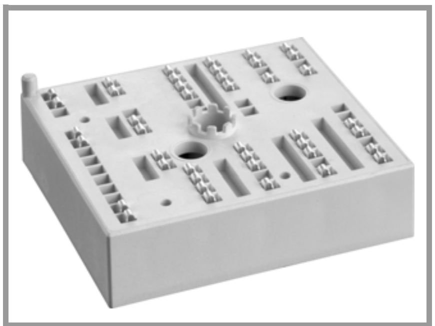


MiniSKiiP® 2

SKiiP 24ACC12T4V10

Features

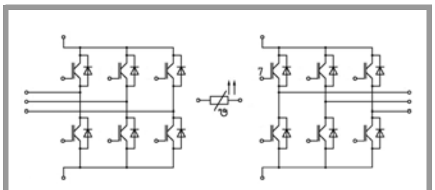
- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

- 4Q inverters

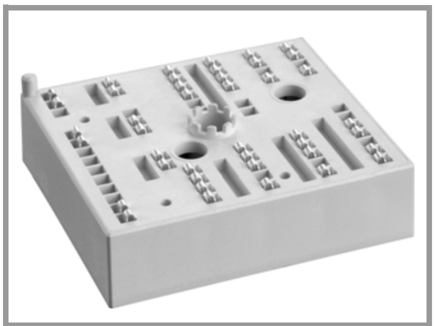
Remarks

- Case temperature limited to T_C= 125°C max.; T_C = T_S (for baseplateless modules)
- Recommended T_{op}=-40...+125°C



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	37	A
		T_s = 70 °C	29	A
I_C	T_j = 175 °C	T_s = 25 °C	41	A
		T_s = 70 °C	34	A
I_{Cnom}			25	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		75	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	47	A
		T_s = 70 °C	36	A
I_C	T_j = 175 °C	T_s = 25 °C	52	A
		T_s = 70 °C	43	A
I_{Cnom}			35	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		105	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	25	A
		T_s = 70 °C	17	A
I_F	T_j = 150 °C	T_s = 25 °C	28	A
		T_s = 70 °C	21	A
I_{Fnom}			15	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		30	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		170	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	39	A
		T_s = 70 °C	30	A
I_F	T_j = 175 °C	T_s = 25 °C	44	A
		T_s = 70 °C	35	A
I_{Fnom}			35	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		105	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		170	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	20A per spring		40	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50Hz, 1 min		2500	V



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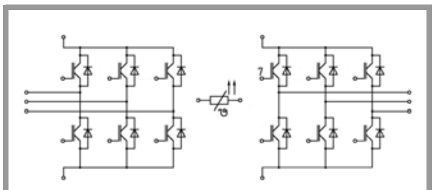
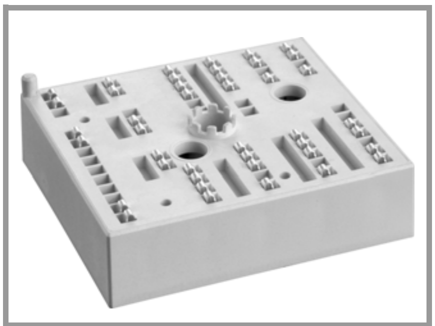


ACC

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1 - 6						
$V_{CE(sat)}$	I_C = 25 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		42	48	mΩ
		T_j = 150 °C		62	66	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		1.43		nF
C_{oes}		f = 1 MHz		0.12		nF
C_{res}		f = 1 MHz		0.09		nF
Q_G	V_{GE} = - 8 V...+ 15 V			142		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 25 A $R_{G\,on}$ = 20 Ω $R_{G\,off}$ = 20 Ω di/dt$_{on}$ = 640 A/µs di/dt$_{off}$ = 680 A/µs V_{GE} = +15/-15 V	T_j = 125 °C		22		ns
t_r		T_j = 125 °C		24		ns
E_{on}		T_j = 125 °C		3.5		mJ
$t_{d(off)}$		T_j = 125 °C		275		ns
t_f		T_j = 125 °C		34		ns
E_{off}		T_j = 125 °C		2		mJ
$R_{th(j-s)}$	per IGBT			1		K/W
IGBT 7 - 12						
$V_{CE(sat)}$	I_C = 35 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		30	34	mΩ
		T_j = 150 °C		44	47	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		1.95		nF
C_{oes}		f = 1 MHz		0.16		nF
C_{res}		f = 1 MHz		0.12		nF
Q_G	V_{GE} = - 8 V...+ 15 V			200		nC
R_{Gint}	T_j = 25 °C			0.00		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 35 A $R_{G\,on}$ = 16 Ω $R_{G\,off}$ = 16 Ω di/dt$_{on}$ = 1100 A/µs di/dt$_{off}$ = 760 A/µs V_{GE} = +15/-15 V	T_j = 150 °C		19		ns
t_r		T_j = 150 °C		24		ns
E_{on}		T_j = 150 °C		4.2		mJ
$t_{d(off)}$		T_j = 150 °C		290		ns
t_f		T_j = 150 °C		46		ns
E_{off}		T_j = 150 °C		3.1		mJ
$R_{th(j-s)}$	per IGBT			0.85		K/W



MiniSKiiP® 2

SKiiP 24ACC12T4V10

Features

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- UL recognised: File no. E63532

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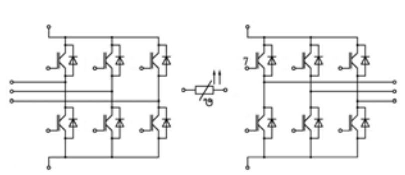
- 4Q inverters

Remarks

- Case temperature limited to T_C= 125°C max.; $T_C = T_S$ (for baseplateless modules)
- Recommended T_{op}=-40...+125°C

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 1 - 6						
$V_F = V_{EC}$	I_F = 25 A, V_{GE} = 0 V, chiplevel	T_j = 25 °C		2.0	2.3	V
		T_j = 125 °C		2.1	2.4	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		40	47	mΩ
		T_j = 125 °C		53	60	mΩ
I_{RRM}	I_F = 25 A, di/dt_{off} = 1440 A/µs, V_{GE} = -15 V, V_R = 600 V	T_j = 125 °C		40		A
Q_{rr}		T_j = 125 °C		5.1		µC
E_{rr}		T_j = 125 °C		2.3		mJ
$R_{th(j-s)}$	per Diode			1.7		K/W
Diode 7 - 12						
$V_F = V_{EC}$	I_F = 35 A, V_{GE} = 0 V, chiplevel	T_j = 25 °C		2.3	2.6	V
		T_j = 150 °C		2.3	2.6	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		29	32	mΩ
		T_j = 150 °C		40	43	mΩ
I_{RRM}	I_F = 35 A, di/dt_{off} = 1500 A/µs, V_{GE} = -15 V, V_{CC} = 600 V	T_j = 150 °C		36		A
Q_{rr}		T_j = 150 °C		5.5		µC
E_{rr}		T_j = 150 °C		2.2		mJ
$R_{th(j-s)}$	per Diode			1.2		K/W
Module						
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}					



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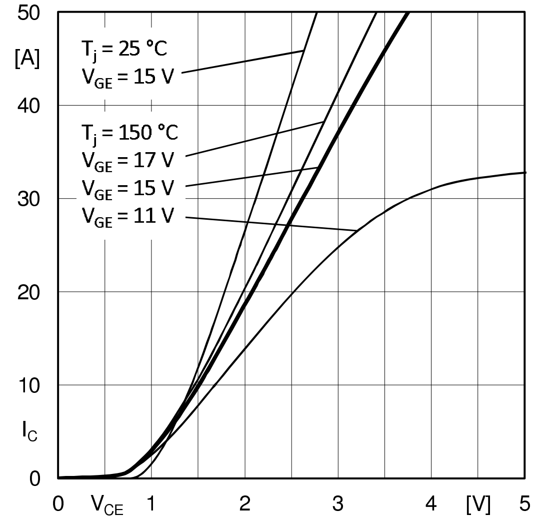
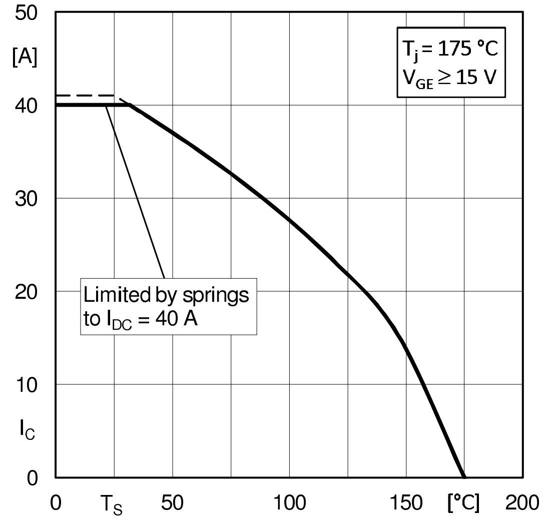
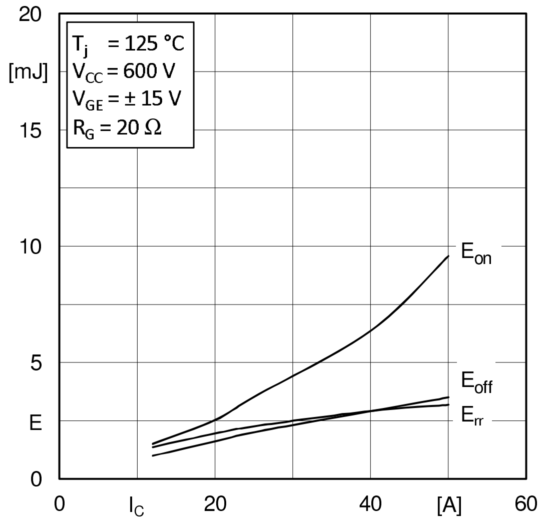


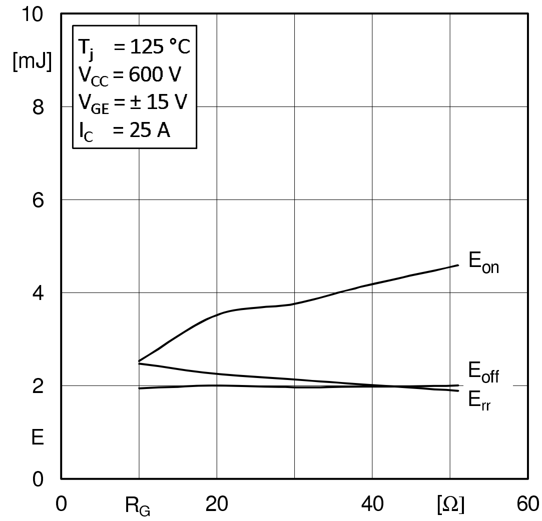
IGBT 1-6 - Fig. 1:
Typ. output characteristic



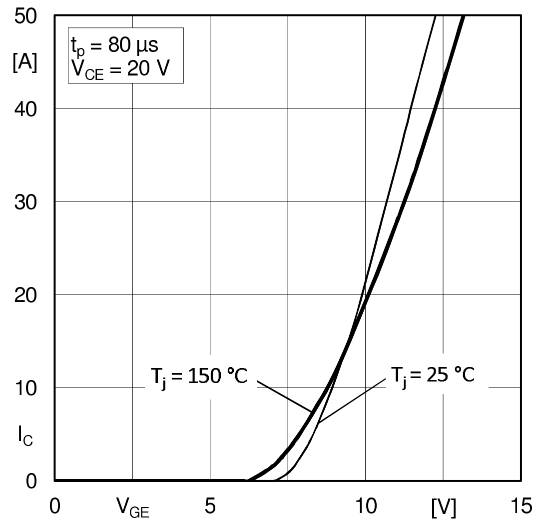
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



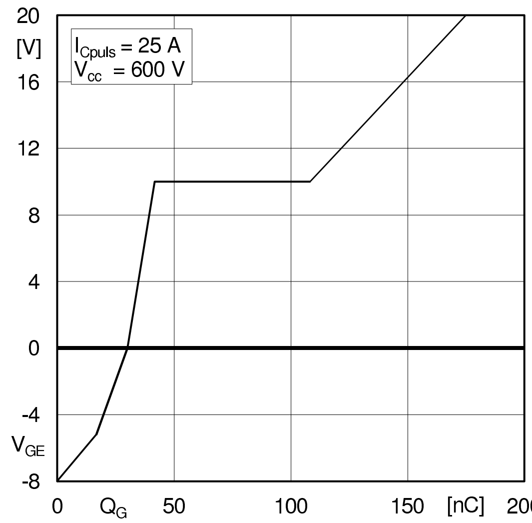
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



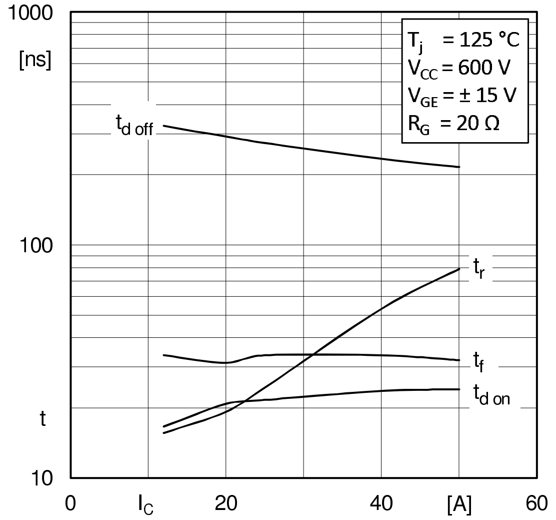
IGBT 1-6 - Fig. 4:
Typ. turn-on /-off energy = $f(R_G)$



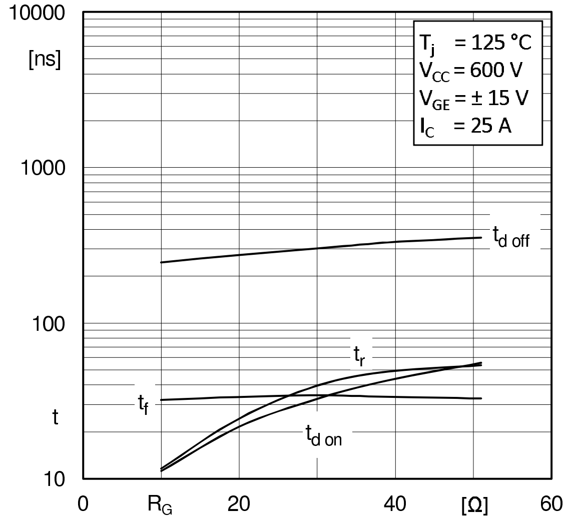
IGBT 1-6 - Fig. 5:
Typ. transfer characteristic



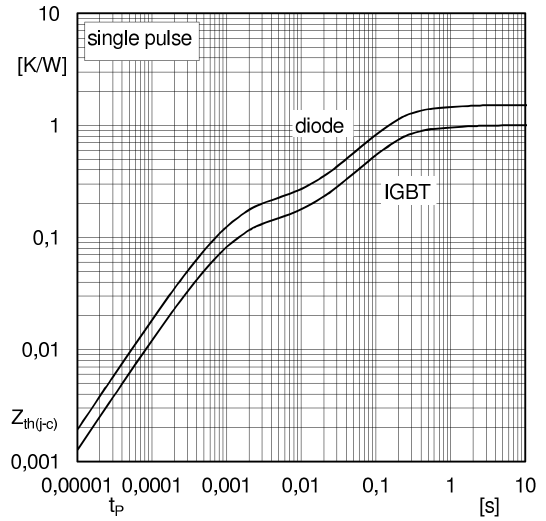
IGBT 1-6 - Fig. 6:
Typ. gate charge characteristic



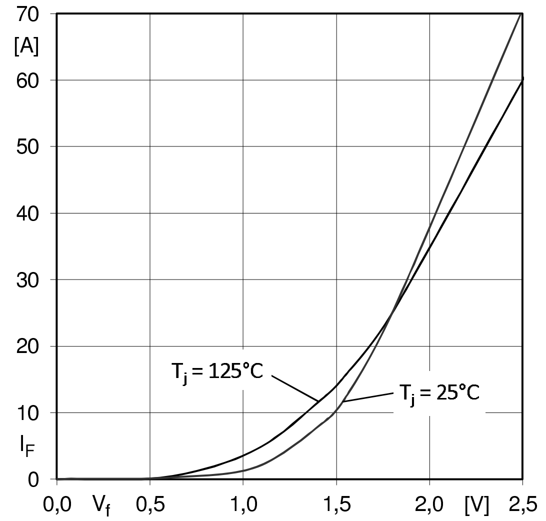
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



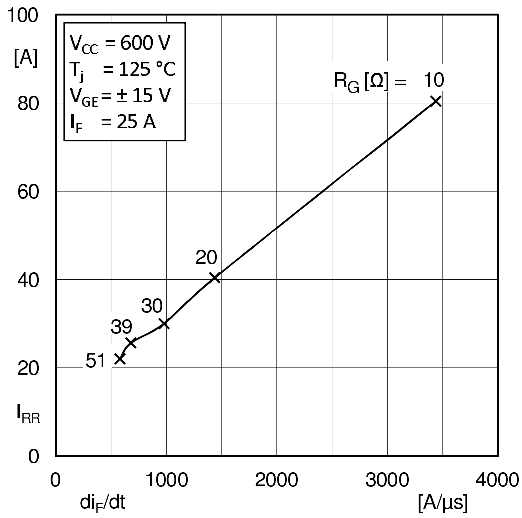
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



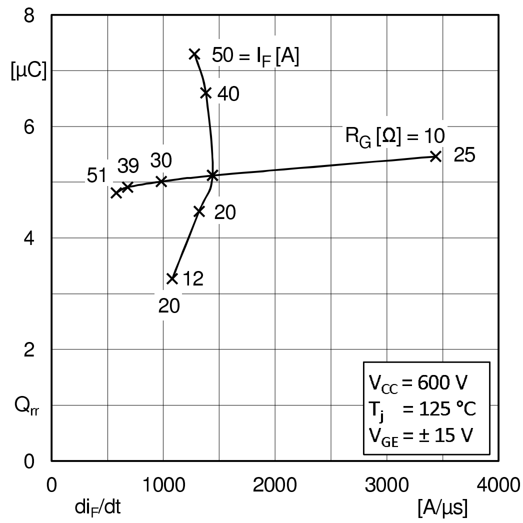
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



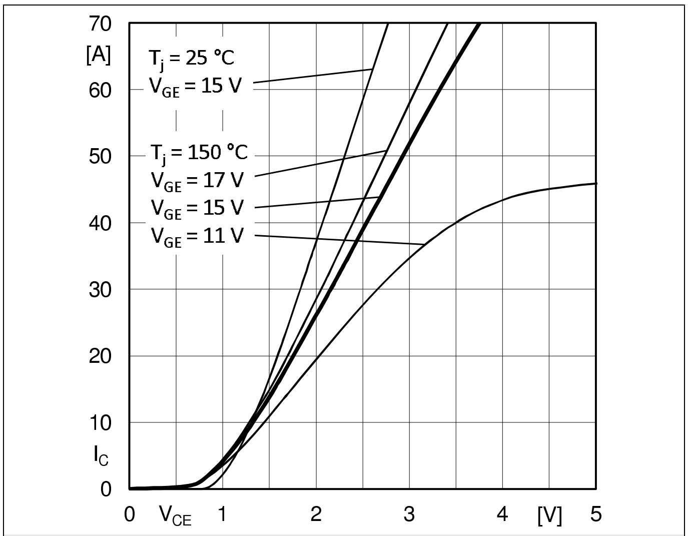
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



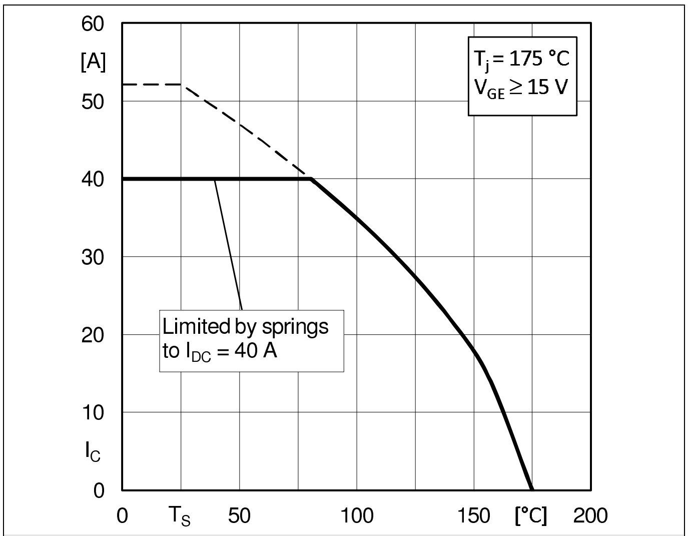
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



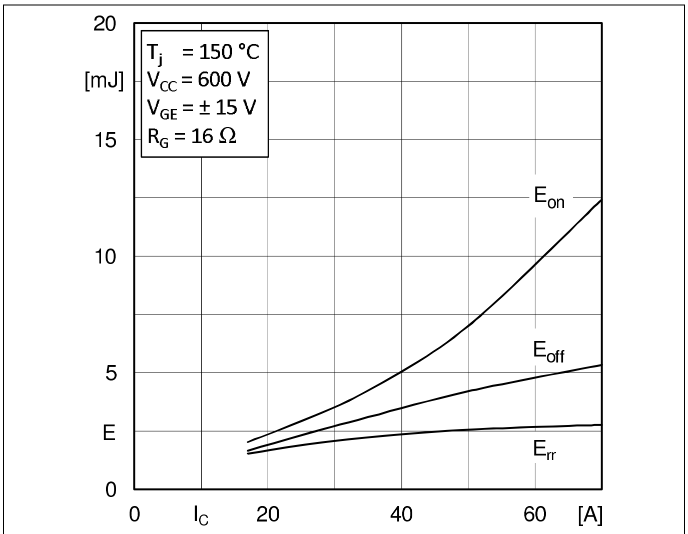
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



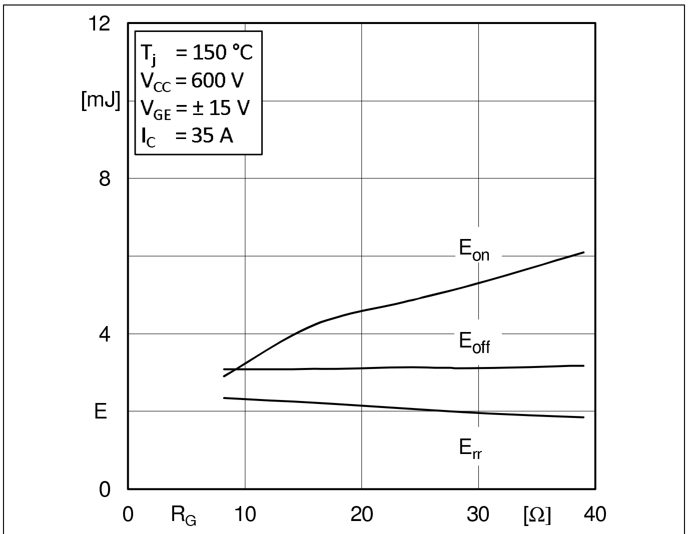
IGBT 7-12 - Fig. 1:
Typ. output characteristic



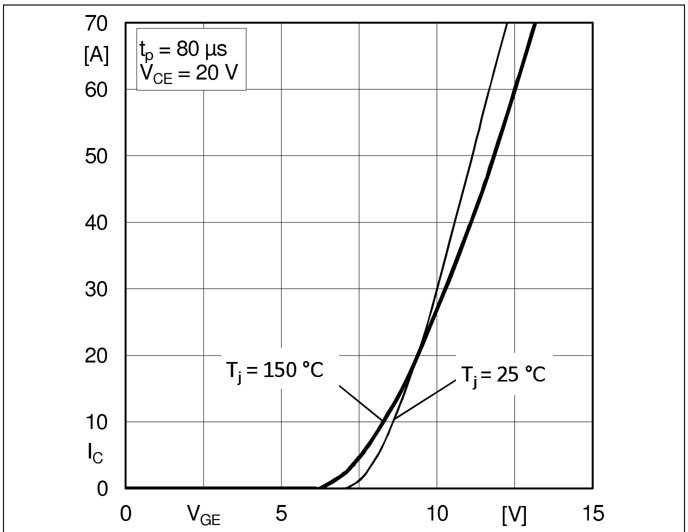
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



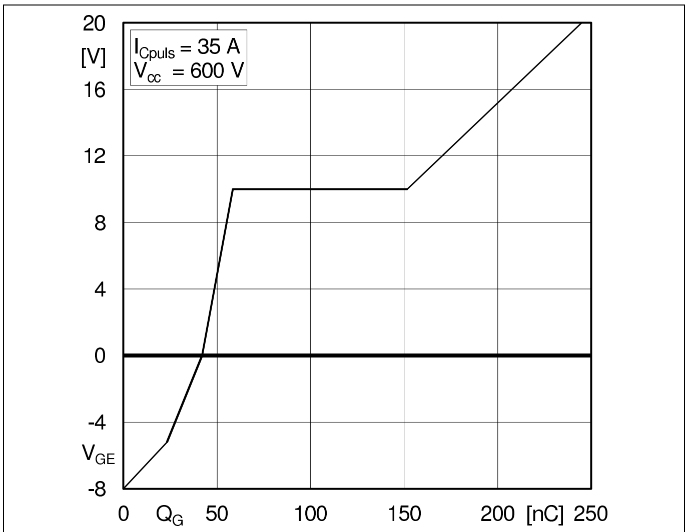
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



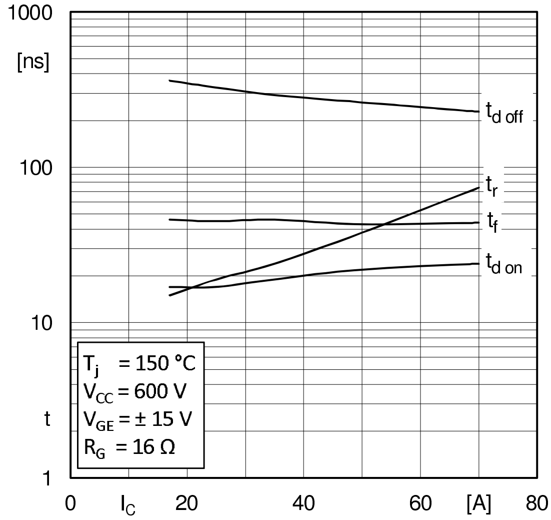
IGBT 7-12 - Fig. 4:
Typ. turn-on / -off energy = $f(R_G)$



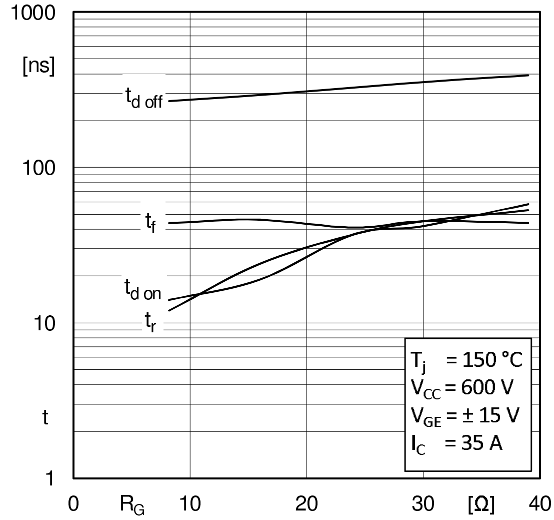
IGBT 7-12 - Fig. 5:
Typ. transfer characteristic



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



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



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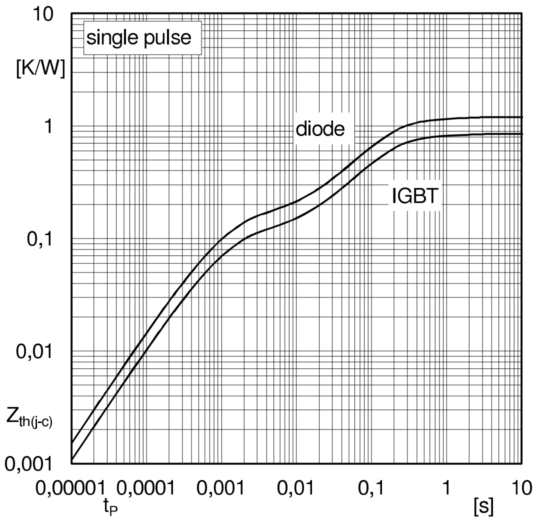

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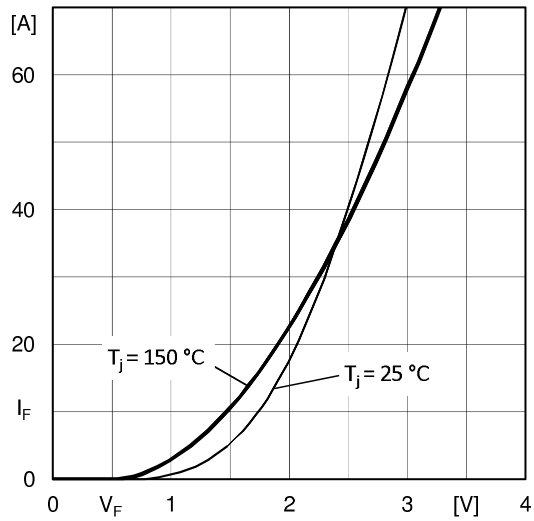
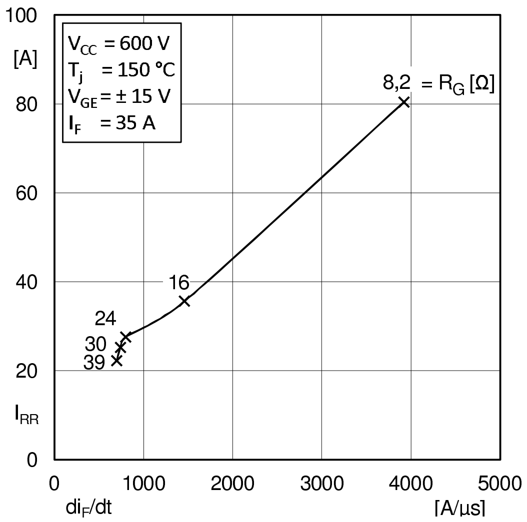
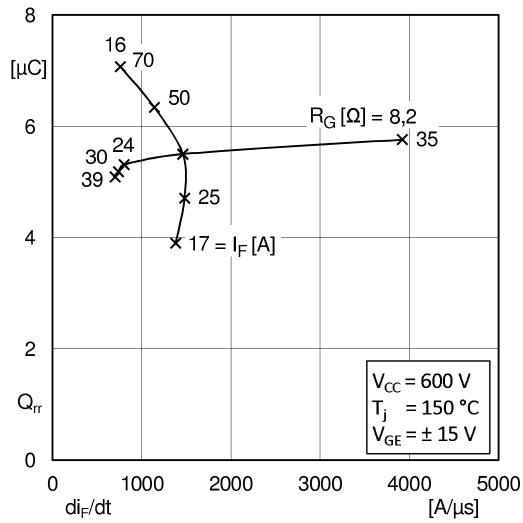


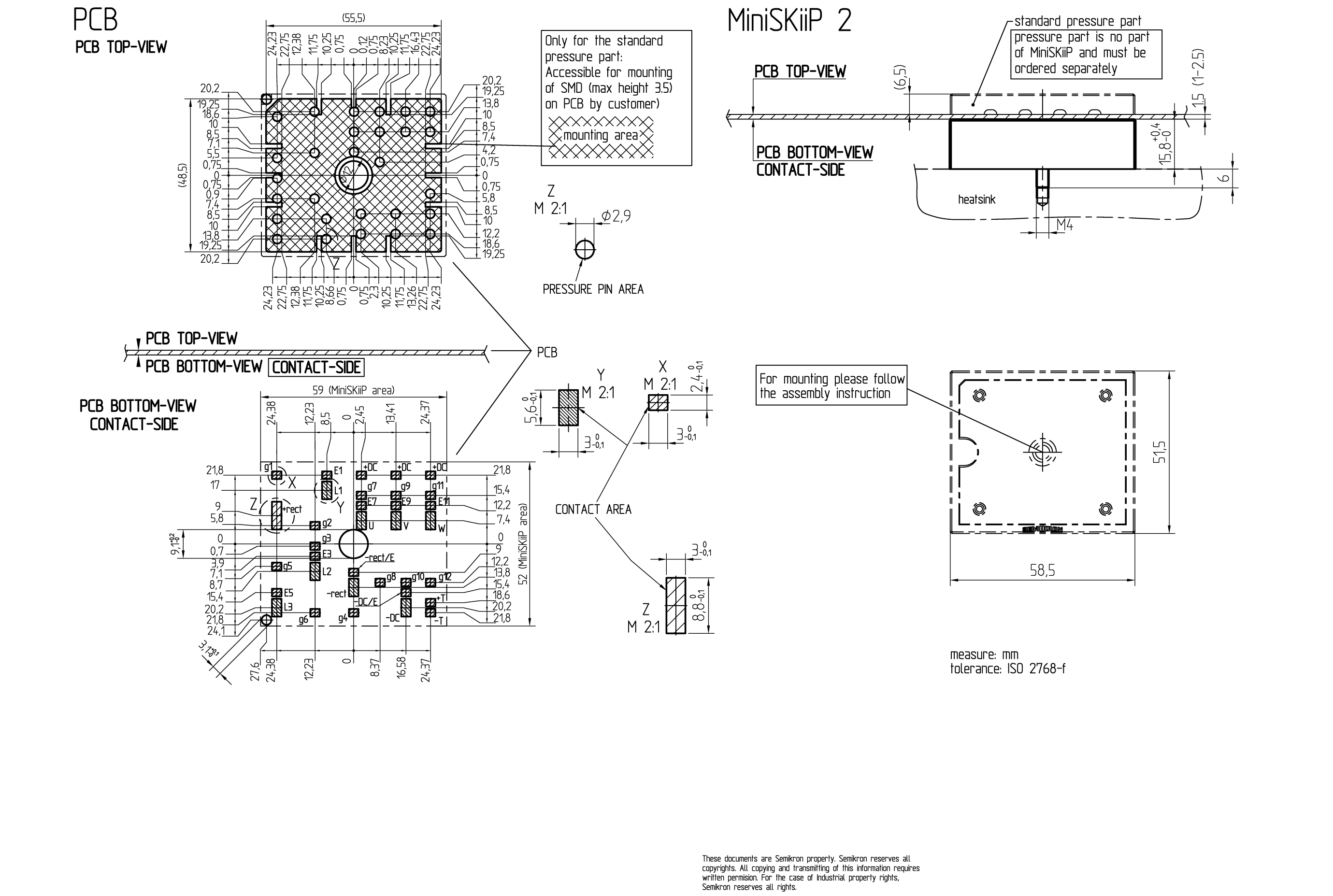
IGBT 7-12 - Fig. 10:
CAL diode forward characteristic



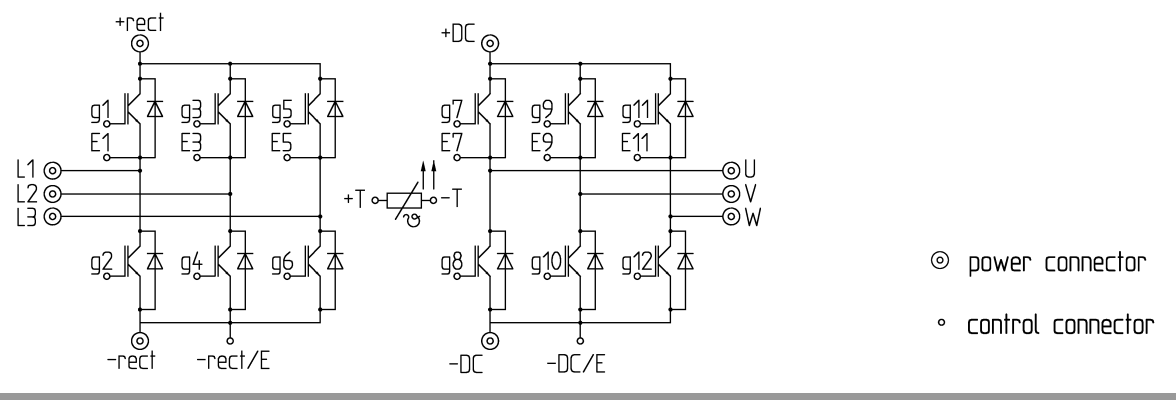
IGBT 7-12 - Fig. 11:
Typ. CAL diode peak reverse recovery current



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.