I _F = 4 A	T _j = 125 °C		5.5		A
Q _{rr}	di/dt _{off} = 260 A/μs	T _j = 125 °C		1.1		μC
E _{rr}	V _{GE} = -15 V	T _j = 125 °C		0.4		mJ
	V _R = 600 V					
R _{th(j-s)}	per Diode			2.5		K/W
Diode 7 - 12						
V _F = V _{EC}	I _F = 8 A	T _j = 25 °C		2.3	2.6	V
	V _{GE} = 0 V chipelevel	T _j = 150 °C		2.4	2.7	V
V _{F0}	chipelevel	T _j = 25 °C		1.3	1.5	V
		T _j = 150 °C		0.9	1.1	V
r _F	chipelevel	T _j = 25 °C		129	144	mΩ
		T _j = 150 °C		181	198	mΩ
I _{RRM}	I _F = 8 A	T _j = 150 °C		8.3		A
Q _{rr}	di/dt _{off} = 380 A/μs	T _j = 150 °C		1.4		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		0.6		mJ
	V _{CC} = 600 V					
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					



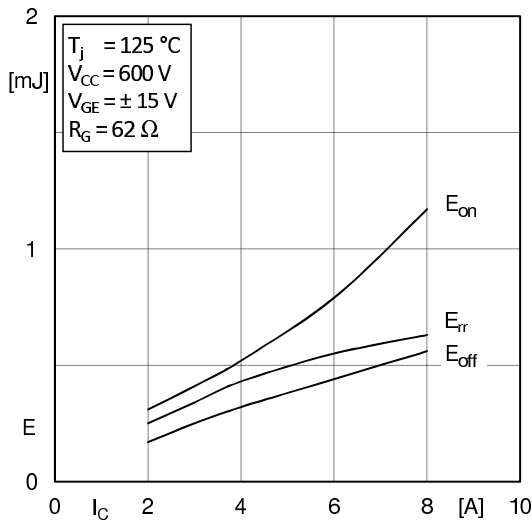
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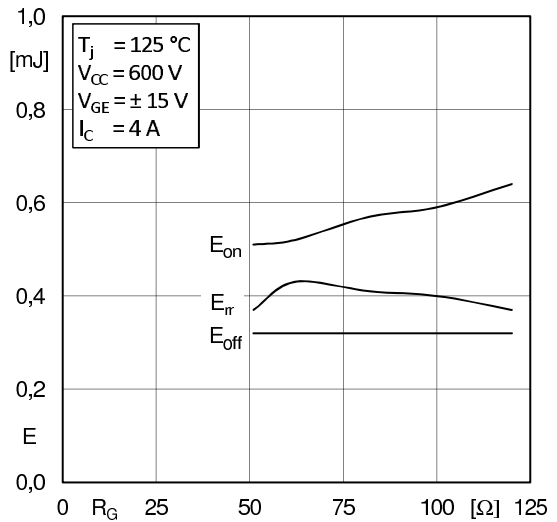
IGBT 1-6 - Fig. 1:
Typ. output characteristic



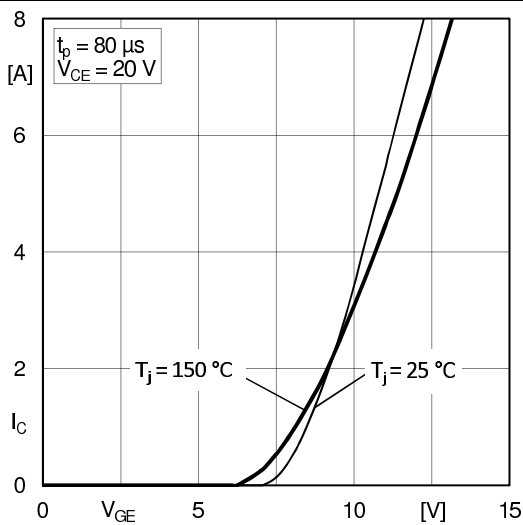
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_s)$



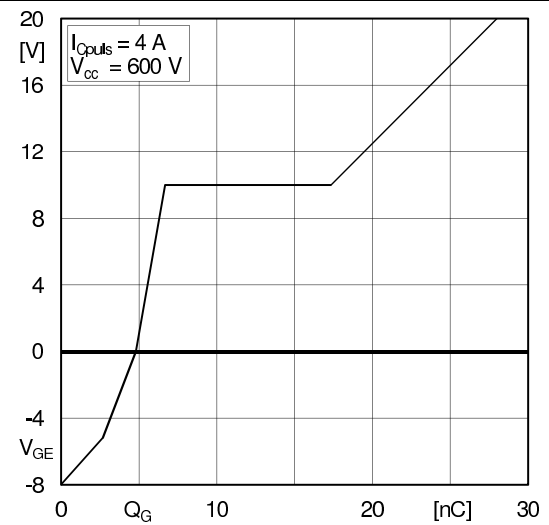
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



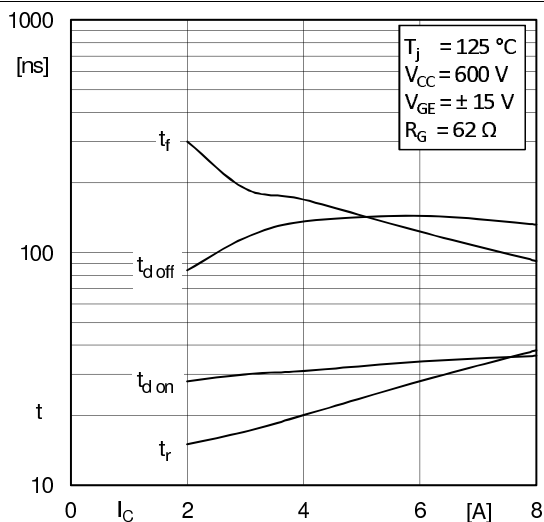
IGBT 1-6 - Fig. 4:
Typ. turn-on /-off energy = $f(R_G)$



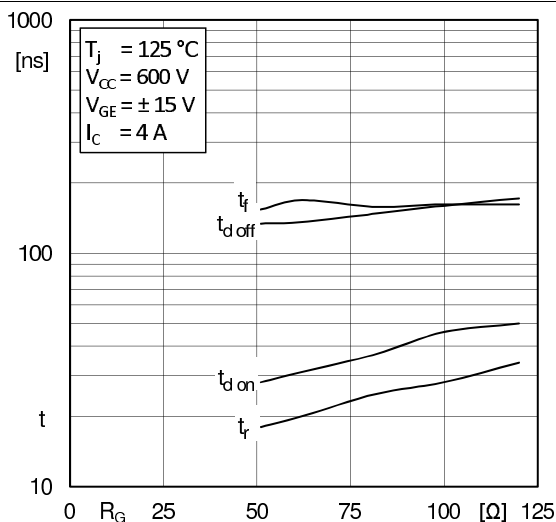
IGBT 1-6 - Fig. 5:
Typ. transfer characteristic



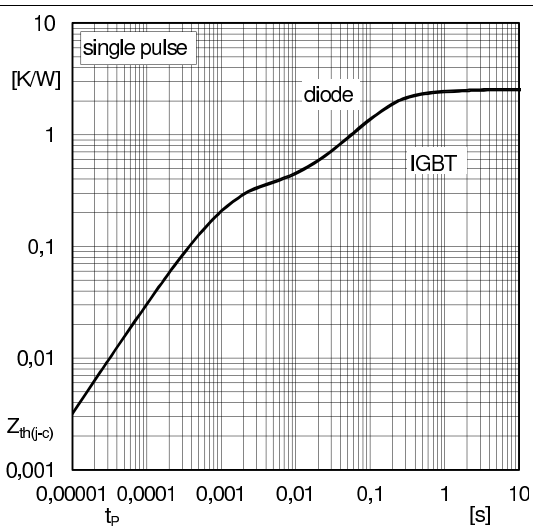
IGBT 1-6 - Fig. 6:
Typ. gate charge characteristic



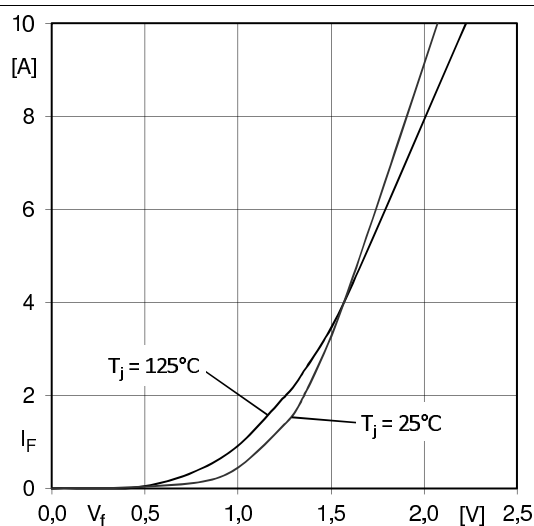
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



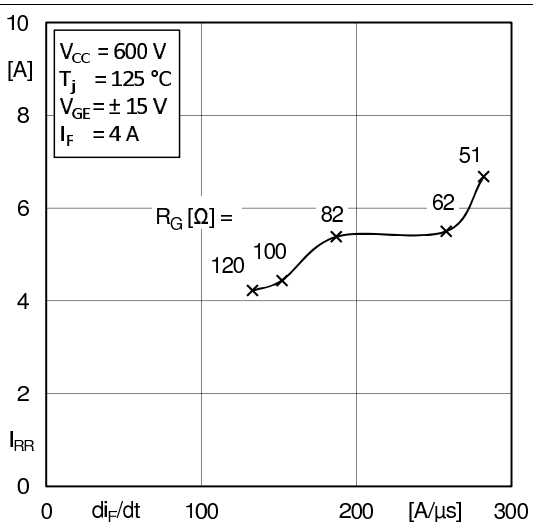
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



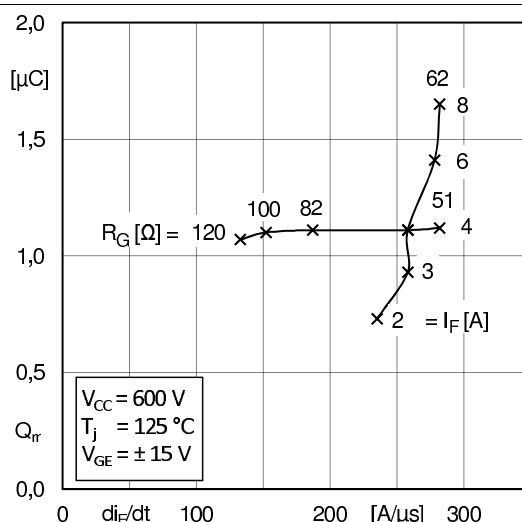
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



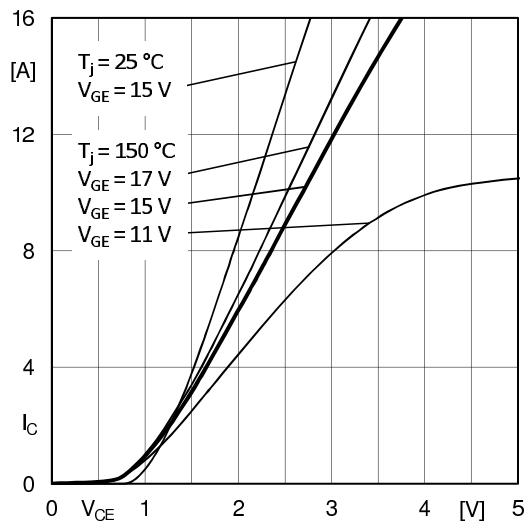
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



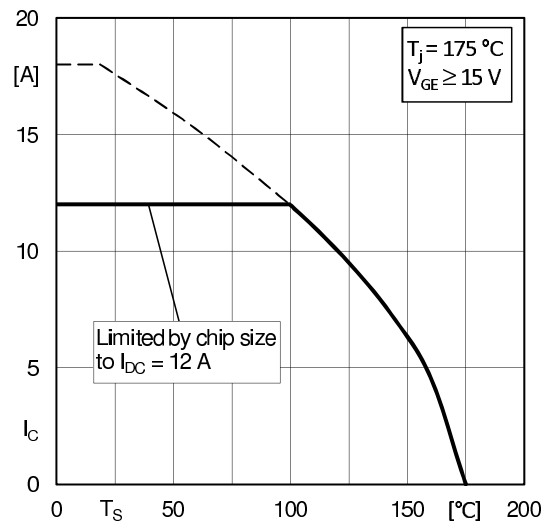
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



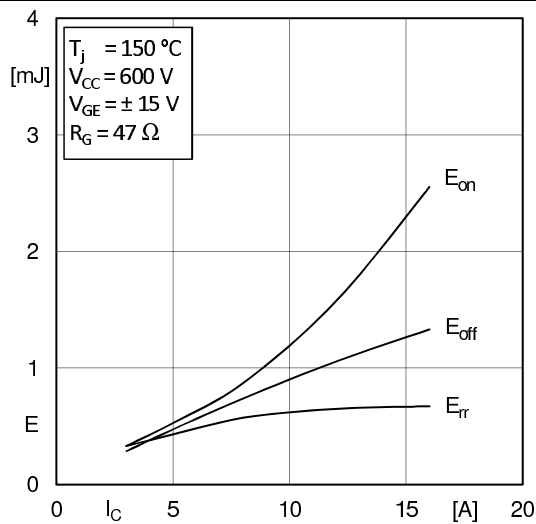
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



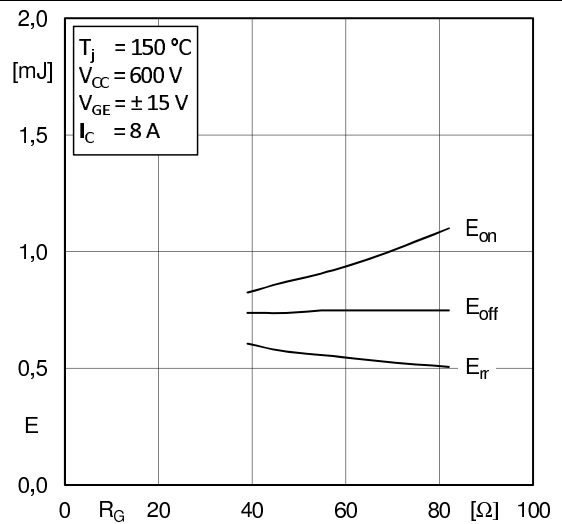
IGBT 7-12 - Fig. 1:
Typ. output characteristic



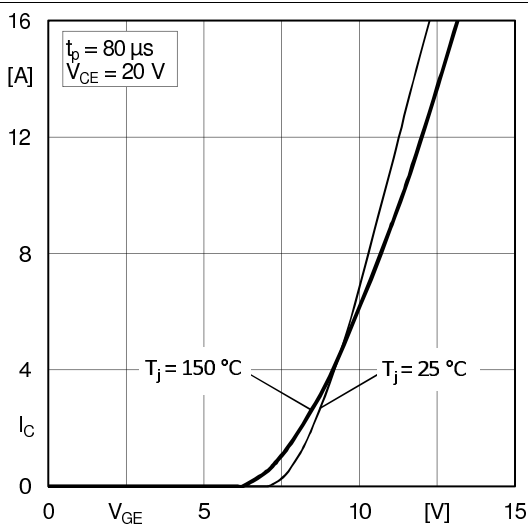
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_s)$



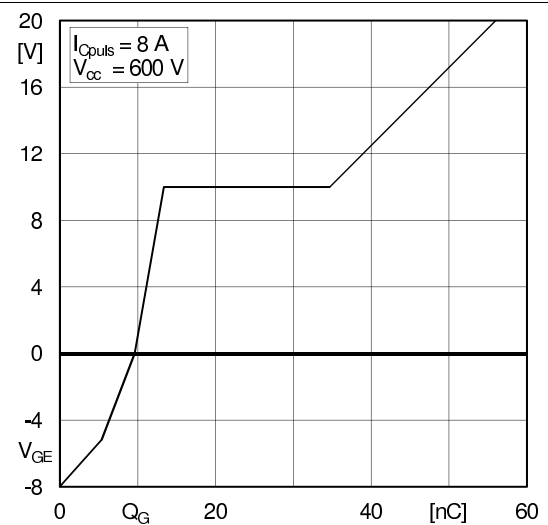
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



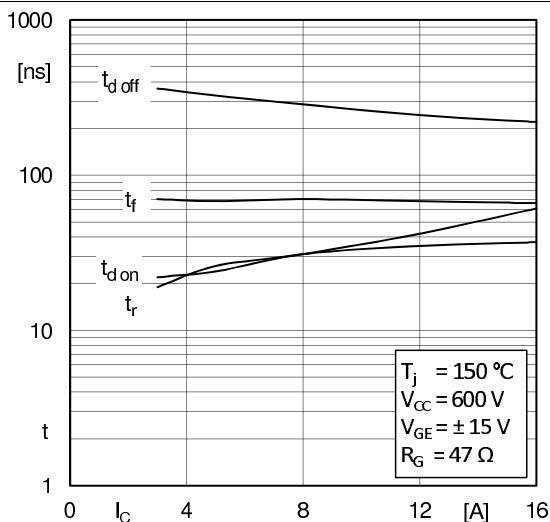
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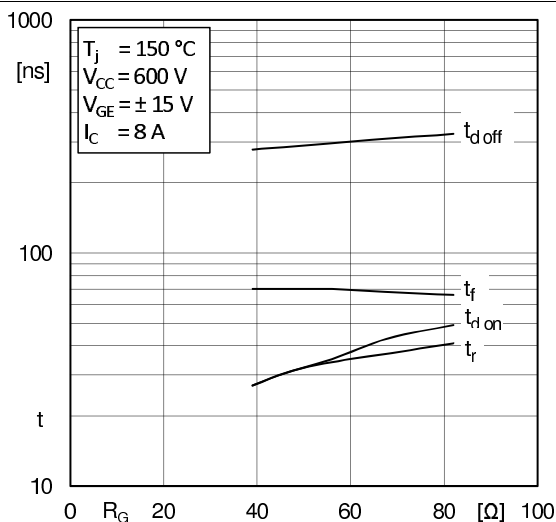
IGBT 7-12 - Fig. 5:
Typ. transfer characteristic



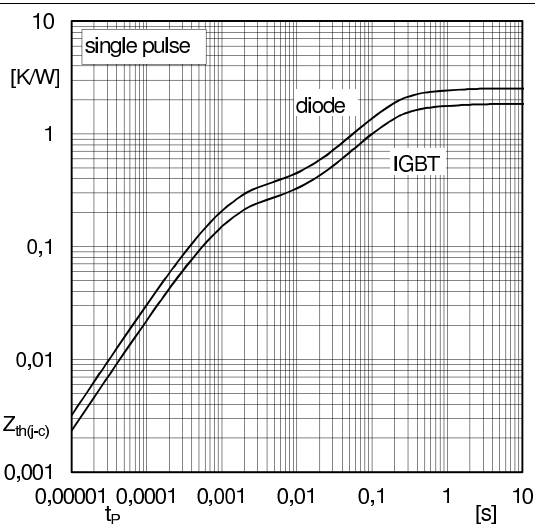
IGBT 7-12 - Fig. 6:
Typ. gate charge characteristic



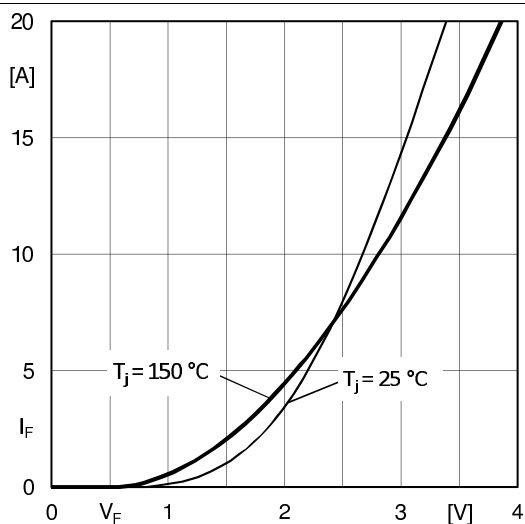
IGBT 7-12 - Fig. 7:
Typ. switching times vs. I_C



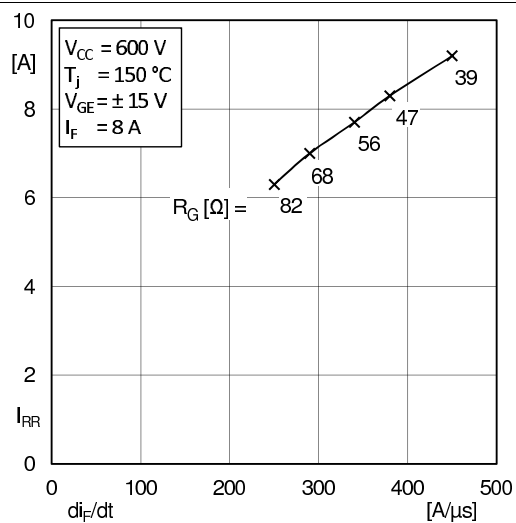
IGBT 7-12 - Fig. 8:
Typ. switching times vs. gate resistor R_G



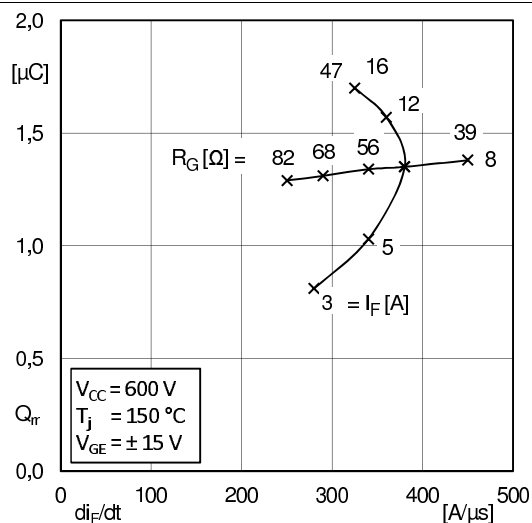
IGBT 7-12 - Fig. 9:
Transient thermal impedance of IGBT and Diode



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

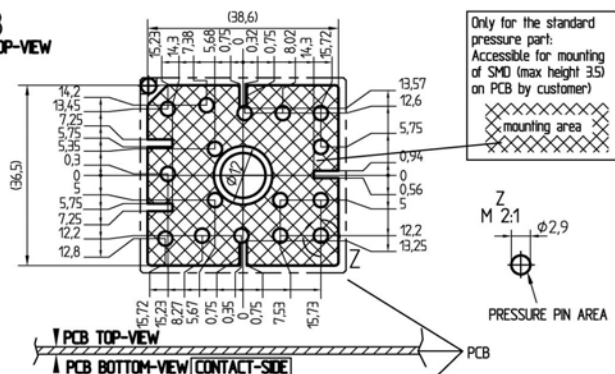


IGBT 7-12 - Fig. 11:
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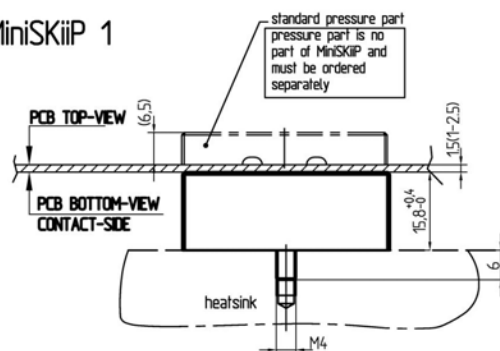


IGBT 7-12 - Fig. 12:
Typ. CAL diode recovery charge

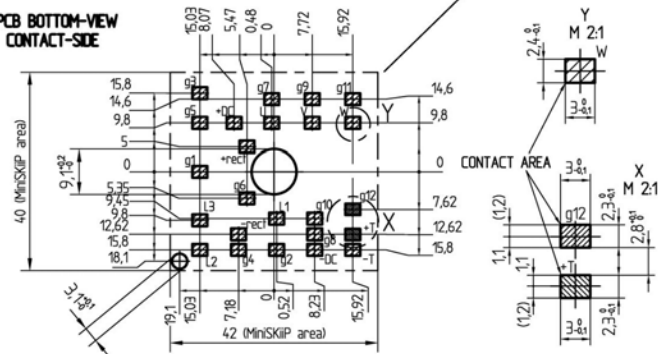
PCB
PCB TOP-VIEW



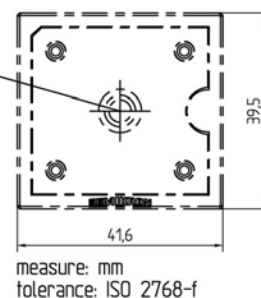
MiniSKiiP 1



PCB BOTTOM-VIEW
CONTACT-SIDE



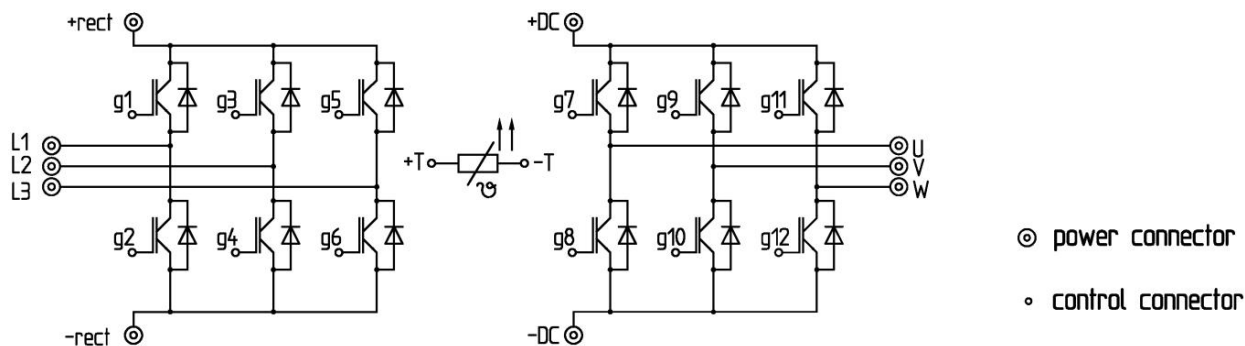
For mounting please follow the assembly instruction



measure: mm
tolerance: ISO 2768-f

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pinout, dimensions



pinout

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

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