

SKiiP 12ACC12T4V10



MiniSKiiP® 1

SKiiP 12ACC12T4V10

Features

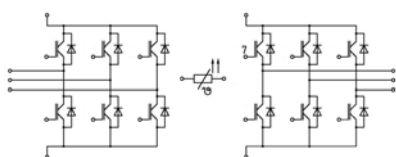
- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

- 4Q inverters

Remarks

- Case temperature limited to $T_C = 125^\circ\text{C}$ max.; $T_C = T_S$ (valid 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	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
IGBT 7 - 12				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 150 °C	T _s = 25 °C	18	A
		T _s = 70 °C	18	A
I _C	T _j = 175 °C	T _s = 25 °C	18	A
		T _s = 70 °C	18	A
I _{Cnom}			15	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		45	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	13	A
		T _s = 70 °C	9	A
I _F	T _j = 150 °C	T _s = 25 °C	14	A
		T _s = 70 °C	11	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	21	A
		T _s = 70 °C	16	A
I _F	T _j = 175 °C	T _s = 25 °C	23	A
		T _s = 70 °C	18	A
I _{Fnom}			15	A
I _{FRM}	I _{FRM} = 3 x I _{Fnom}		45	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		65	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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- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

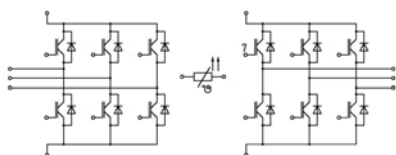
- 4Q inverters

Remarks

- Case temperature limited to $T_C = 125^\circ\text{C}$ max.; $T_C = T_S$ (valid 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 = 8 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chipelevel	T _j = 25 °C		0.8	0.9	V
		T _j = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		131	150	mΩ
	chipelevel	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		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 125 °C		30		ns
t _r	I _C = 8 A	T _j = 125 °C		25		ns
E _{on}	R _{G on} = 51 Ω	T _j = 125 °C		0.9		mJ
	R _{G off} = 51 Ω					
t _{d(off)}	di/dt _{on} = 260 A/μs	T _j = 125 °C		180		ns
t _f	di/dt _{off} = 115 A/μs	T _j = 125 °C		140		ns
E _{off}	V _{GE} = +15/-15 V	T _j = 125 °C		0.6		mJ
R _{th(j-s)}	per IGBT			1.84		K/W
IGBT 7 - 12						
V _{CE(sat)}	I _C = 15 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chipelevel	T _j = 25 °C		0.8	0.9	V
		T _j = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		70	80	mΩ
	chipelevel	T _j = 150 °C		103	110	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		0.90		nF
C _{oes}		f = 1 MHz		0.08		nF
C _{res}		f = 1 MHz		0.06		nF
Q _G	V _{GE} = - 8 V...+ 15 V			85		nC
R _{Gint}	T _j = 25 °C			0.00		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		32		ns
t _r	I _C = 15 A	T _j = 150 °C		35		ns
E _{on}	R _{G on} = 39 Ω	T _j = 150 °C		1.7		mJ
	R _{G off} = 39 Ω					
t _{d(off)}	di/dt _{on} = 800 A/μs	T _j = 150 °C		310		ns
t _f	di/dt _{off} = 300 A/μs	T _j = 150 °C		77		ns
E _{off}	V _{GE} = +15/-15 V	T _j = 150 °C		1.4		mJ
R _{th(j-s)}	per IGBT			1.3		K/W



ACC

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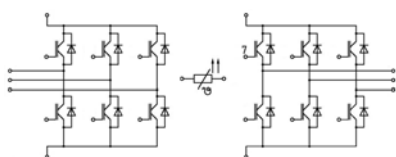
Typical Applications*

- 4Q inverters

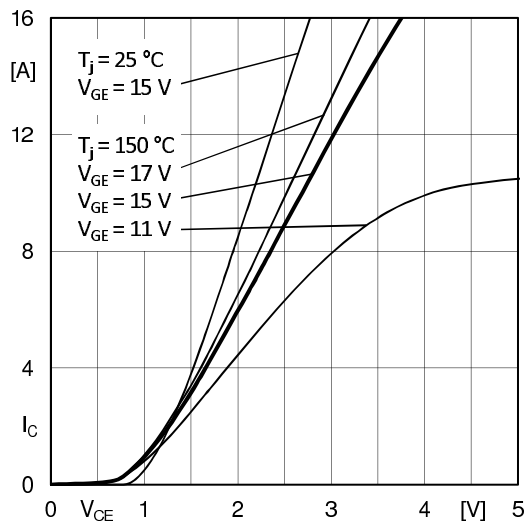
Remarks

- Case temperature limited to $T_C = 125^\circ\text{C}$ max.; $T_C = T_S$ (valid 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

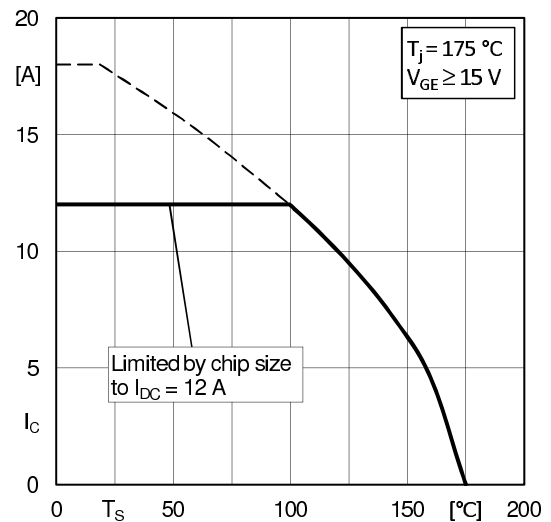
Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1 - 6						
V _F = V _{EC}	I _F = 8 A	T _j = 25 °C		2.0	2.2	V
	V _{GE} = 0 V chipelevel	T _j = 125 °C		2.1	2.3	V
V _{F0}	chipelevel	T _j = 25 °C		1.0	1.1	V
		T _j = 125 °C		0.8	0.9	V
r _F	chipelevel	T _j = 25 °C		120	140	mΩ
		T _j = 125 °C		160	180	mΩ
I _{RRM}	I _F = 8 A	T _j = 125 °C		7.7		A
Q _{rr}	di/dt _{off} = 330 A/μs	T _j = 125 °C		1.1		μC
E _{rr}	V _{GE} = -15 V	T _j = 125 °C		0.5		mJ
	V _R = 600 V					
R _{th(j-s)}	per Diode			2.5		K/W
Diode 7 - 12						
V _F = V _{EC}	I _F = 15 A	T _j = 25 °C		2.4	2.7	V
	V _{GE} = 0 V chipelevel	T _j = 150 °C		2.4	2.8	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		72	81	mΩ
		T _j = 150 °C		103	111	mΩ
I _{RRM}	I _F = 15 A	T _j = 150 °C		17		A
Q _{rr}	di/dt _{off} = 650 A/μs	T _j = 150 °C		2.5		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		1.1		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode			1.92		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					



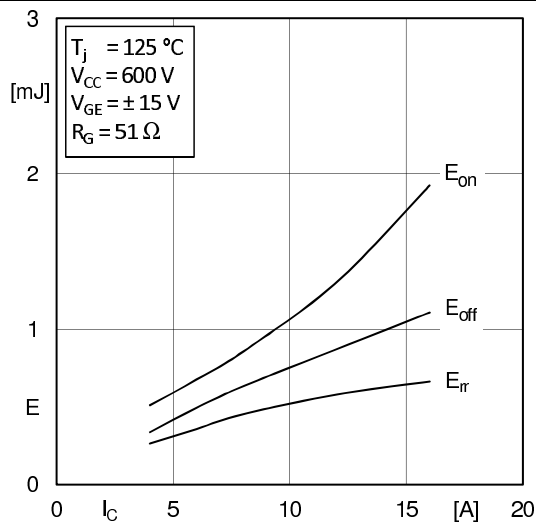
ACC



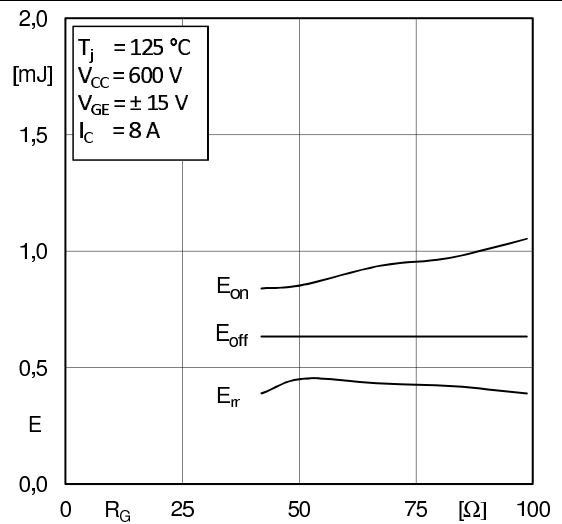
IGBT 1-6 - Fig. 1:
Typ. output characteristic



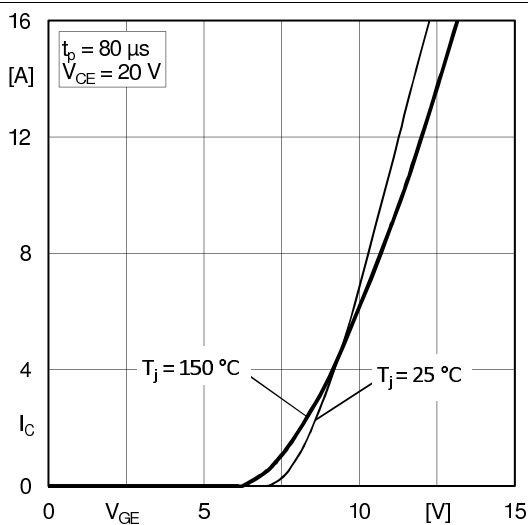
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



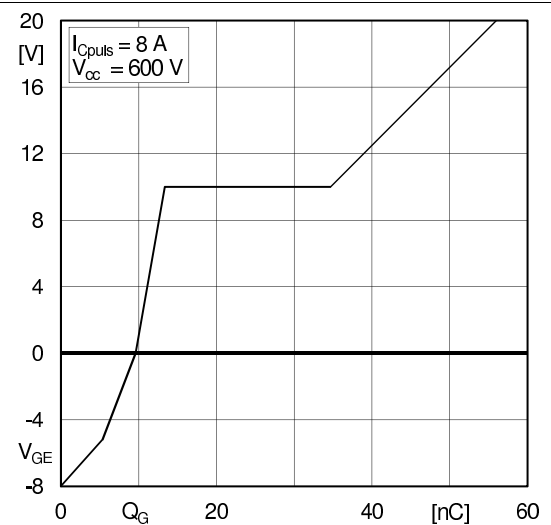
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



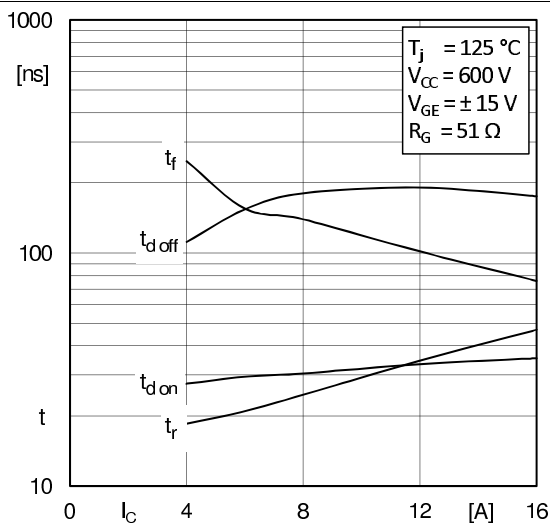
IGBT 1-6 - Fig. 4:
Typ. turn-on /-off energy = $f(R_G)$



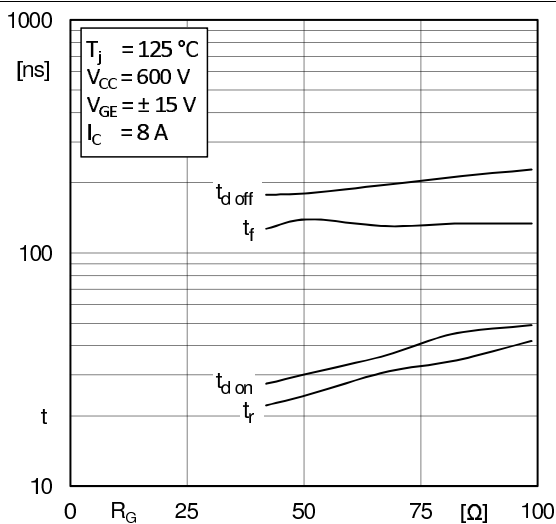
IGBT 1-6 - Fig. 5:
Typ. transfer characteristic



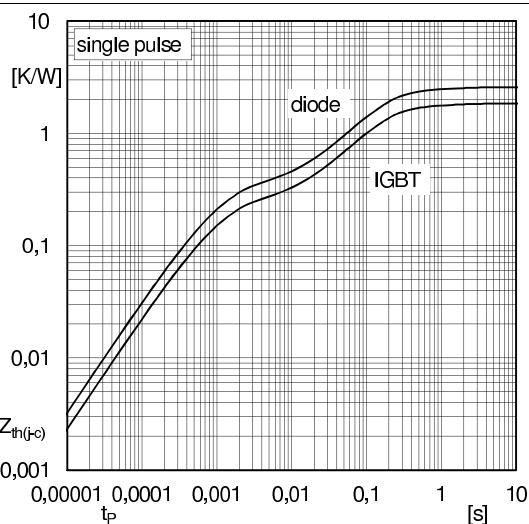
IGBT 1-6 - Fig. 6:
Typ. gate charge characteristic



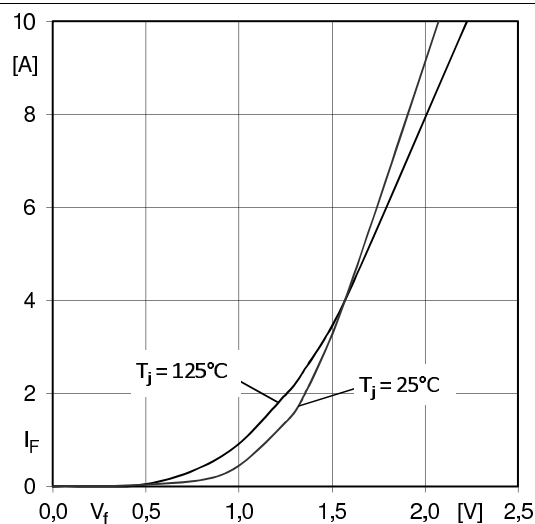
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



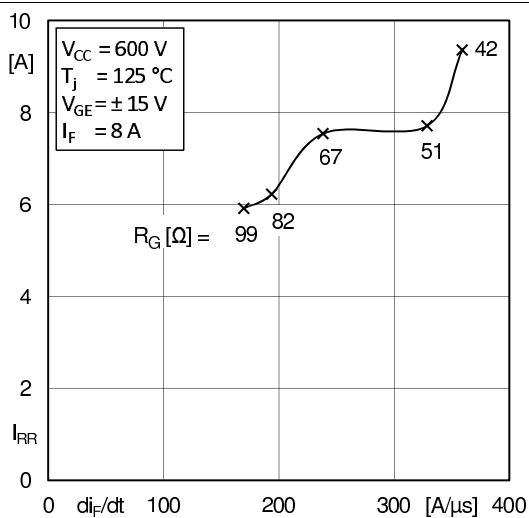
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



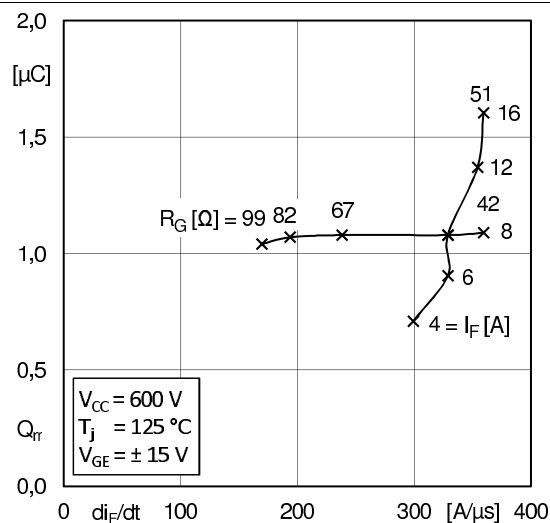
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



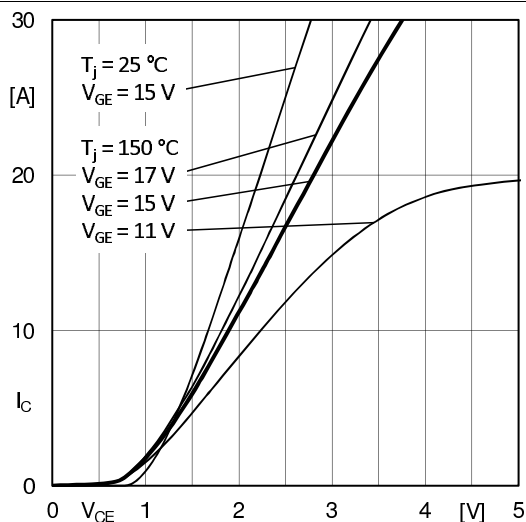
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



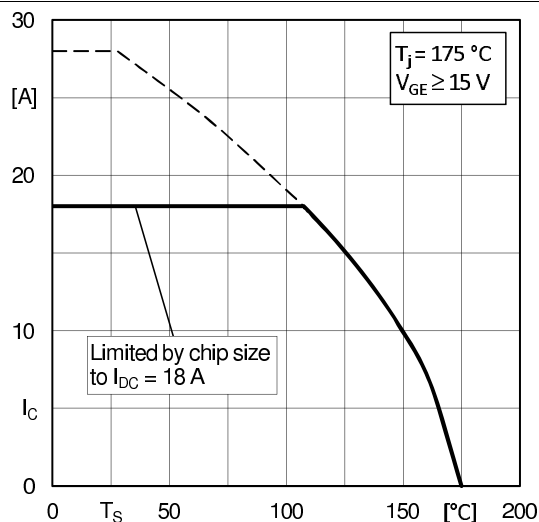
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



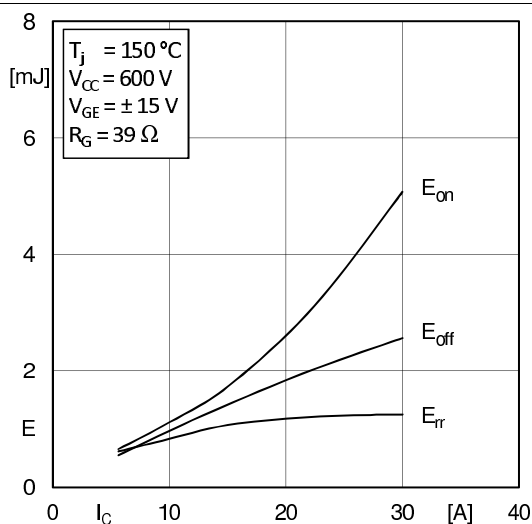
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



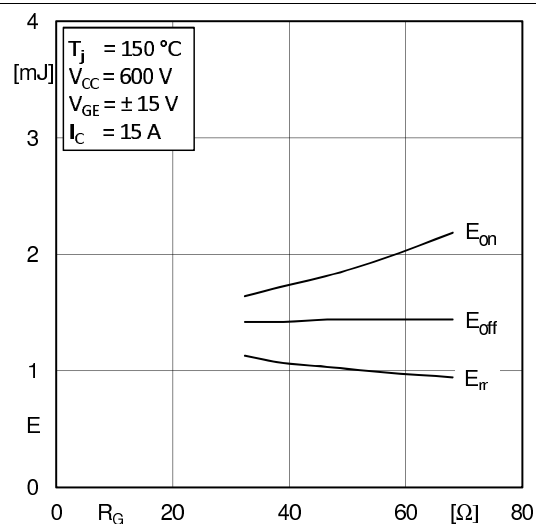
IGBT 7-12 - Fig. 1:
Typ. output characteristic



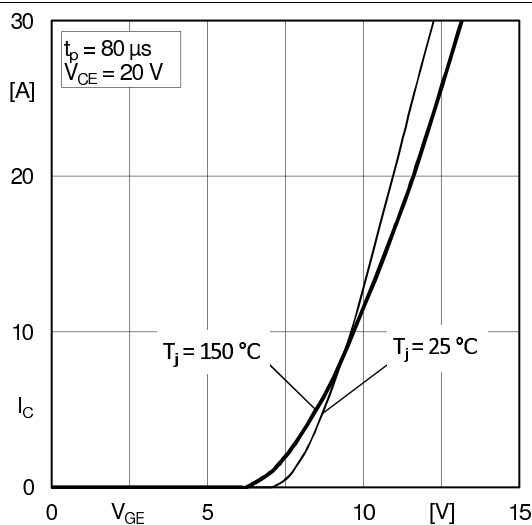
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



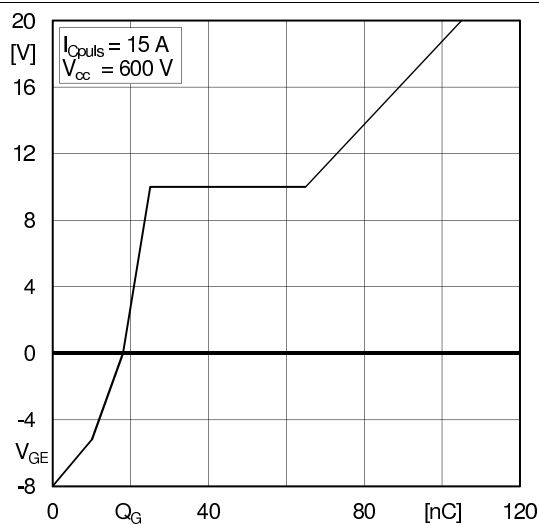
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



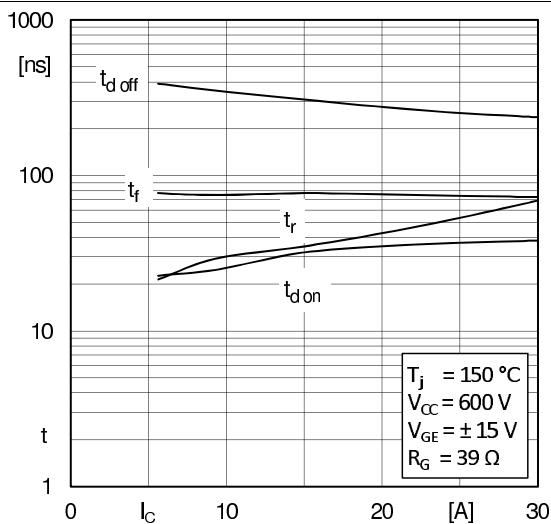
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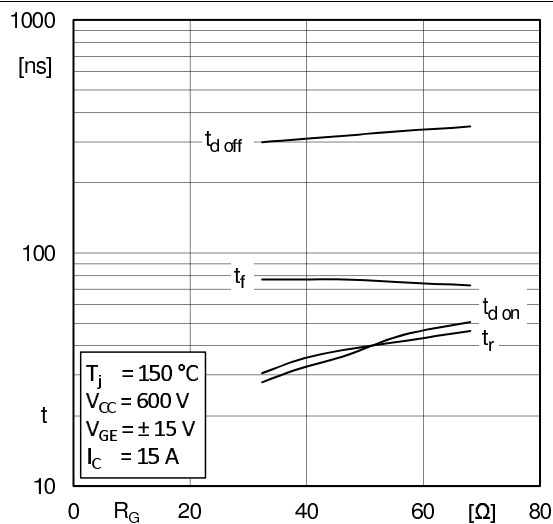
IGBT 7-12 - Fig. 5:
Typ. transfer characteristic



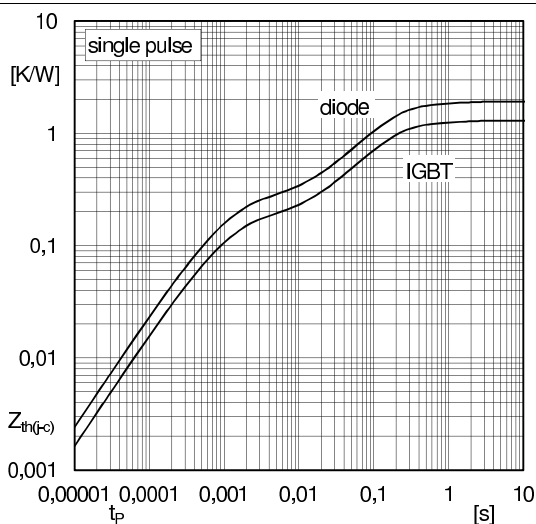
IGBT 7-12 - Fig. 6:
Typ. gate charge characteristic



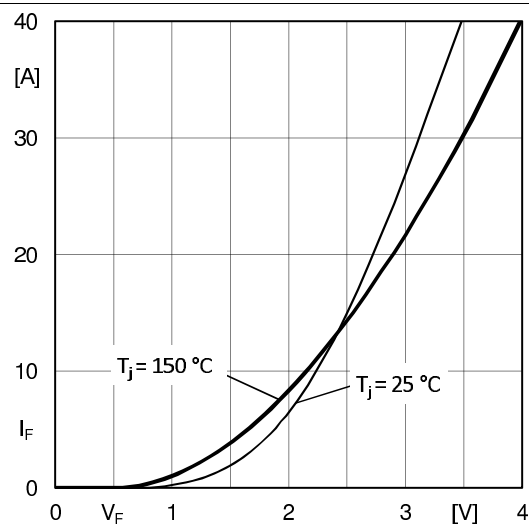
IGBT 7-12 - Fig. 7:
Typ. switching times vs. I_C



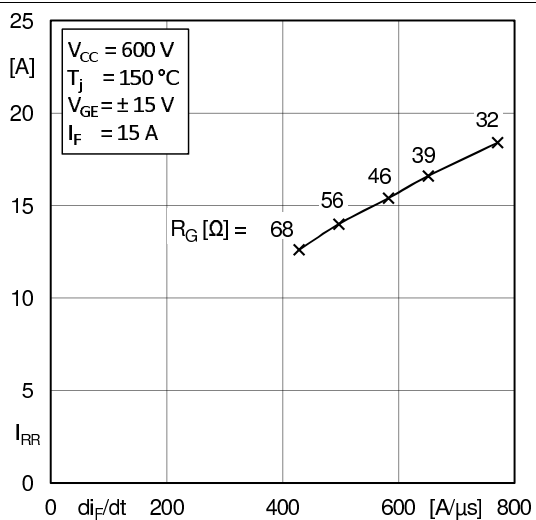
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Typ. switching times vs. gate resistor R_G



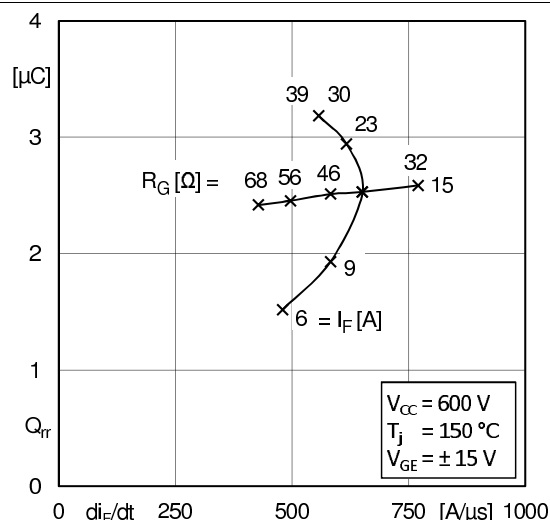
IGBT 7-12 - Fig. 9:
Transient thermal impedance of IGBT and Diode



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

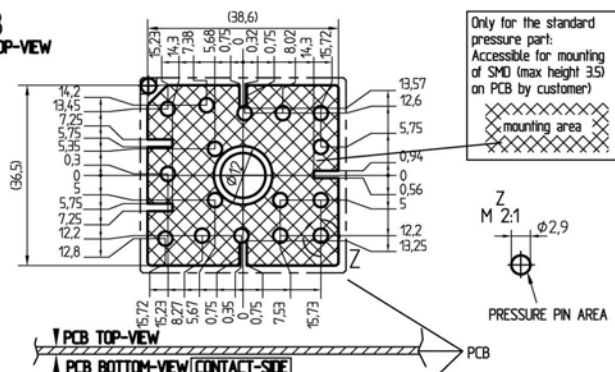


IGBT 7-12 - Fig. 11:
Typ. CAL diode peak reverse recovery current

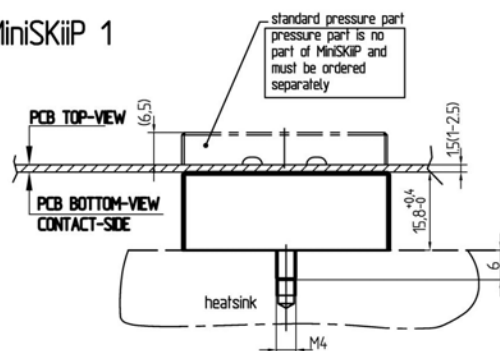


IGBT 7-12 - Fig. 12:
Typ. CAL diode recovery charge

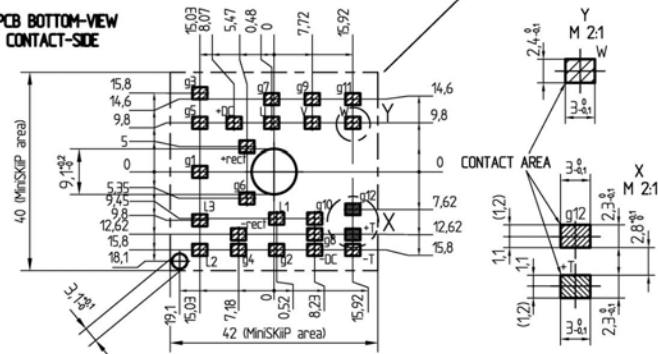
PCB
PCB TOP-VIEW



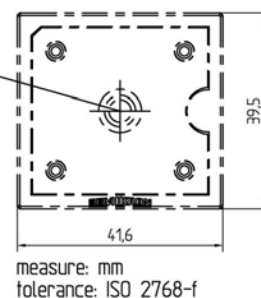
MiniSKiiP 1



PCB BOTTOM-VIEW
CONTACT-SIDE



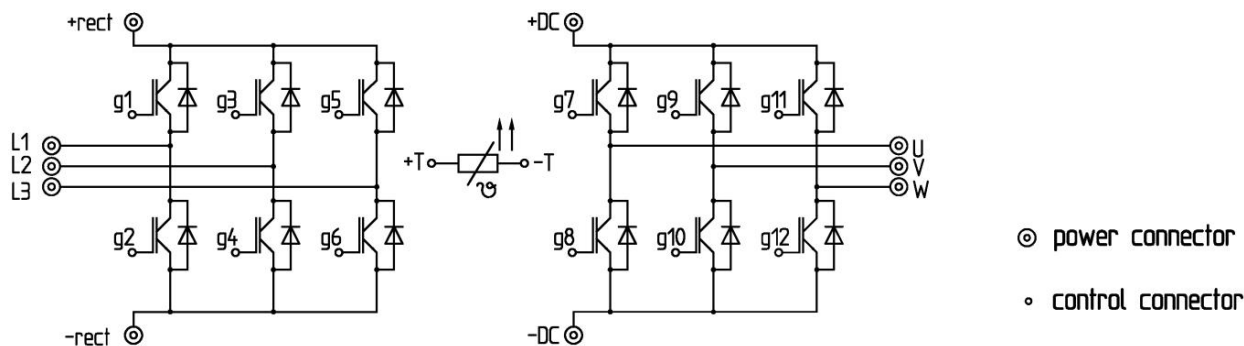
For mounting please follow the assembly instruction



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

* 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.