



SEMITRANS®2

Fast IGBT4 Modules

SKM50GB12T4

Features

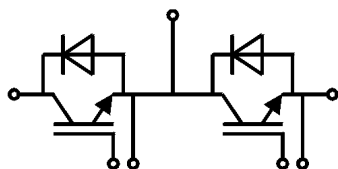
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_{Cnom}
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Isolated copper baseplate using DBC Technology (Direct Copper Bonding)

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm.
 $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j = 150^\circ$



GB

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 175 °C	T _c = 25 °C	81	A
		T _c = 80 °C	62	A
I _{Cnom}			50	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		150	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
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	65	A
		T _c = 80 °C	49	A
I _{Fnom}			50	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		270	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}			200	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 1 min		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 50 A	T _J = 25 °C		1.85	2.1	V
	V _{GE} = 15 V chipelevel	T _J = 150 °C		2.2	2.4	V
V _{CE0}		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		21.0	24.0	mΩ
		T _J = 150 °C		30.0	32.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 1.7 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	T _J = 150 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		2.77		nF
C _{oes}		f = 1 MHz		0.20		nF
C _{res}		f = 1 MHz		0.16		nF
Q _G	V _{GE} = - 8 V...+ 15 V			280		nC
R _{Gint}	T _J = 25 °C			4.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 150 °C		98		ns
t _r	I _C = 50 A	T _J = 150 °C		29		ns
E _{on}	V _{GE} = ±15 V	T _J = 150 °C		5.5		mJ
t _{d(off)}	R _{G on} = 8.2 Ω	T _J = 150 °C		325		ns
t _f	R _{G off} = 8.2 Ω	T _J = 150 °C		75		ns
E _{off}	di/dt _{on} = 1700 A/μs	T _J = 150 °C		4.5		mJ
R _{th(j-c)}	per IGBT				0.53	K/W



SEMITRANS®2

Fast IGBT4 Modules

SKM50GB12T4

Features

- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_{cnom}
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Isolated copper baseplate using DBC Technology (Direct Copper Bonding)

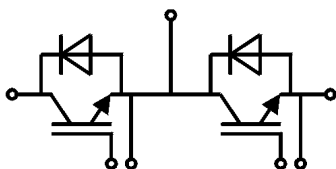
Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm.
 $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j = 150^\circ$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 50 A	T _J = 25 °C		2.22	2.54	V
	V _{GE} = 0 V chip	T _J = 150 °C		2.18	2.5	V
V _{F0}		T _J = 25 °C		1.3	1.5	V
		T _J = 150 °C		0.9	1.1	V
r _F		T _J = 25 °C		18.4	20.8	mΩ
		T _J = 150 °C		25.6	28.0	mΩ
I _{RRM}	I _F = 50 A	T _J = 150 °C		35		A
Q _{rr}	di/dt _{off} = 1380 A/μs	T _J = 150 °C		8.7		μC
E _{rr}	V _{GE} = ±15 V	T _J = 150 °C		3.8		mJ
R _{th(j-c)}	per diode				0.84	K/W
Module						
L _{CE}					30	nH
R _{CC'+EE'}	terminal-chip	T _C = 25 °C		0.65		mΩ
		T _C = 125 °C		1		mΩ
R _{th(c-s)}	per module			0.04	0.05	K/W
M _s	to heat sink M6		3		5	Nm
M _t		to terminals M5	2.5		5	Nm
						Nm
w					160	g



GB

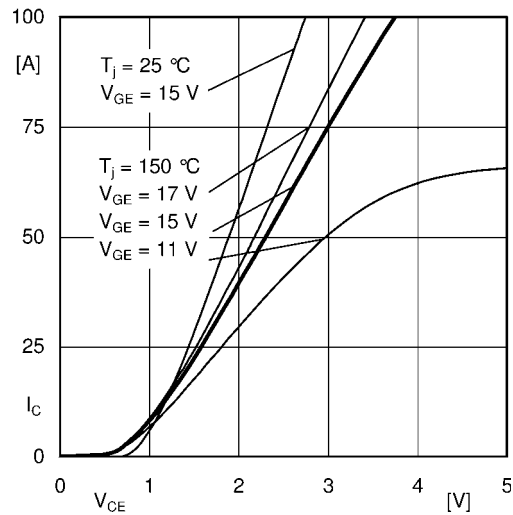


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + EE'$

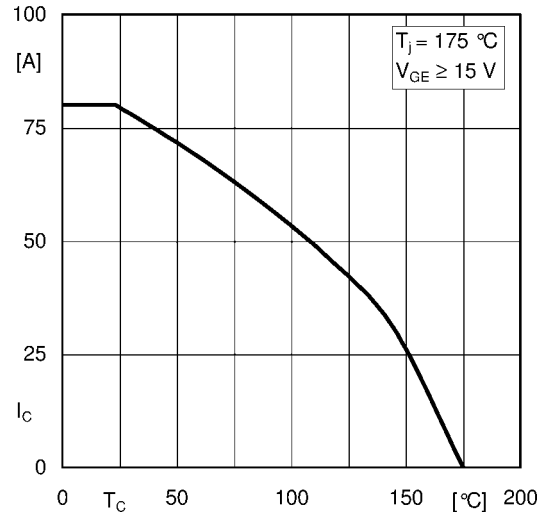


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

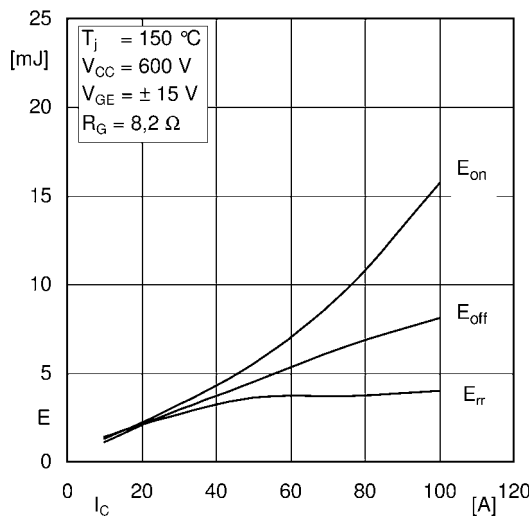


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

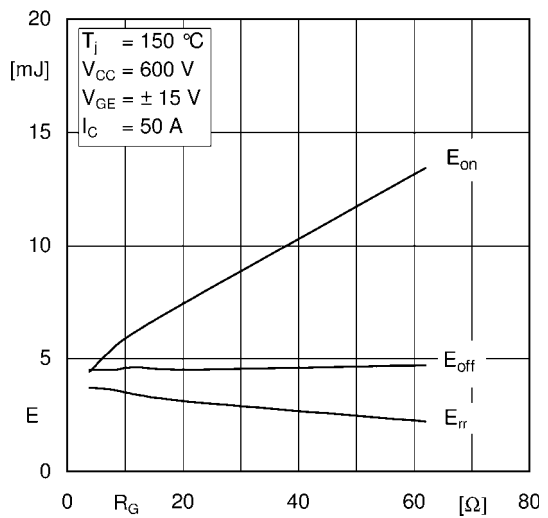


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

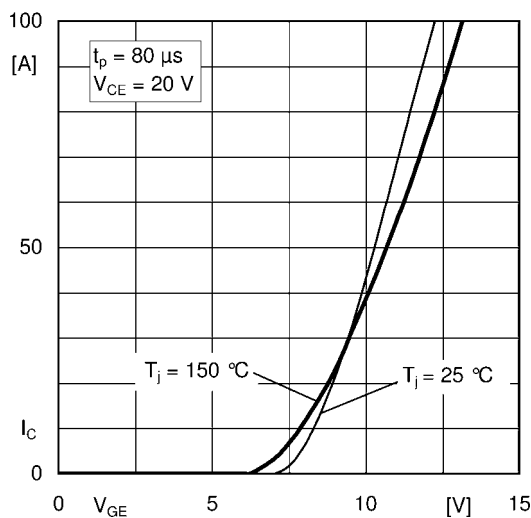


Fig. 5: Typ. transfer characteristic

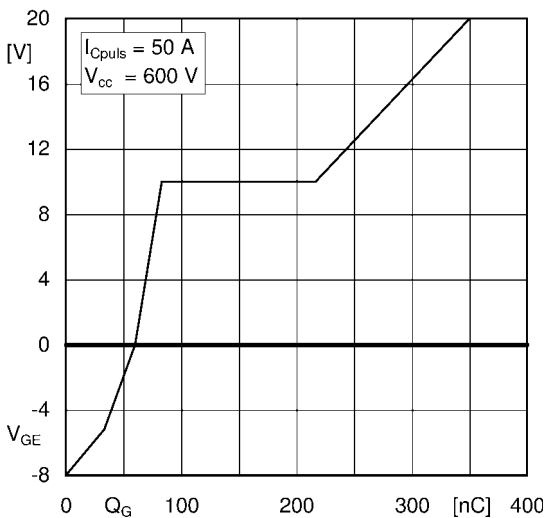


Fig. 6: Typ. gate charge characteristic

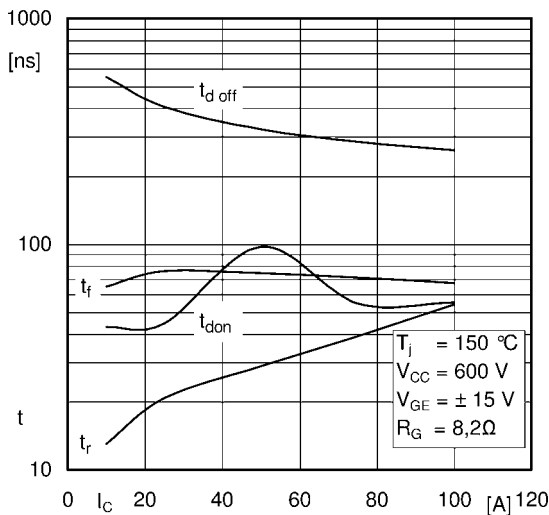


Fig. 7: Typ. switching times vs. I_C

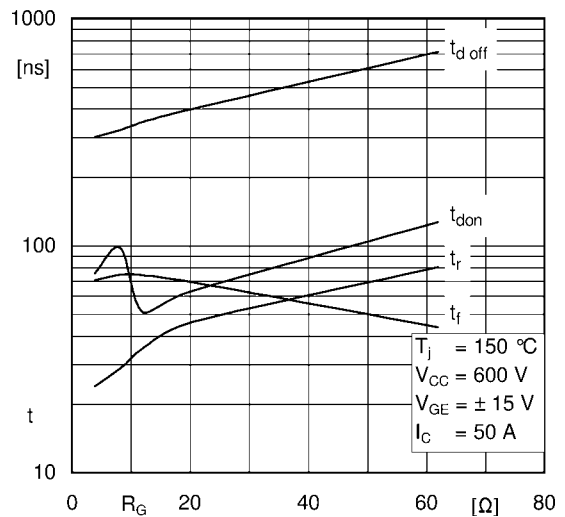


Fig. 8: Typ. switching times vs. gate resistor R_G

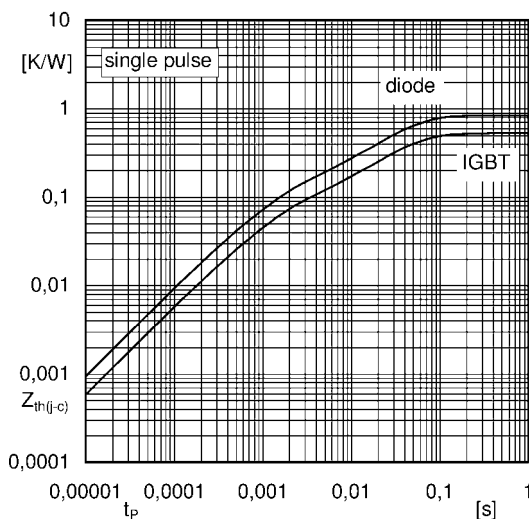


Fig. 9: Transient thermal impedance

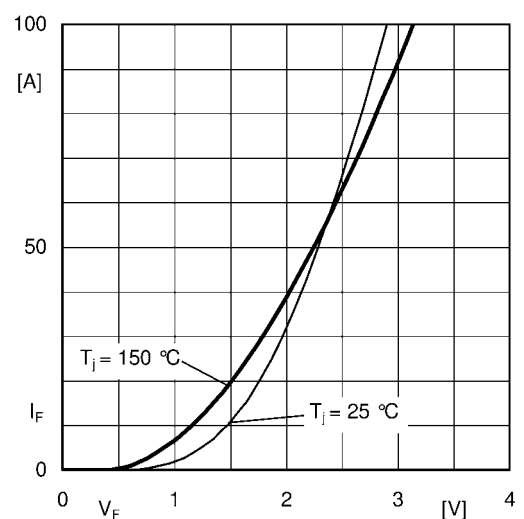


Fig. 10: CAL diode forward characteristic

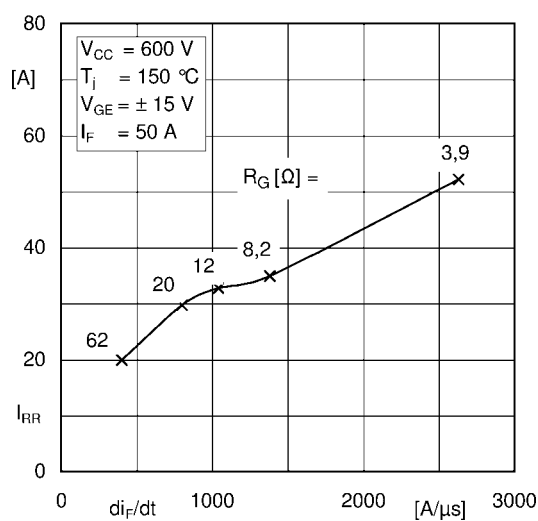


Fig. 11: CAL diode peak reverse recovery current

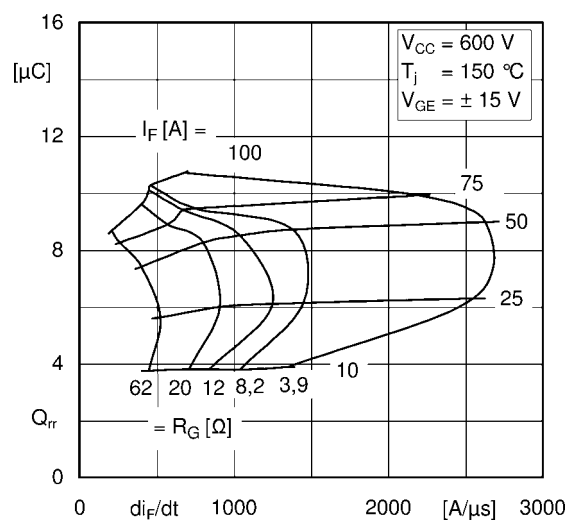
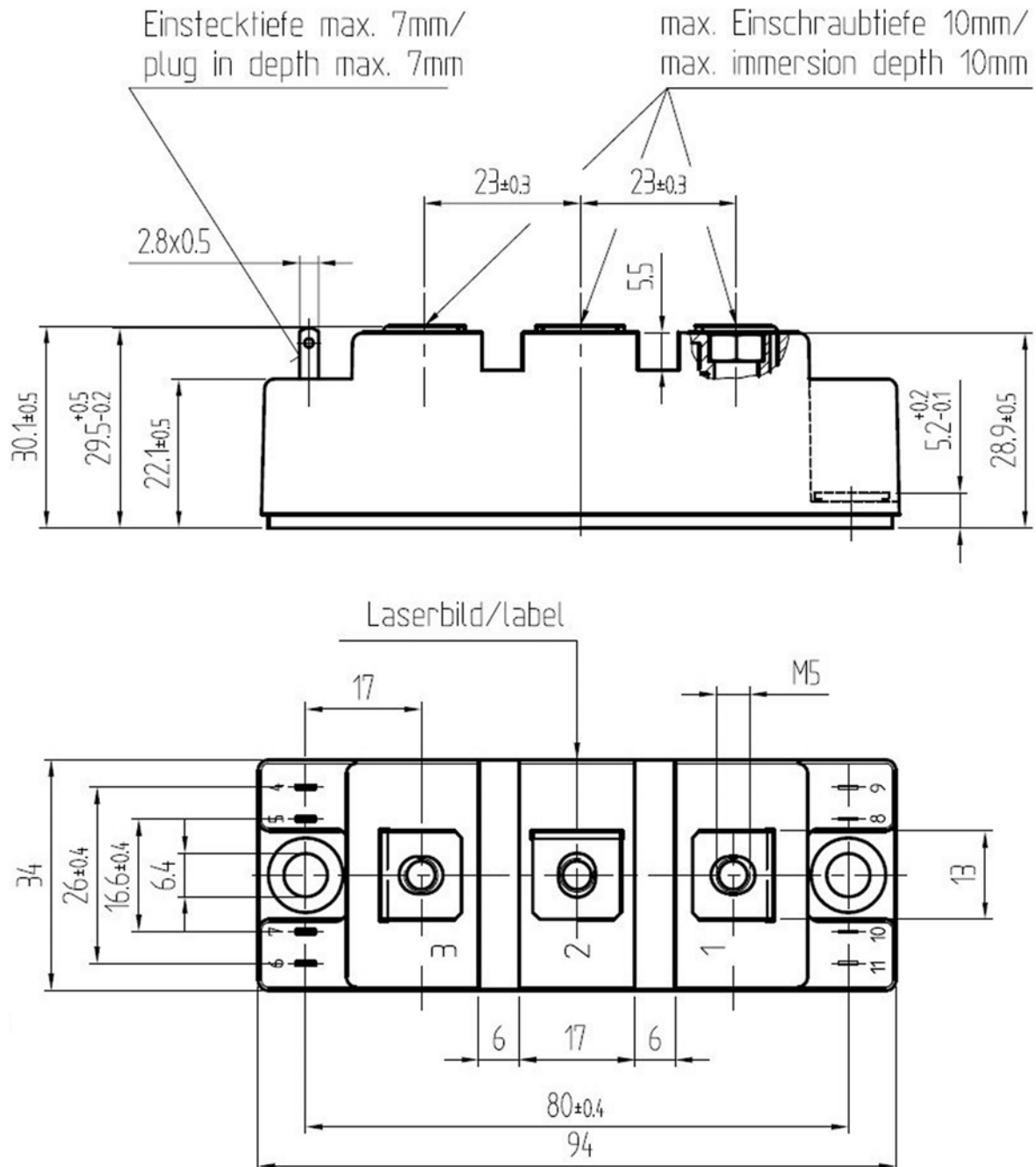
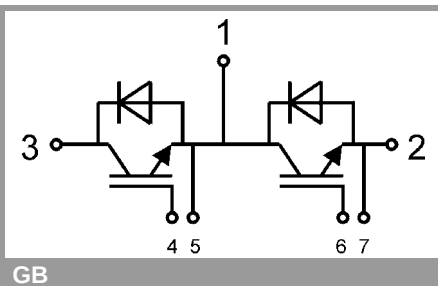


Fig. 12: Typ. CAL diode peak reverse recovery charge



Semitrans 2



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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.