SKM300GA12T4

SEMITRANS®4

Fast IGBT4 Modules

SKM300GA12T4

Features

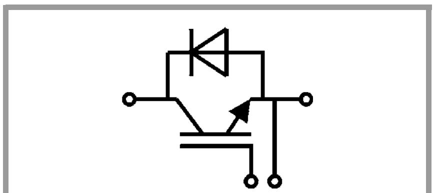
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x Icnom
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Isolated copper baseplate using DBC Technology (Direct Copper Bonding)

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	422	A
		T_c = 80 °C	324	A
I_{Cnom}			300	A
I_{CRM}	I_{CRM} = 3xI_{Cnom}		900	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	353	A
		T_c = 80 °C	264	A
I_{Fnom}			300	A
I_{FRM}	I_{FRM} = 3xI_{Fnom}		900	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		1548	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			500	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 = 300 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.1	V
		T_j = 150 °C		2.25	2.45	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		3.5	4.0	mΩ
		T_j = 150 °C		5.2	5.5	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 12 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		17.6		nF
C_{oes}		f = 1 MHz		1.16		nF
C_{res}		f = 1 MHz		0.94		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1700		nC
R_{Gint}	T_j = 25 °C			2.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 300 A V_{GE} = ±15 V $R_{G\,on}$ = 1.4 Ω $R_{G\,off}$ = 1.5 Ω di/dt_{on} = 7500 A/µs di/dt_{off} = 3350 A/µs	T_j = 150 °C		200		ns
t_r		T_j = 150 °C		51		ns
E_{on}		T_j = 150 °C		23.4		mJ
$t_{d(off)}$		T_j = 150 °C		448		ns
t_f		T_j = 150 °C		81		ns
E_{off}		T_j = 150 °C		26		mJ
$R_{th(j-c)}$	per IGBT				0.11	K/W

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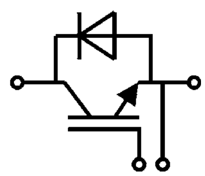

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 300 A V_{GE} = 0 V chip	T_j = 25 °C		2.17	2.49	V
		T_j = 150 °C		2.11	2.42	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		2.9	3.3	mΩ
		T_j = 150 °C		4.0	4.4	mΩ
I_{RRM}	I_F = 300 A di/dt_{off} = 7300 A/µs V_{GE} = ±15 V V_{CC} = 600 V	T_j = 150 °C		345		A
Q_{rr}		T_j = 150 °C		54		µC
E_{rr}		T_j = 150 °C		22.2		mJ
$R_{th(j-c)}$	per diode				0.17	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	terminal-chip	T_C = 25 °C		0.18		mΩ
		T_C = 125 °C		0.22		mΩ
$R_{th(c-s)}$	per module			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6, M4	2.5		5	Nm
						Nm
w					330	g

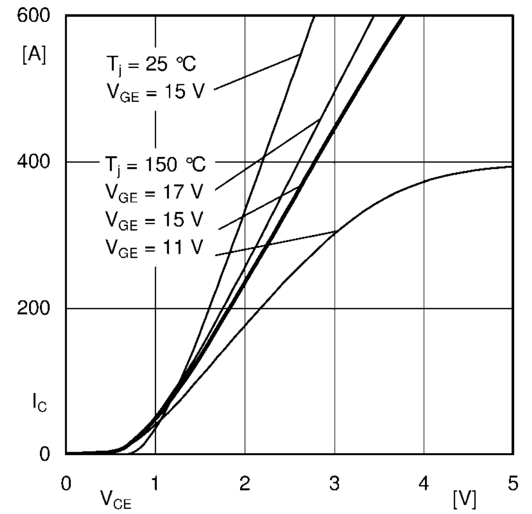


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

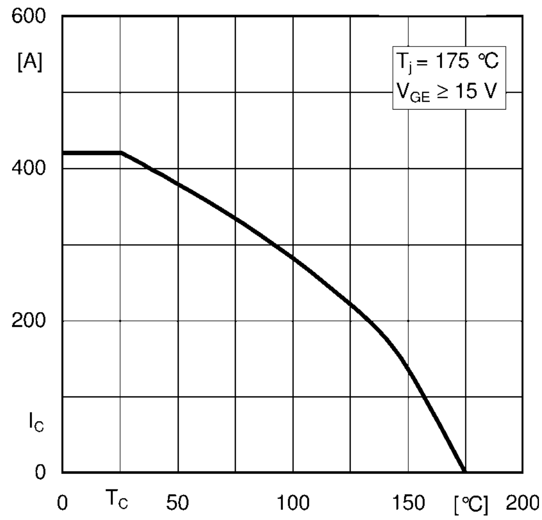


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

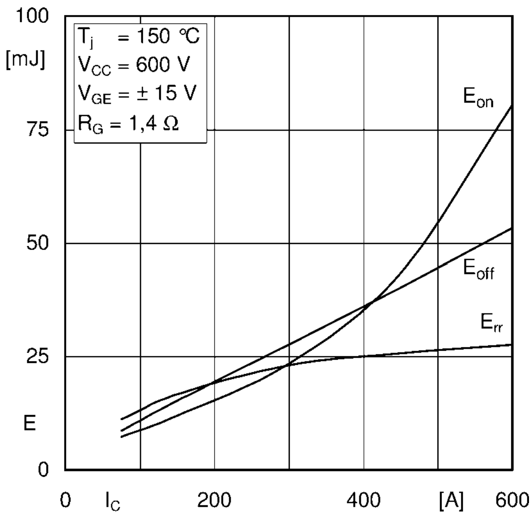


Fig. 3: Typ. turn-on /-off energy = f (I_C)

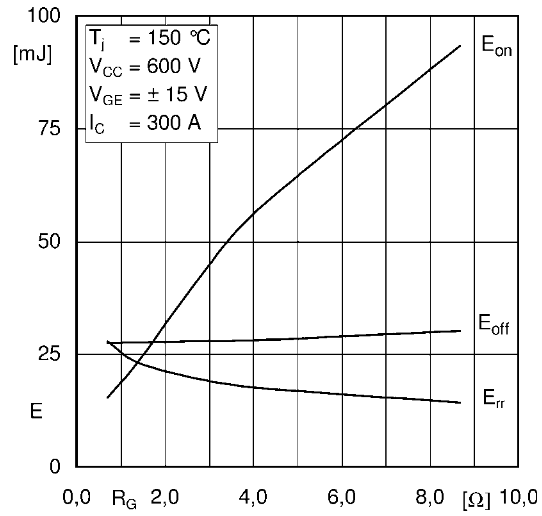


Fig. 4: Typ. turn-on /-off energy = f (R_G)

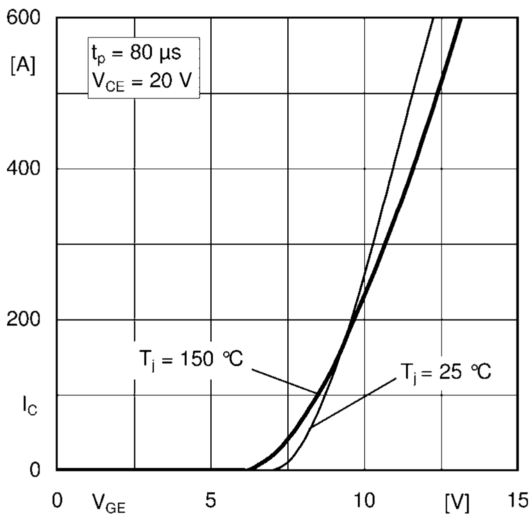


Fig. 5: Typ. transfer characteristic

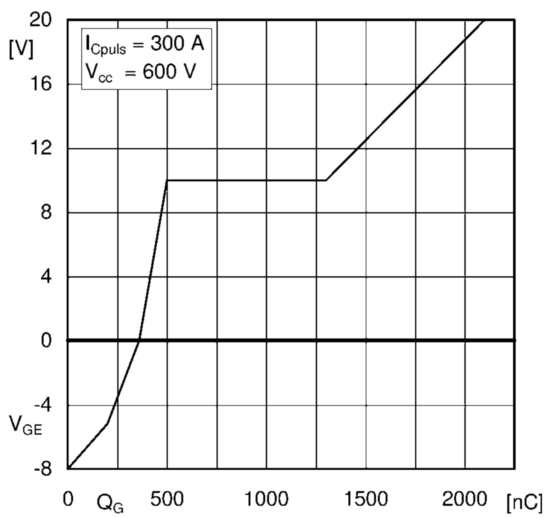


Fig. 6: Typ. gate charge characteristic

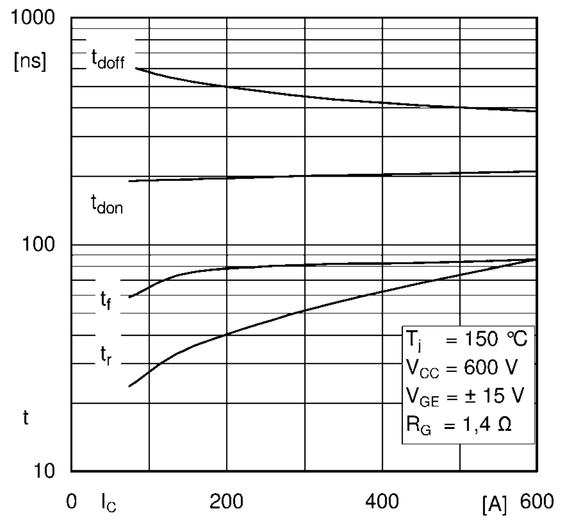


Fig. 7: Typ. switching times vs. I_C

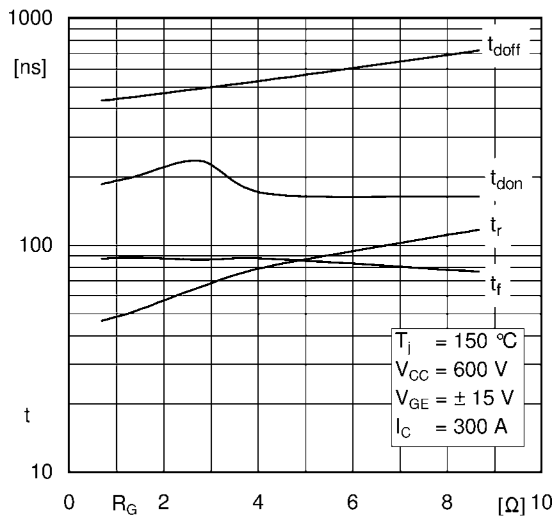


Fig. 8: Typ. switching times vs. gate resistor R_G

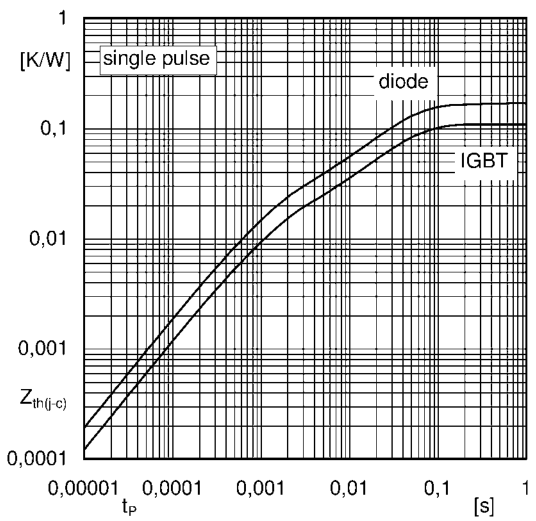


Fig. 9: Transient thermal impedance

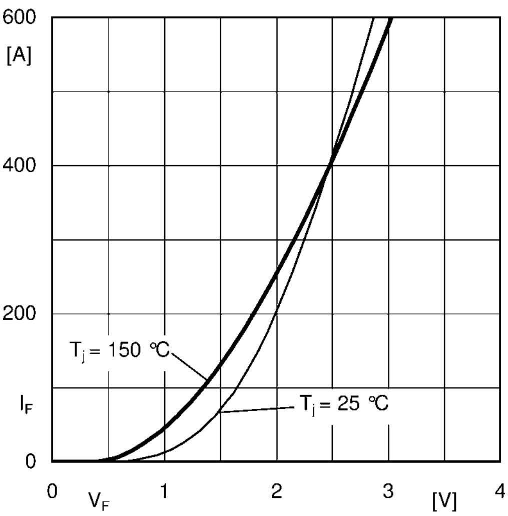


Fig. 10: CAL diode forward characteristic

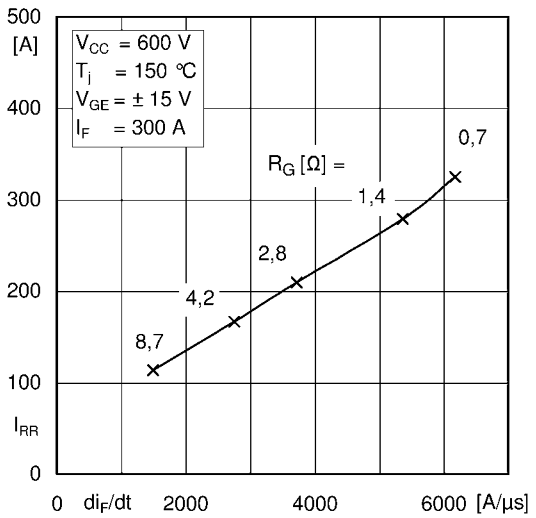


Fig. 11: CAL diode peak reverse recovery current

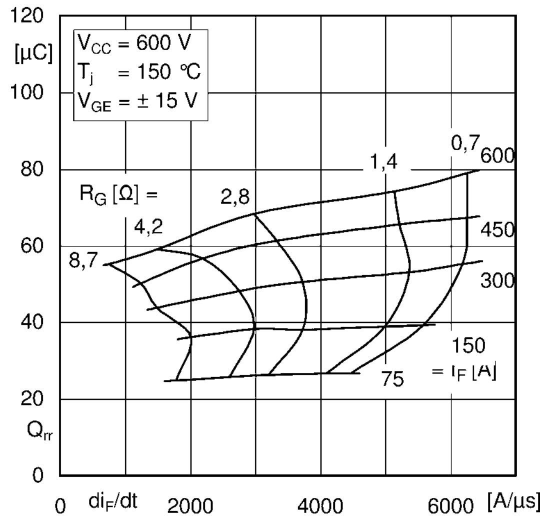
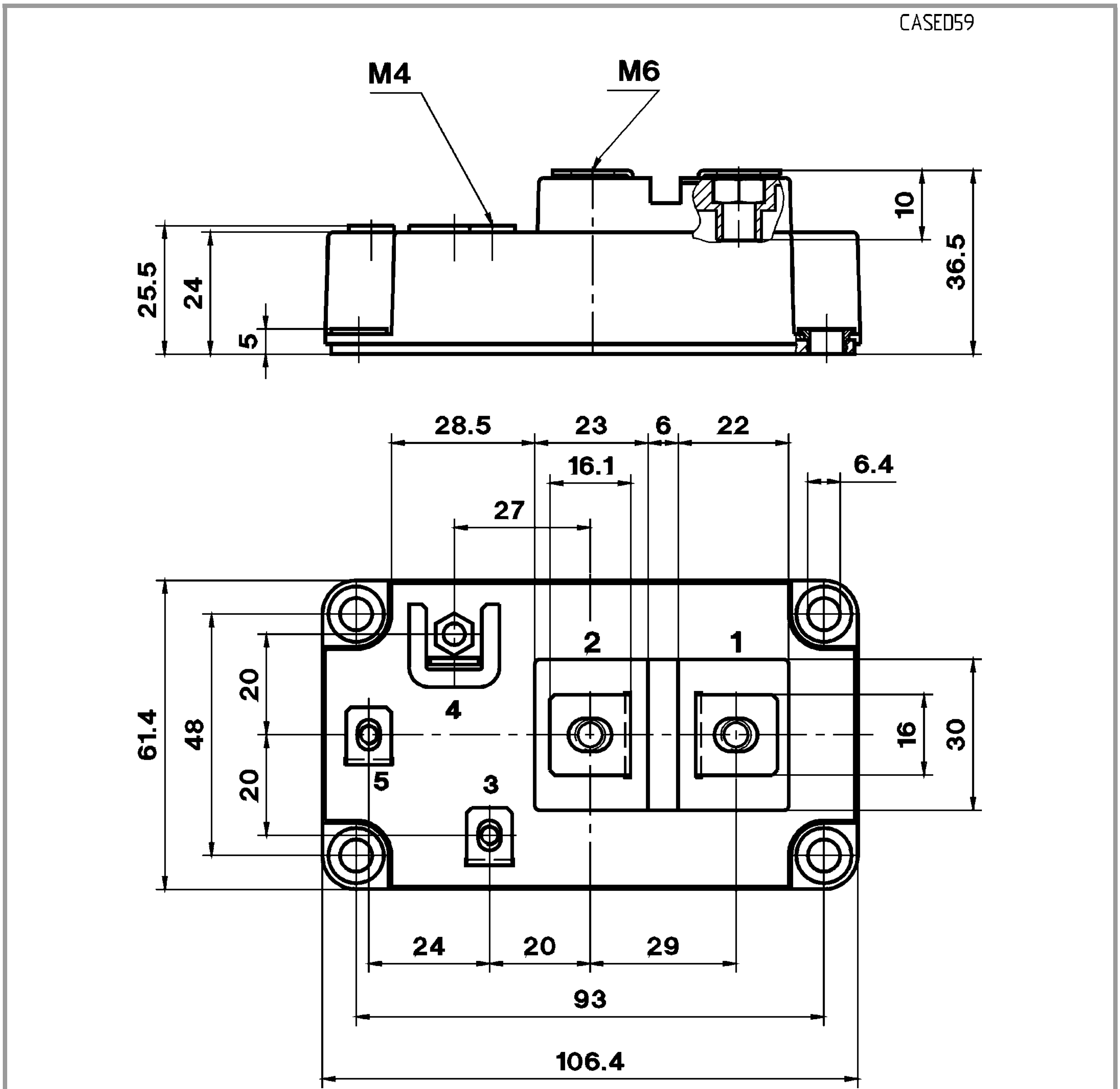


Fig. 12: Typ. CAL diode peak reverse recovery charge



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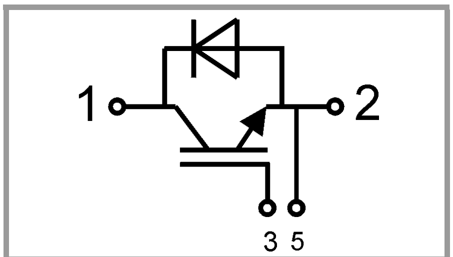

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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