SKM50GB12T4

SEMITRANS®2

Fast IGBT4 Modules

SKM50GB12T4

Features

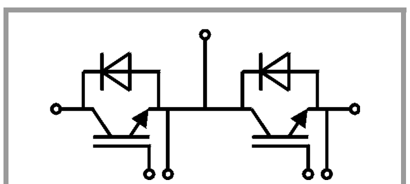
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x Icnom
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Isolated copper baseplate using DBC Technology (Direct Copper Bonding)

Typical Applications

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

Remarks

- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40 ... +150°C, product rel. results valid for T_j = 150°



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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 $V_{GE} \leq$ 15 V $V_{CES} \leq$ 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 V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.1	V
		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 V_{CE} = 1200 V	T_j = 25 °C		0.1	0.3	mA
		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 I_C = 50 A V_{GE} = ±15 V $R_{G\ on}$ = 8.2 Ω $R_{G\ off}$ = 8.2 Ω di/dt_{on} = 1700 A/µs di/dt_{off} = 670 A/µs	T_j = 150 °C		98		ns
t_r		T_j = 150 °C		29		ns
E_{on}		T_j = 150 °C		5.5		mJ
$t_{d(off)}$		T_j = 150 °C		325		ns
t_f		T_j = 150 °C		75		ns
E_{off}		T_j = 150 °C		4.5		mJ
$R_{th(j-c)}$	per IGBT				0.53	K/W

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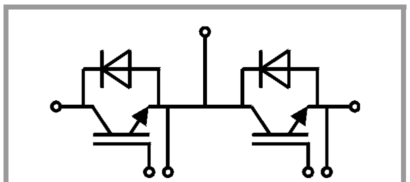

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 50 A V_{GE} = 0 V chip	T_j = 25 °C		2.22	2.54	V
		T_j = 150 °C		2.18	2.5	V
V_{F0}		T_j = 25 °C		1.3	1.5	V
		T_j = 150 °C		0.9	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 di/dt_{off} = 1380 A/µs V_{GE} = ±15 V V_{CC} = 600 V	T_j = 150 °C		35		A
Q_{rr}		T_j = 150 °C		8.7		µC
E_{rr}		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

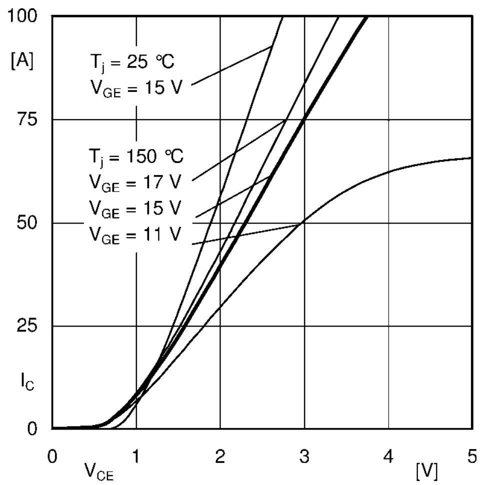


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

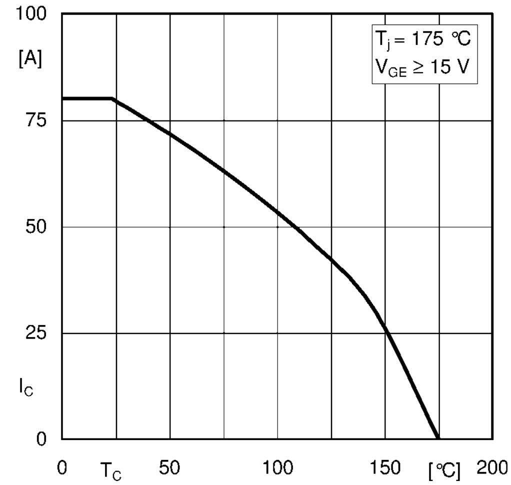


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

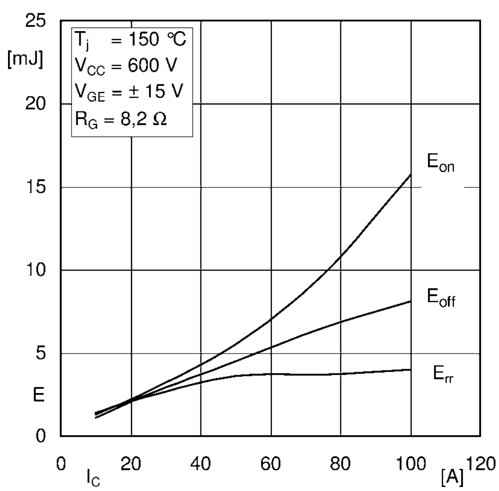


Fig. 3: Typ. turn-on /-off energy = f (I_C)

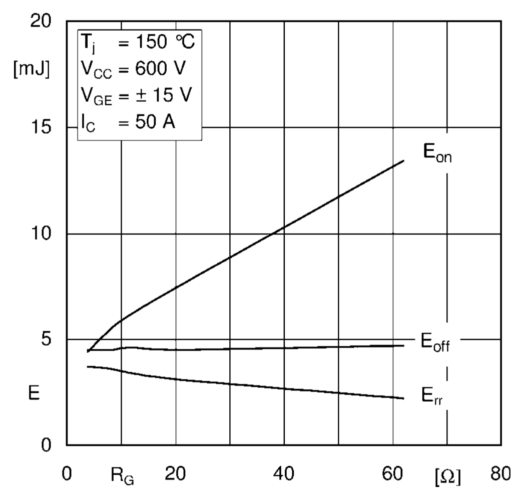


Fig. 4: Typ. turn-on /-off energy = f (R_G)

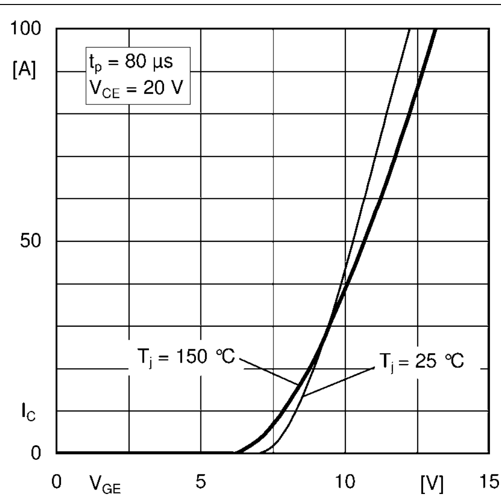


Fig. 5: Typ. transfer characteristic

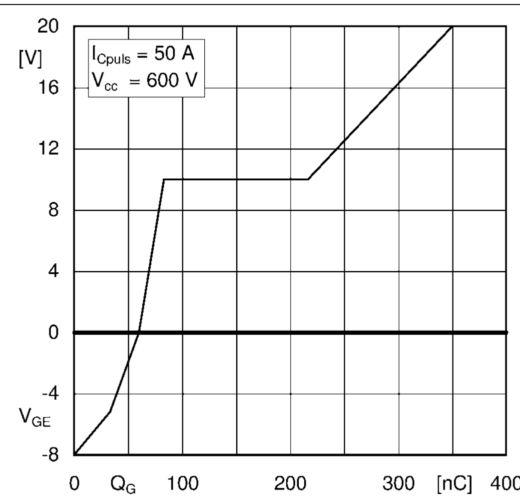


Fig. 6: Typ. gate charge characteristic

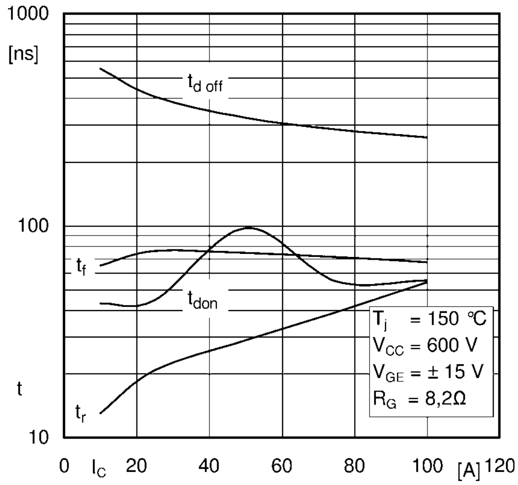


Fig. 7: Typ. switching times vs. I_C

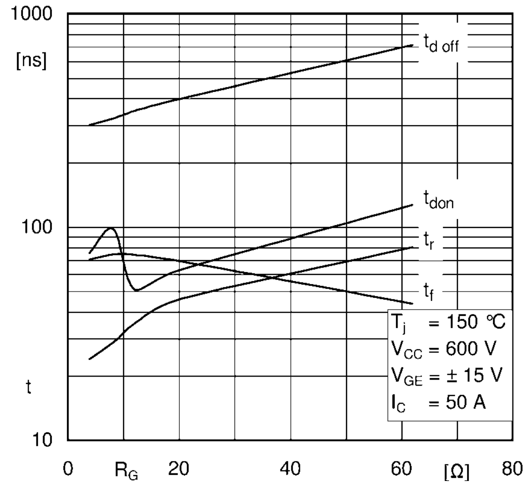


Fig. 8: Typ. switching times vs. gate resistor R_G

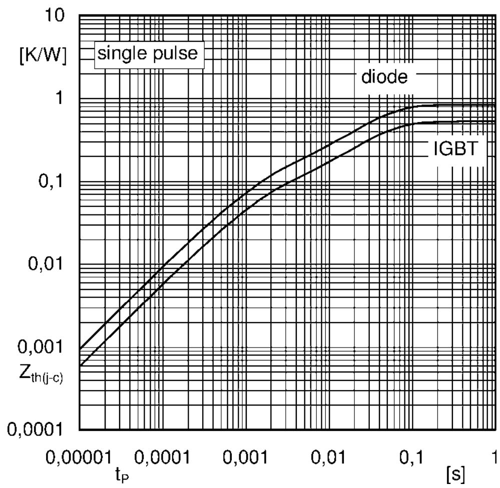


Fig. 9: Transient thermal impedance

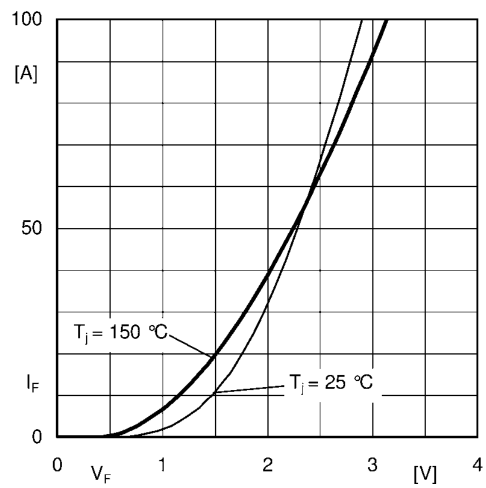


Fig. 10: CAL diode forward characteristic

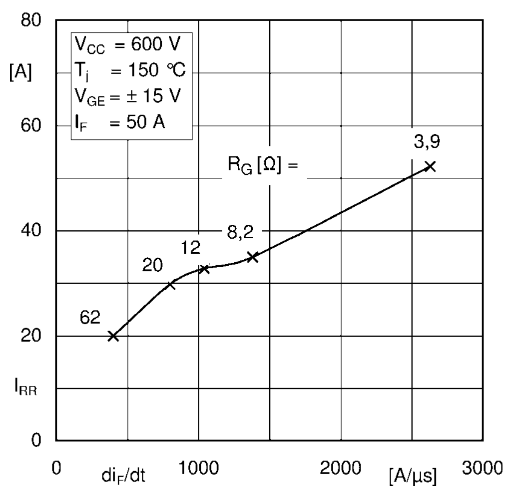


Fig. 11: CAL diode peak reverse recovery current

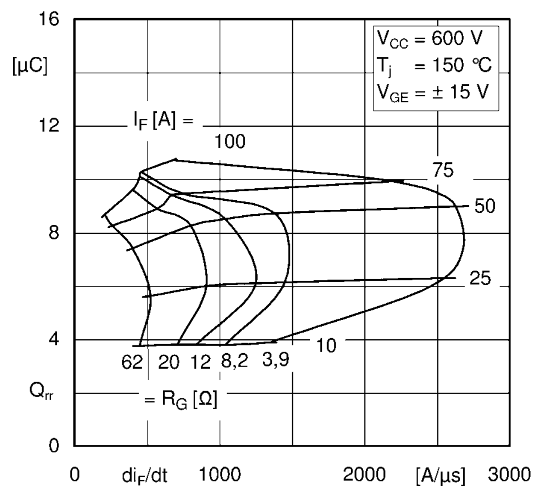
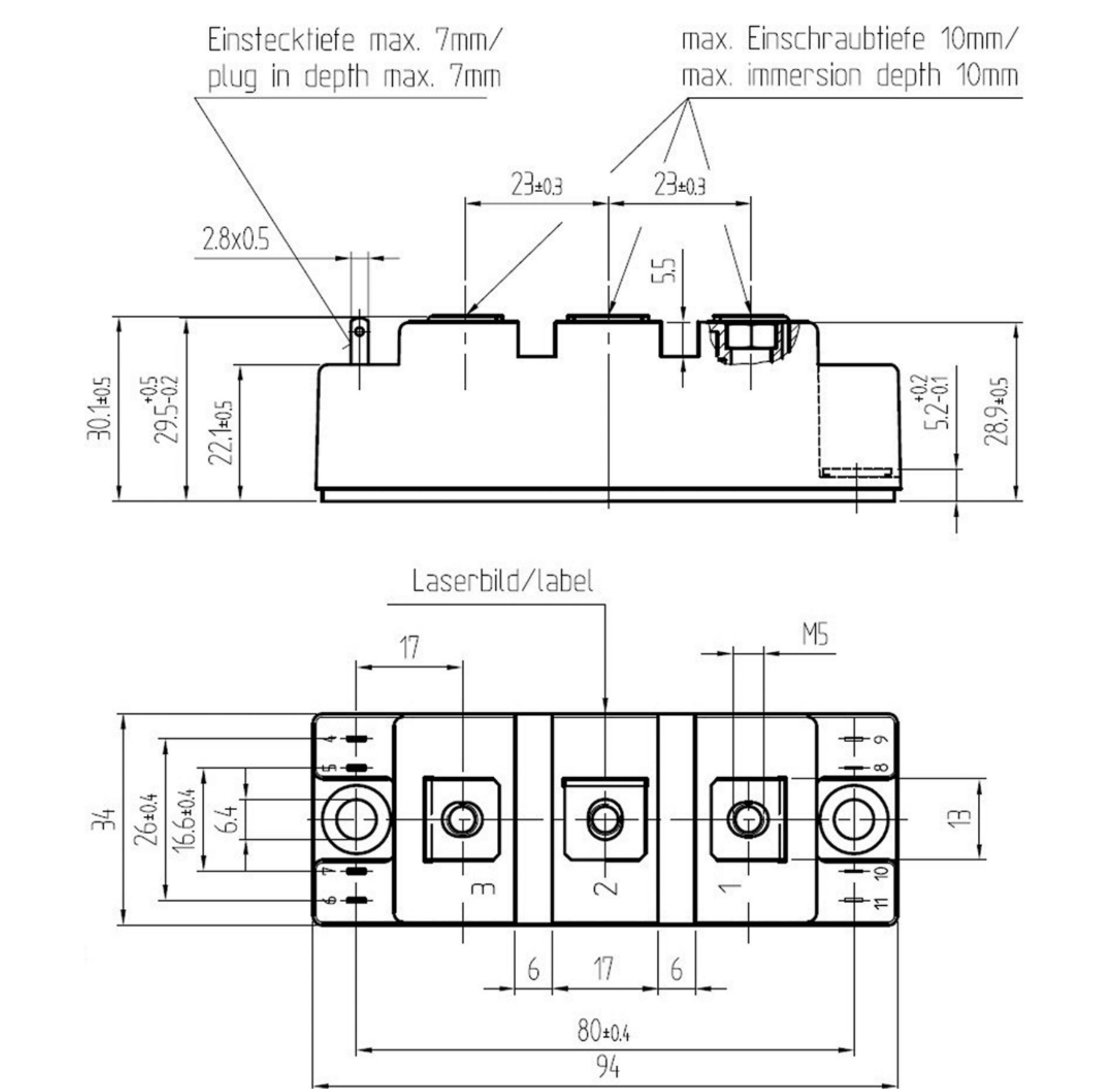


Fig. 12: Typ. CAL diode peak reverse recovery charge



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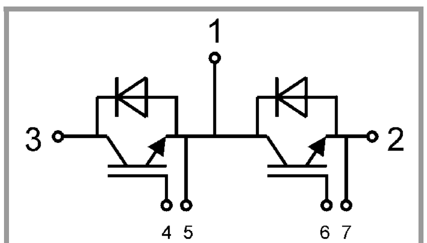

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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