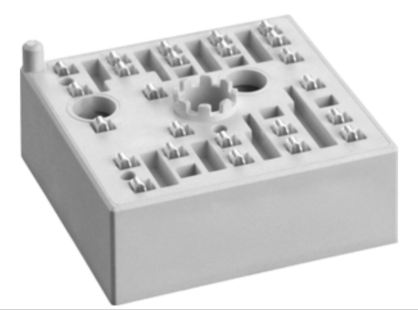


MiniSKiiP® 1

Twin 6-pack

SKiiP 12ACC12T4V10

Features*

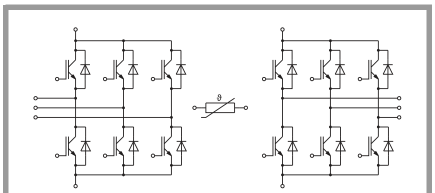
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

- 4Q inverters

Remarks

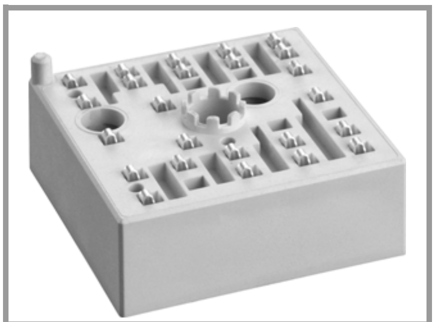
- Max. case temperature limited to T_C=125°C
- Terminal distances sufficient for basic insulation in 3-phase 480VAC TN systems
- DC-link voltage V_{DC}≤800V
- Max. 500V potential difference between +rect and +DC
- Max. 500V potential difference between -rect and -DC
- Temperature sensor: no basic insulation to main circuit, signal processing with reference to -DC potential
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information



ACC

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT 1 - 6				
V_{CES}	T_j = 25 °C		1200	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	18	A
	T_j = 175 °C	T_s = 70 °C	14	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	19	A
	T_j = 175 °C	T_s = 70 °C	16	A
I_{Cnom}			8	A
I_{CRM}			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	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	28	A
	T_j = 175 °C	T_s = 70 °C	23	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	31	A
	T_j = 175 °C	T_s = 70 °C	26	A
I_{Cnom}			15	A
I_{CRM}			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	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	14	A
	T_j = 150 °C	T_s = 70 °C	11	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	15	A
	T_j = 150 °C	T_s = 70 °C	12	A
I_{FRM}			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	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	23	A
	T_j = 175 °C	T_s = 70 °C	18	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	24	A
	T_j = 175 °C	T_s = 70 °C	20	A
I_{FRM}			30	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		65	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	20 A per spring		20	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, 1 min		2500	V



MiniSKiiP® 1

Twin 6-pack

SKiiP 12ACC12T4V10

Features*

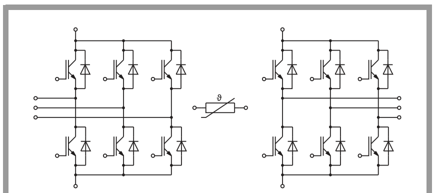
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

- 4Q inverters

Remarks

- Max. case temperature limited to T_C=125°C
- Terminal distances sufficient for basic insulation in 3-phase 480VAC TN systems
- DC-link voltage V_{DC}≤800V
- Max. 500V potential difference between +rect and +DC
- Max. 500V potential difference between -rect and -DC
- Temperature sensor: no basic insulation to main circuit, signal processing with reference to -DC potential
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information



ACC

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1 - 6						
$V_{CE(sat)}$	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		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	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			1	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		Ω
$t_{d(on)}$	V_{CC} = 600 V, I_C = 8 A, $R_{G\,on}$ = 51 Ω, $R_{G\,off}$ = 51 Ω, di/dt$_{on}$ = 97 A/µs, di/dt$_{off}$ = 106 A/µs, dv/dt = 3300 V/µs, V_{GE} = +15/-15 V, L_s = 22 nH	T_j = 125 °C		117		ns
t_r		T_j = 125 °C		70		ns
E_{on}		T_j = 125 °C		1		mJ
$t_{d(off)}$		T_j = 125 °C		300		ns
t_f		T_j = 125 °C		120		ns
E_{off}		T_j = 125 °C		0.7		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			1.84		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			1.6		K/W
IGBT 7 - 12						
$V_{CE(sat)}$	I_C = 15 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		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V, chiplevel	T_j = 25 °C		70	80	mΩ
		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, V_{CE} = 1200 V	T_j = 25 °C			1	mA
				-		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		Ω
$t_{d(on)}$	V_{CC} = 600 V, I_C = 15 A, $R_{G\,on}$ = 39 Ω, $R_{G\,off}$ = 39 Ω, di/dt$_{on}$ = 188 A/µs, di/dt$_{off}$ = 200 A/µs, dv/dt = 3500 V/µs, V_{GE} = +15/-15 V, L_s = 22 nH	T_j = 150 °C		92		ns
t_r		T_j = 150 °C		74		ns
E_{on}		T_j = 150 °C		2.1		mJ
$t_{d(off)}$		T_j = 150 °C		319		ns
t_f		T_j = 150 °C		77		ns
E_{off}		T_j = 150 °C		1.6		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			1.3		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			1.1		K/W

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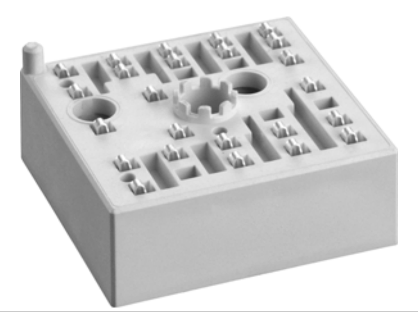


MiniSKiiP® 1

Twin 6-pack

SKiiP 12ACC12T4V10

Features*

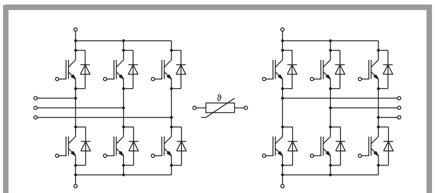
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

- 4Q inverters

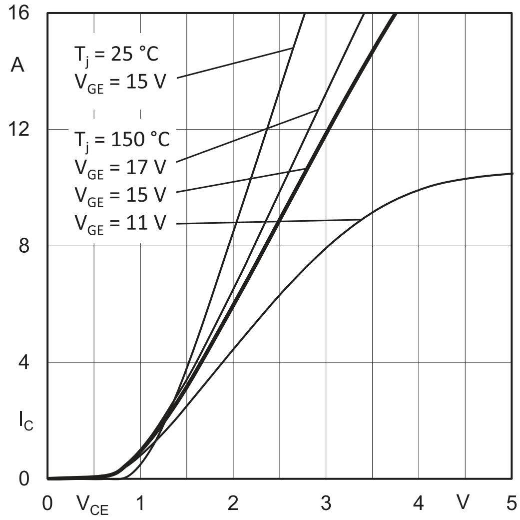
Remarks

- Max. case temperature limited to T_C=125°C
- Terminal distances sufficient for basic insulation in 3-phase 480VAC TN systems
- DC-link voltage V_{DC}≤800V
- Max. 500V potential difference between +rect and +DC
- Max. 500V potential difference between -rect and -DC
- Temperature sensor: no basic insulation to main circuit, signal processing with reference to -DC potential
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

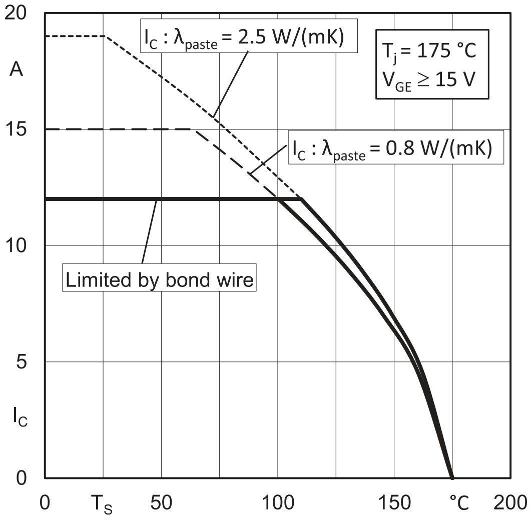


ACC

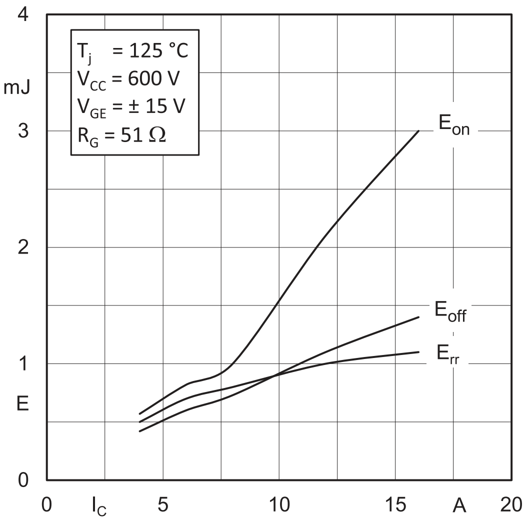
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 1 - 6						
$V_F = V_{EC}$	I_F = 8 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.96	2.22	V
		T_j = 125 °C		2.08	2.34	V
V_{F0}	chiplevel	T_j = 25 °C		1.00	1.10	V
		T_j = 125 °C		0.80	0.90	V
r_F	chiplevel	T_j = 25 °C		120	140	mΩ
		T_j = 125 °C		160	180	mΩ
I_{RRM}	I_F = 8 A di/dt$_{off}$ = 93 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 125 °C		5.4		A
Q_{rr}		T_j = 125 °C		1.9		µC
E_{rr}		T_j = 125 °C		0.8		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			2.5		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			2.2		K/W
Diode 7 - 12						
$V_F = V_{EC}$	I_F = 15 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.38	2.71	V
		T_j = 150 °C		2.44	2.77	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		72	81	mΩ
		T_j = 150 °C		103	111	mΩ
I_{RRM}	I_F = 15 A di/dt$_{off}$ = 220 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		8.9		A
Q_{rr}		T_j = 150 °C		2.2		µC
E_{rr}		T_j = 150 °C		0.8		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.92		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			1.7		K/W
Module						
L_{CE}				60		nH
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} °C^{-1}, B = 1.731*10^{-5}°C^{-2} °C^{-2}					



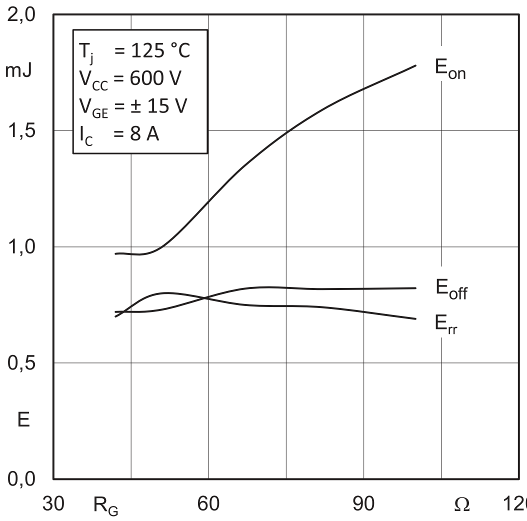
IGBT 1-6 - Fig. 1:
Typ. output characteristic



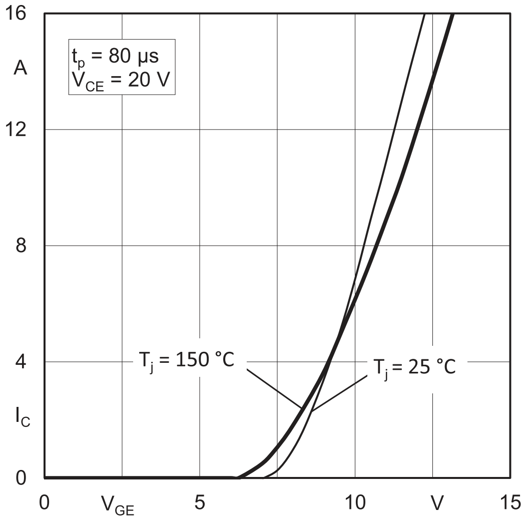
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



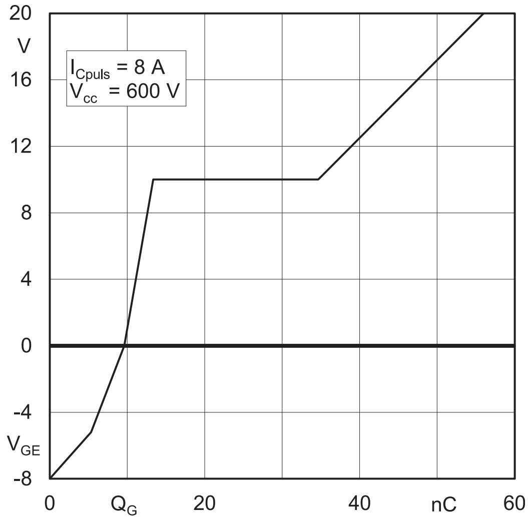
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



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

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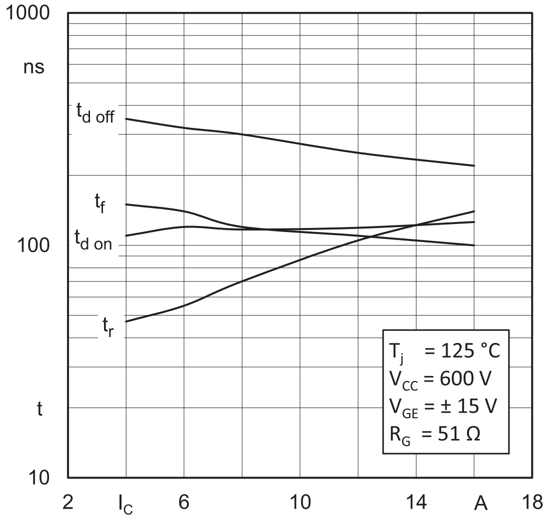
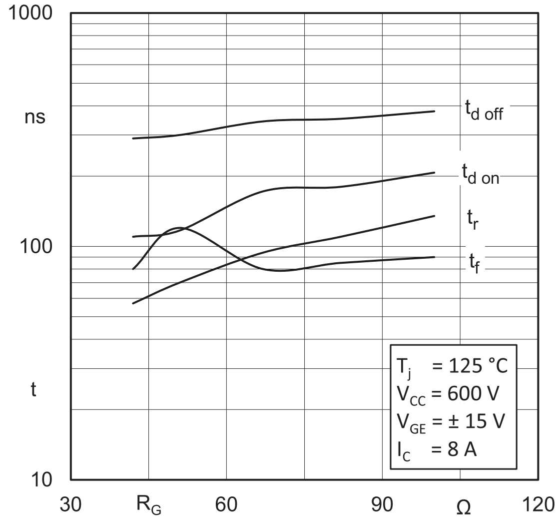
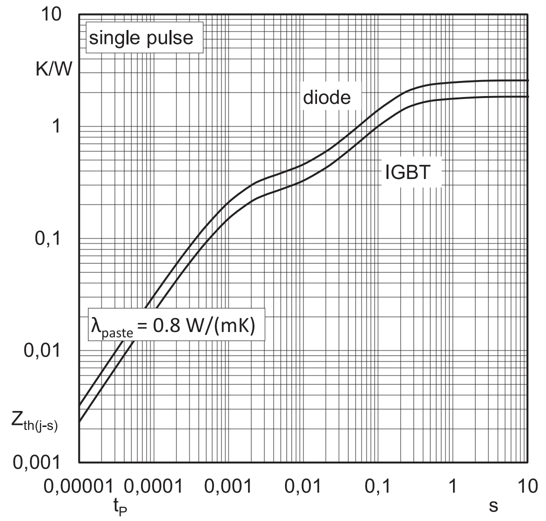


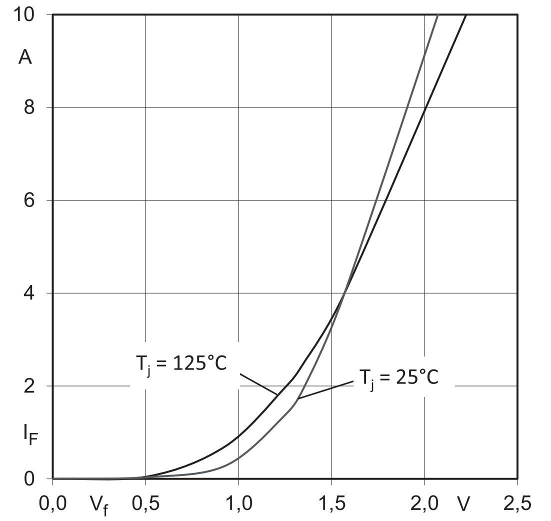
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



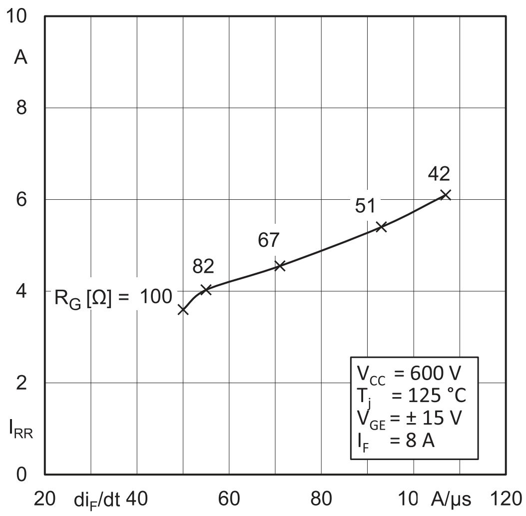
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



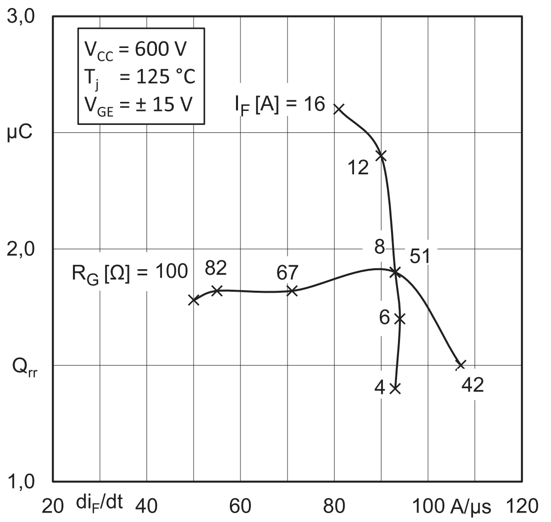
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



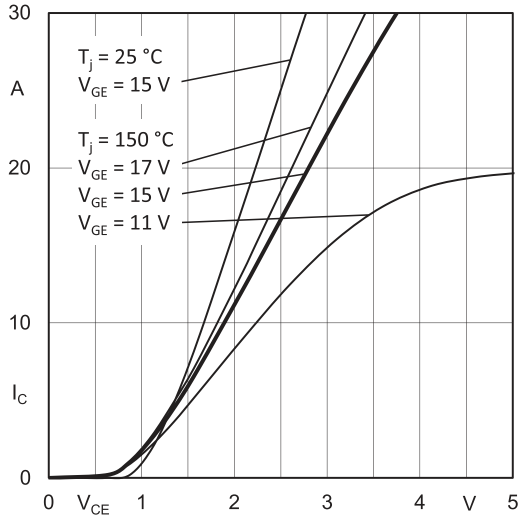
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



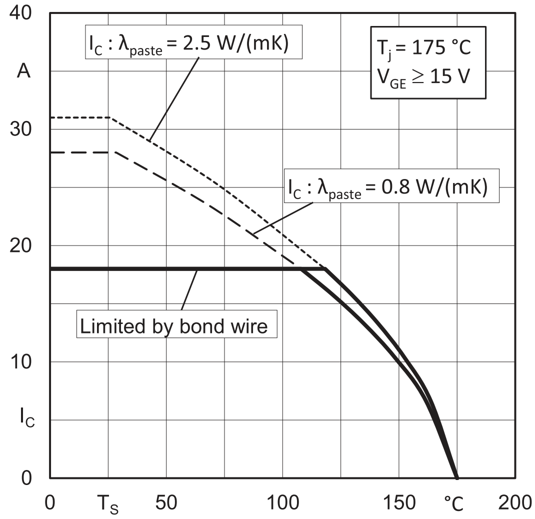
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



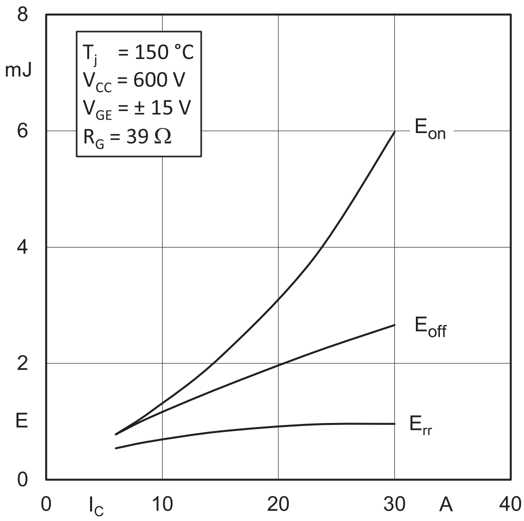
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



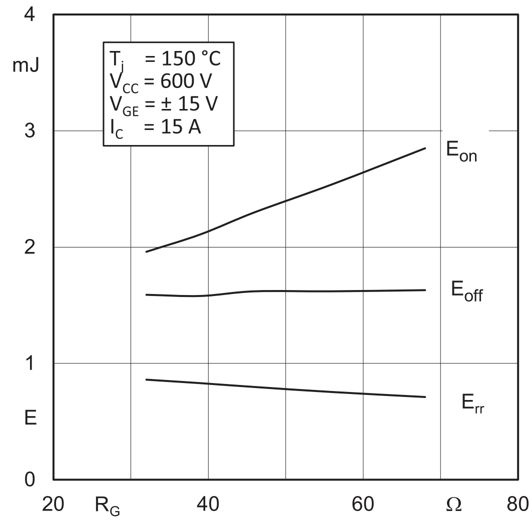
IGBT 7-12 - Fig. 1:
Typ. output characteristic



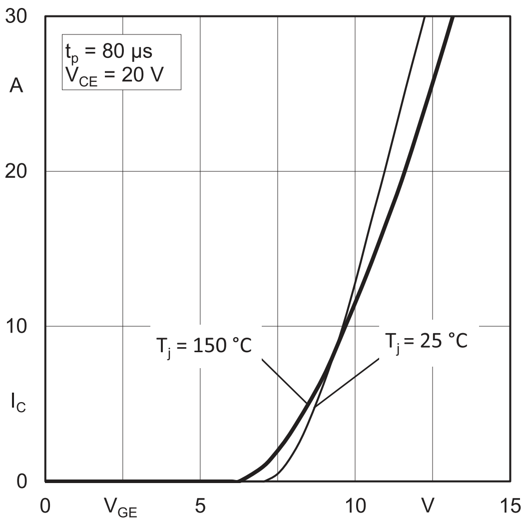
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



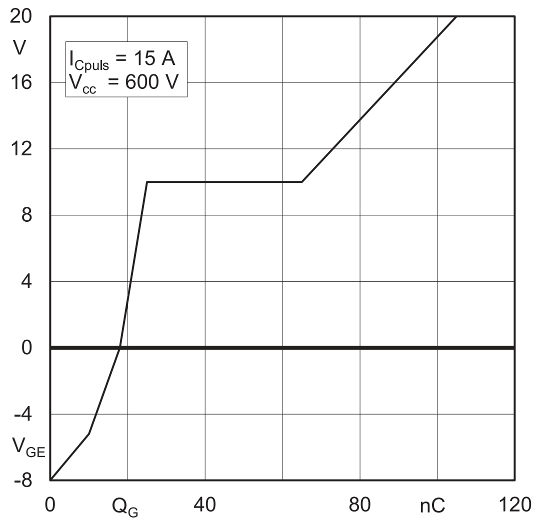
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



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

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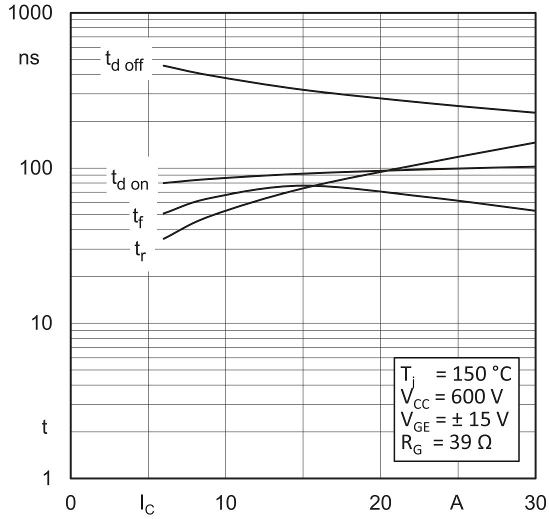
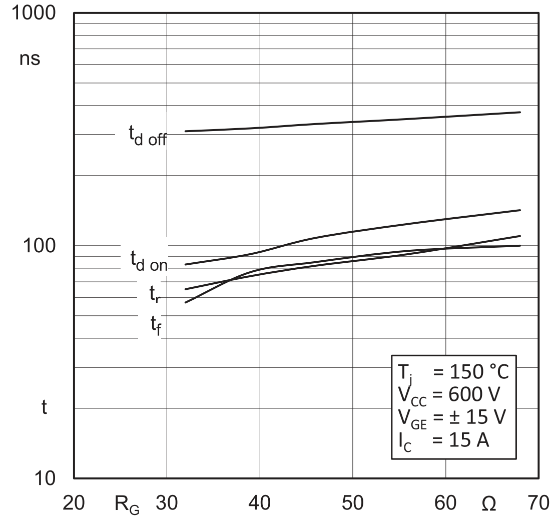
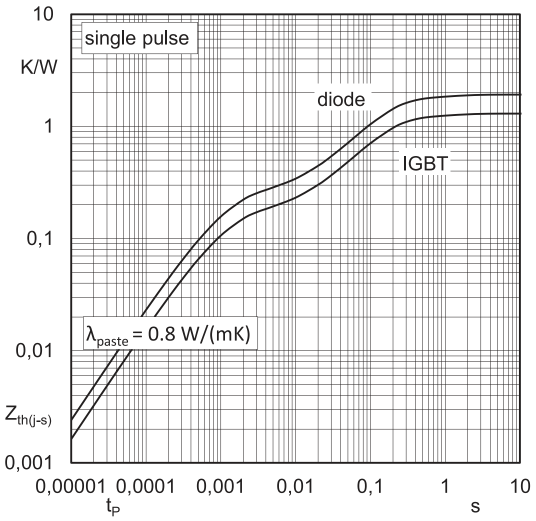


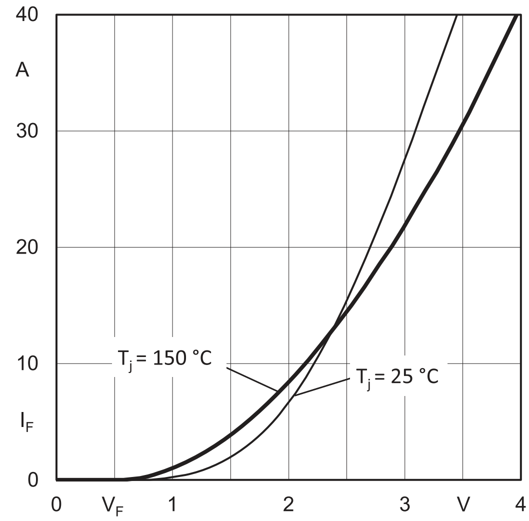
IGBT 7-12 - Fig. 7:
Typ. switching times vs. I_C



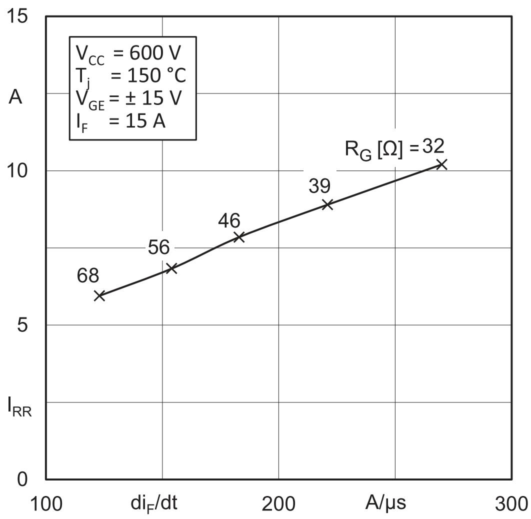
IGBT 7-12 - Fig. 8:
Typ. switching times vs. gate resistor R_G



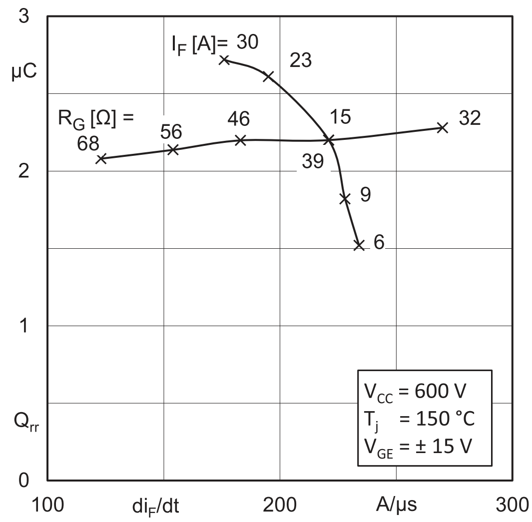
IGBT 7-12 - Fig. 9:
Transient thermal impedance of IGBT and Diode



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



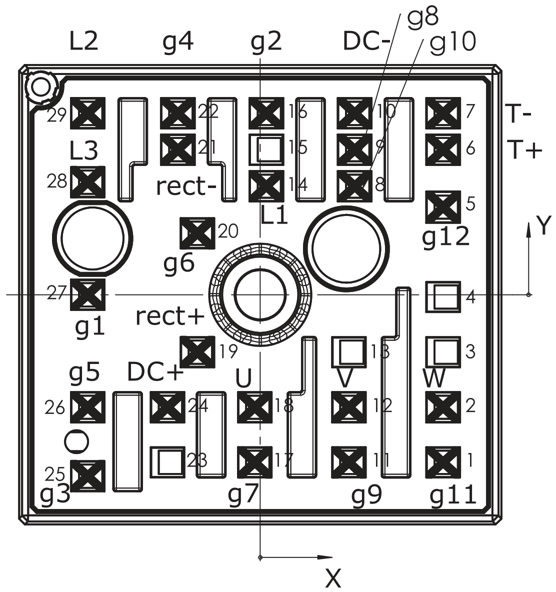
IGBT 7-12 - Fig. 11:
Typ. CAL diode peak reverse recovery current



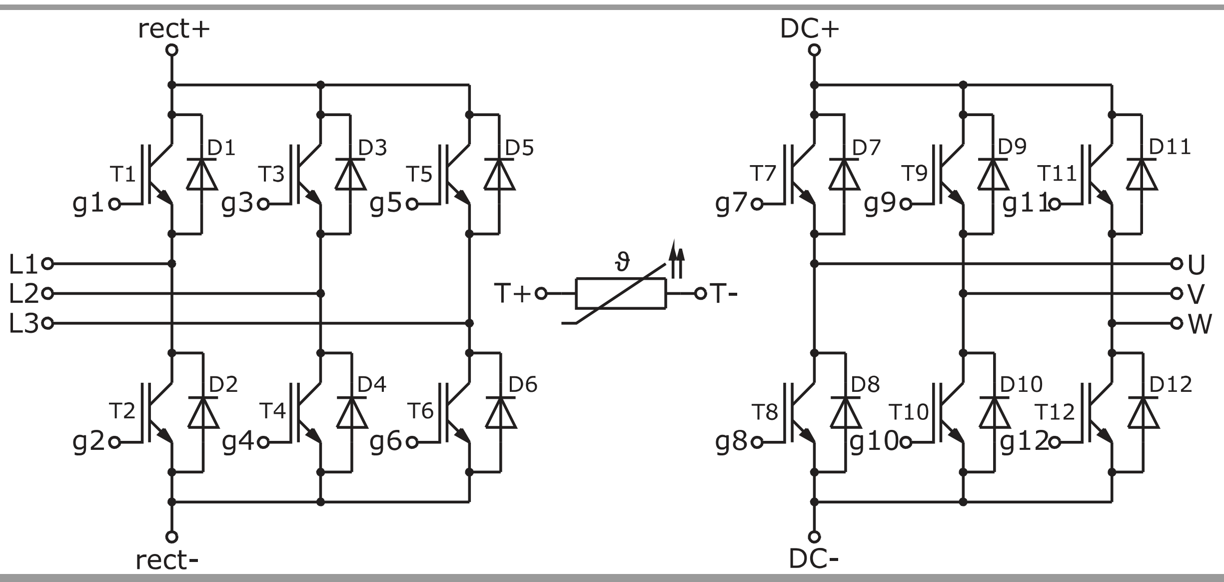
IGBT 7-12 - Fig. 12:
Typ. CAL diode recovery charge

Pin out							
Pin	*X*	*Y*	*Function*	*Pin*	*X*	*Y*	*Function*
1	15,93	-14,60	g11	16	0,53	15,80	g2
2	15,93	-9,80	W	17	-0,48	-14,6	g7
3	15,93	-5,00		18	-0,48	-9,80	U
4	15,93	-0,20		19	-5,48	-5,00	rect+
5	15,93	7,63	g12	20	-5,48	5,35	g6
6	15,93	12,63	T+	21	-7,18	12,63	rect-
7	15,93	15,80	T-	22	-7,18	15,80	g4
8	8,23	9,45	g10	23	-8,08	-14,60	
9	8,23	12,63	g8	24	-8,08	-9,80	DC+
10	8,23	15,80	DC-	25	-15,03	-15,80	g3
11	7,73	-14,60	g9	26	-15,03	-9,80	g5
12	7,73	-9,80	V	27	-15,03	0	g1
13	7,73	-5,00		28	-15,03	9,80	L3
14	0,53	9,45	L1	29	-15,03	15,80	L2
15	0,53	12,63					

all values in mm



Pinout and Dimensions



Pinout

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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