SKM100GB07E3

SEMITRANS® 2

Trench IGBT Modules

SKM100GB07E3

Features*

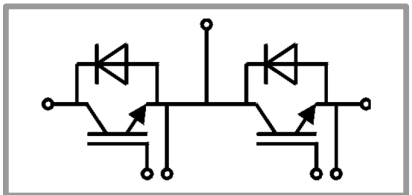
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_{Cnom}
- Fast & soft switching inverse CAL diodes
- Insulated copper baseplate using DCB Technology (Direct Copper Bonding)
- With integrated gate resistor

Typical Applications

- AC inverter drives
- UPS
- Electronic welders
- Wind power
- Public transport

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°C
- Use of soft R_G necessary



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 175 °C	T_c = 25 °C	128	A
		T_c = 80 °C	97	A
I_{Cnom}			100	A
I_{CRM}			300	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 360 V V_{GE} ≤ 15 V V_{CES} ≤ 650 V	T_j = 150 °C	6	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 175 °C	T_c = 25 °C	142	A
		T_c = 80 °C	104	A
I_{FRM}			200	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		820	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			200	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT						
$V_{CE(sat)}$	I_C = 100 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.45	1.85	V
		T_j = 150 °C		1.70	2.10	V
V_{CE0}	chiplevel	T_j = 25 °C		0.90	1.00	V
		T_j = 150 °C		0.82	0.90	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		5.5	8.5	mΩ
		T_j = 150 °C		8.8	12	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.6 mA		5.1	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 650 V, T_j = 25 °C				0.3	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		6.2		nF
C_{oes}		f = 1 MHz		0.38		nF
C_{res}		f = 1 MHz		0.18		nF
Q_G	V_{GE} = - 8V ... + 15 V			800		nC
R_{Gint}	T_j = 25 °C			2.0		Ω
$t_{d(on)}$	V_{CC}= 300 V I_C= 100 A V_{GE} =+15/-15V R_{Gon}= 3 Ω R_{Goff}= 1.5 Ω di/dt$_{on}$= 2700 A/µs di/dt$_{off}$= 1580 A/µs dv/dt = 4150 V/µs	T_j = 150 °C		70		ns
t_r		T_j = 150 °C		35		ns
E_{on}		T_j = 150 °C		3.2		mJ
$t_{d(off)}$		T_j = 150 °C		230		ns
t_f		T_j = 150 °C		55		ns
E_{off}		T_j = 150 °C		3.2		mJ
$R_{th(j-c)}$	per IGBT				0.467	K/W
$R_{th(c-s)}$	per IGBT, P12 (reference)			0.081		K/W
$R_{th(c-s)}$	per IGBT, HP-PCM			0.045		K/W

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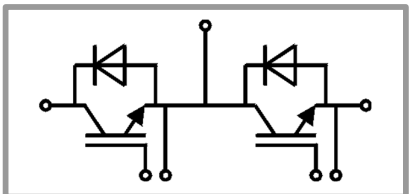

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 100 A, V_{GE} = 0 V, chiplevel	T_j = 25 °C		1.40	1.76	V
		T_j = 150 °C		1.38	1.77	V
V_{F0}	chiplevel	T_j = 25 °C		1.04	1.24	V
		T_j = 150 °C		0.85	0.99	V
r_F	chiplevel	T_j = 25 °C		3.6	5.3	mΩ
		T_j = 150 °C		5.3	7.8	mΩ
I_{RRM}	V_{CC} = 300 V, I_F = 100 A, V_{GE} = -15 V, di/dt_{off} = 2450 A/µs	T_j = 150 °C		85		A
Q_{rr}		T_j = 150 °C		9.8		µC
E_{rr}		T_j = 150 °C		2		mJ
$R_{th(j-c)}$	per diode				0.528	K/W
$R_{th(c-s)}$	per diode, P12 (reference)			0.087		K/W
$R_{th(c-s)}$	per diode, HP-PCM			0.048		K/W
Module						
L_{CE}				30		nH
$R_{CC'+EE'}$	measured per switch	T_j = 25 °C		0.65		mΩ
		T_j = 150 °C		1.09		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling, P12 (reference)			0.021		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, P12 (reference)			0.034		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, HP-PCM			0.019		K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminal M5	2.5		5	Nm
				-		Nm
w					160	g

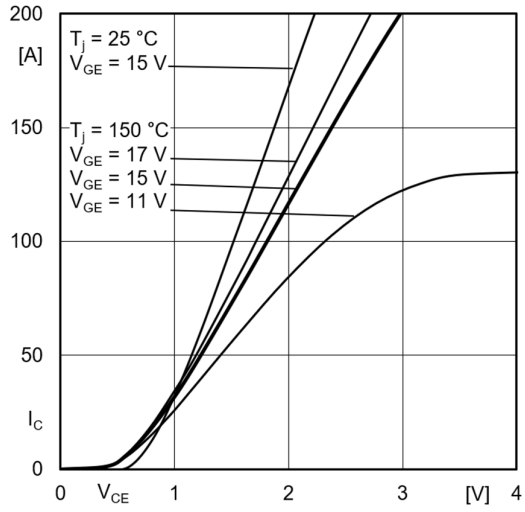


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

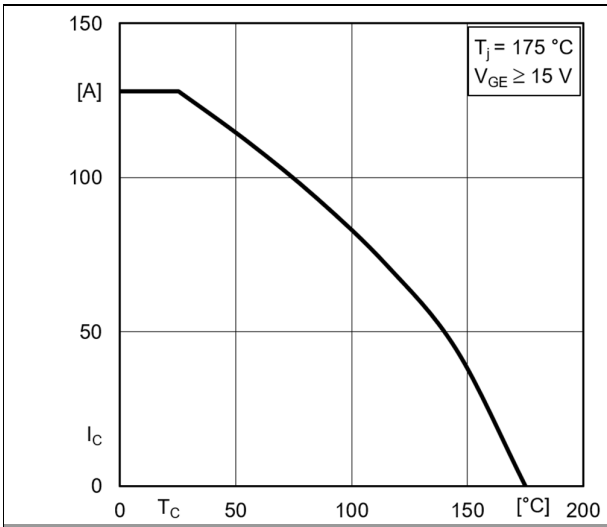


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

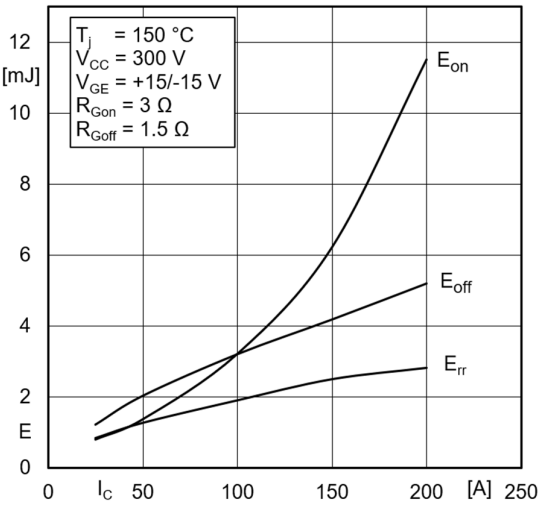


Fig. 3: Typ. turn-on /-off energy = f (I_C)

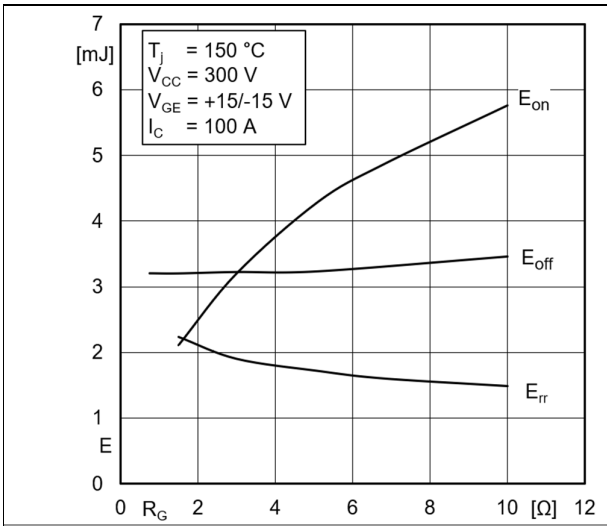


Fig. 4: Typ. turn-on /-off energy = f (R_G)

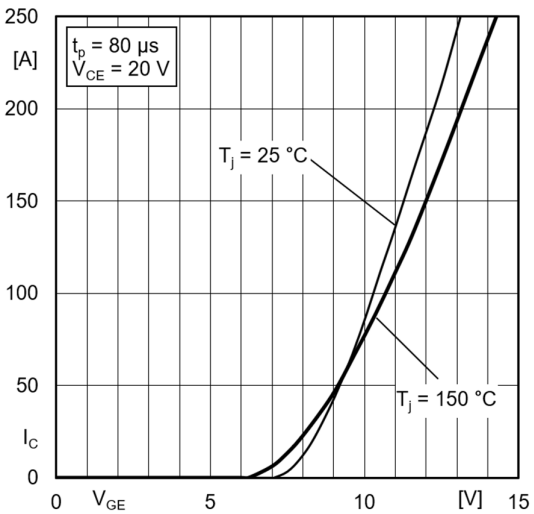


Fig. 5: Typ. transfer characteristic

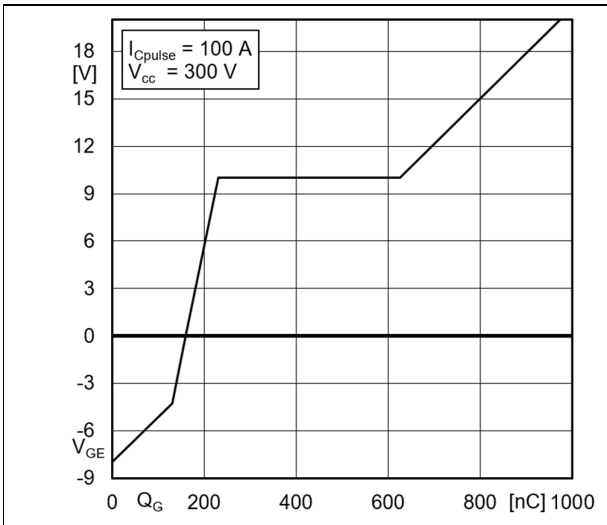


Fig. 6: Typ. gate charge characteristic

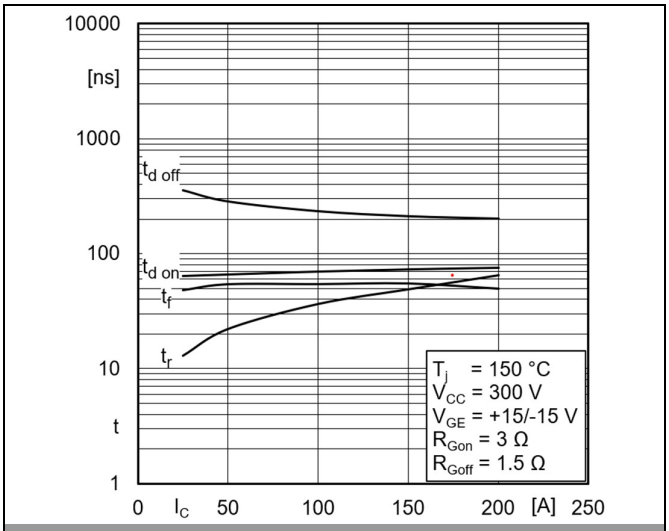


Fig. 7: Typ. switching times vs. I_C

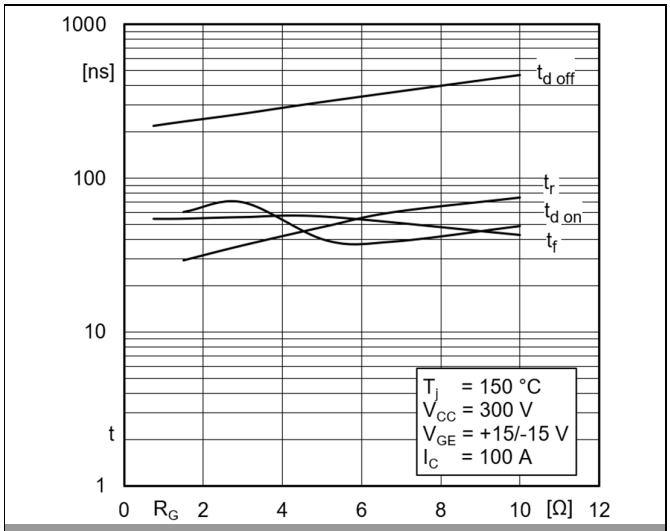


Fig. 8: Typ. switching times vs. gate resistor R_G

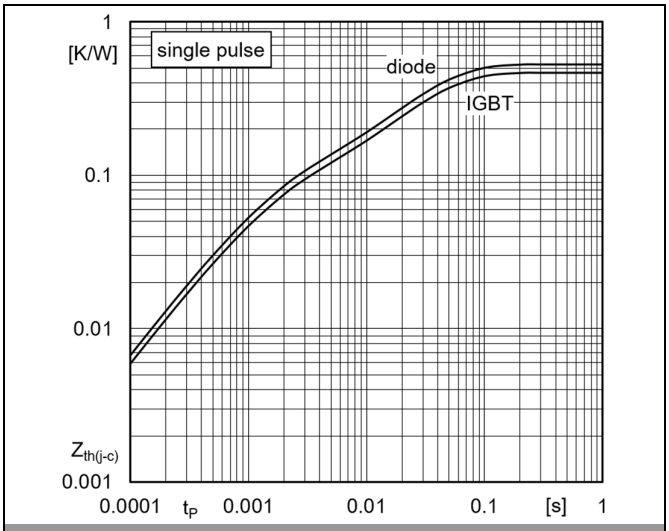


Fig. 9: Transient thermal impedance

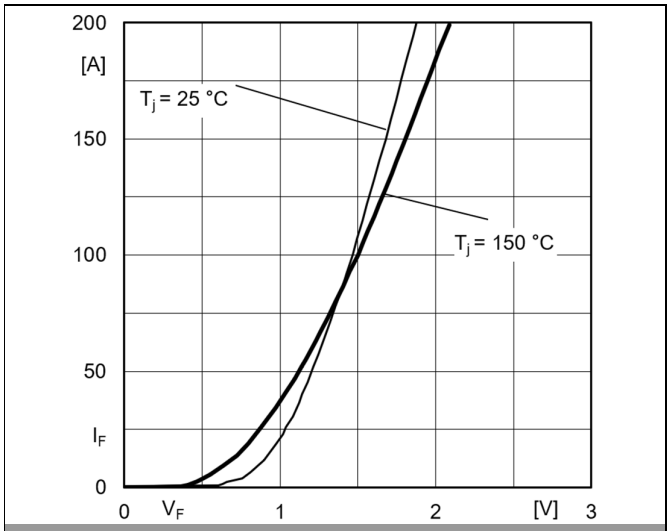


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

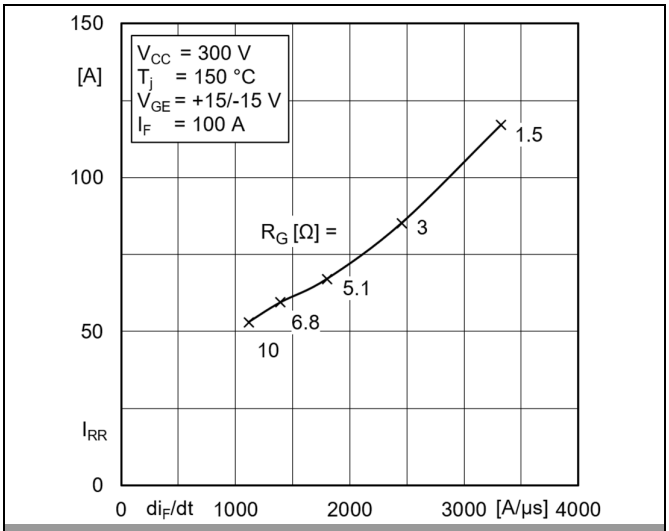


Fig. 11: CAL diode peak reverse recovery current

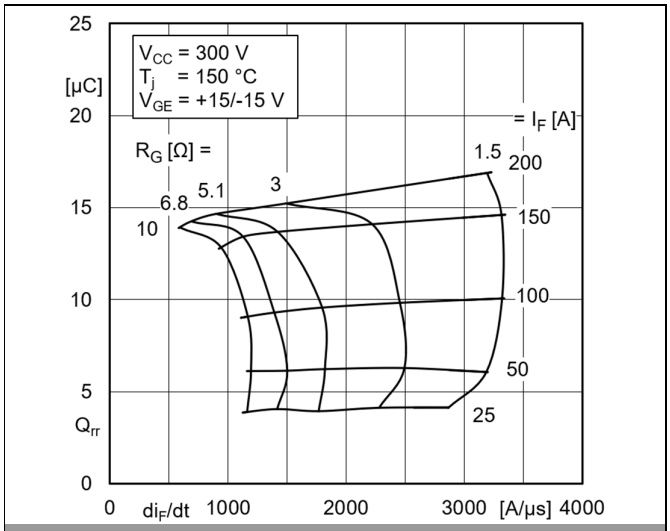
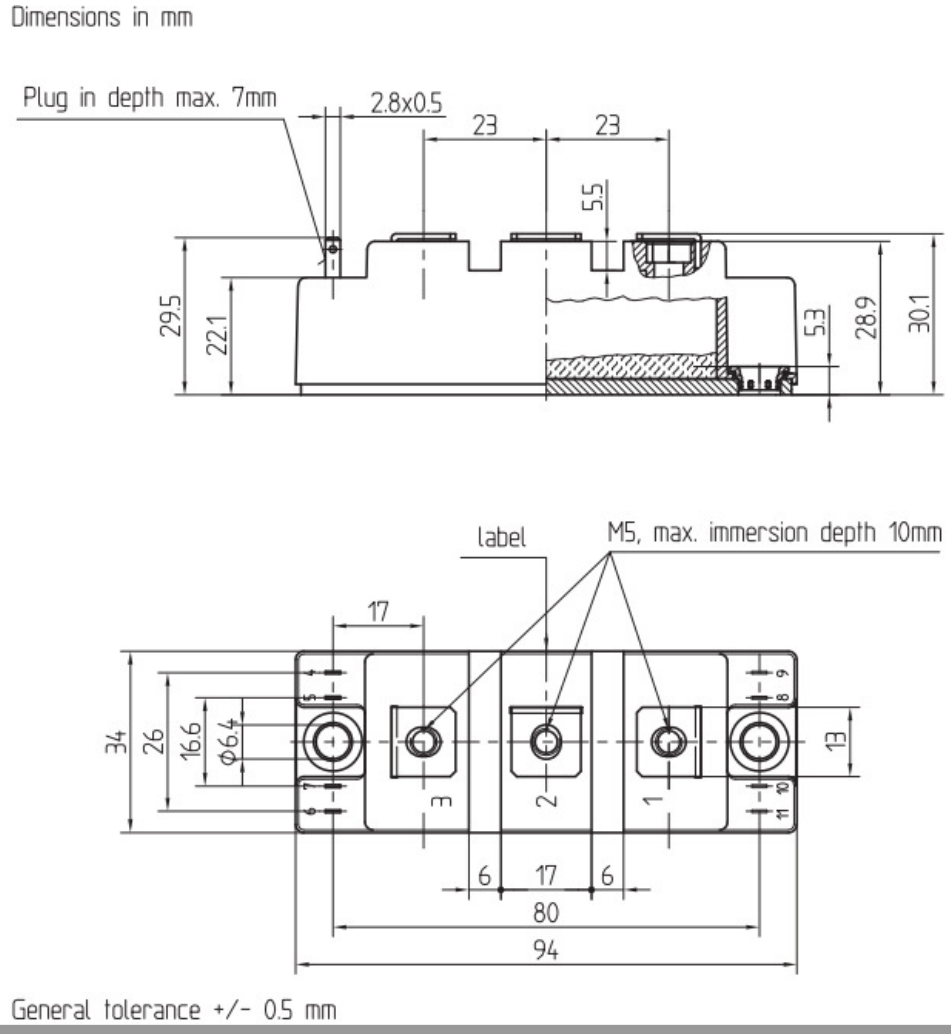
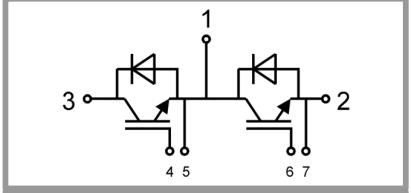


Fig. 12: Typ. CAL diode peak reverse recovery charge



Pinout and Dimensions



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

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