

SKM200GB12F4SiC2



SEMITRANS® 3

High Speed IGBT4 Modules

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Features*

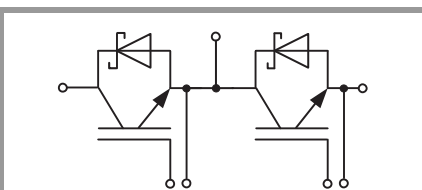
- IGBT4 = 4. Generation Fast Trench (High Speed) IGBT (Infineon)
- With Silicon Carbide Schottky diodes (ROHM)
- Insulated copper baseplate using DBC Technology (Direct Bonded Copper)
- UL recognized, file no. E63532
- With integrated gate resistor
- For higher switching frequencies

Typical Applications

- AC inverter drives
- UPS
- Electronic welders
- DC/DC converters

Remarks

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



GB

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V	
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	312	A
		$T_c = 80^\circ\text{C}$	239	A
I_{Cnom}		200	A	
I_{CRM}		400	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$ $R_{G\ on/off} \geq 2\ \Omega$	$T_j = 150^\circ\text{C}$	10	μs
T_j		-40 ... 175	$^\circ\text{C}$	
Inverse diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1200	V	
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	246	A
		$T_c = 80^\circ\text{C}$	187	A
I_{FRM}		336	A	
I_{FSM}	$t_p = 8.3\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$	531	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Module				
$I_{t(RMS)}$		500	A	
T_{stg}		-40 ... 125	$^\circ\text{C}$	
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 200\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	2.06	2.42	V
		$T_j = 150^\circ\text{C}$	2.59	2.97	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	1.10	1.28	V
		$T_j = 150^\circ\text{C}$	0.95	1.13	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	4.8	5.7	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	8.2	9.2	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 7.6\text{ mA}$	5.1	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$		2.7	mA
		$T_j = 150^\circ\text{C}$		-	mA
C_{ies}	$V_{CE} = 25\text{ V}$		12.3		nF
C_{oes}	$V_{GE} = 0\text{ V}$		0.81		nF
C_{res}			0.69		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		1134		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		2.4		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 200\text{ A}$		133		ns
t_r	$V_{GE} = +15/-15\text{ V}$		28		ns
E_{on}	$R_{G\ on} = 1\ \Omega$		3.5		mJ
$t_{d(off)}$	$R_{G\ off} = 1\ \Omega$		336		ns
t_f	$di/dt_{on} = 7560\text{ A}/\mu\text{s}$ $di/dt_{off} = 2760\text{ A}/\mu\text{s}$		65		ns
E_{off}	$dv/dt = 4590\text{ V}/\mu\text{s}$ $L_s = 25\text{ nH}$		14		mJ
$R_{th(j-c)}$	per IGBT			0.115	K/W

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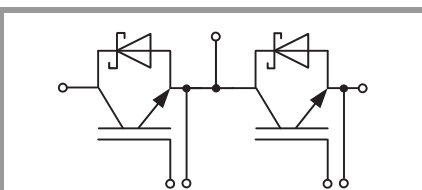
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{SD}$	$I_F = 160\text{ A}$ $V_{GE} = 0\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$		1.40	1.60	V
		$T_j = 150^\circ\text{C}$		1.81	2.10	V
V_{F0}	chipllevel	$T_j = 25^\circ\text{C}$		0.95	1.05	V
		$T_j = 150^\circ\text{C}$		0.83	0.90	V
r_F	chipllevel	$T_j = 25^\circ\text{C}$		2.8	3.4	m Ω
		$T_j = 150^\circ\text{C}$		6.1	7.5	m Ω
C_j	f = 1 MHz, $V_R = 800\text{ V}$, $T_j = 25^\circ\text{C}$, parallel to C_{oss}			0.68		nF
Q_C	$V_R = 800\text{ V}$, $di/dt_{off} = 500\text{ A}/\mu\text{s}$			0.53		μC
$R_{th(j-c)}$	per diode				0.21	K/W
Module						
L_{CE}				15		nH
$R_{CC'+EE'}$	measured per switch	$T_C = 25^\circ\text{C}$		0.55		m Ω
		$T_C = 125^\circ\text{C}$		0.85		m Ω
$R_{th(c-s)1}$	calculated without thermal coupling ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
						Nm
W					325	g



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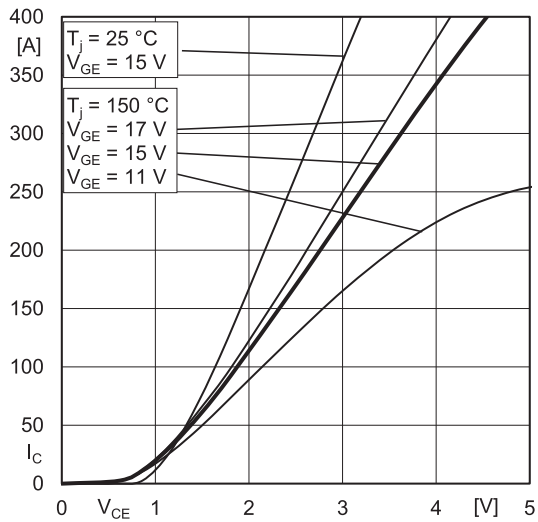


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

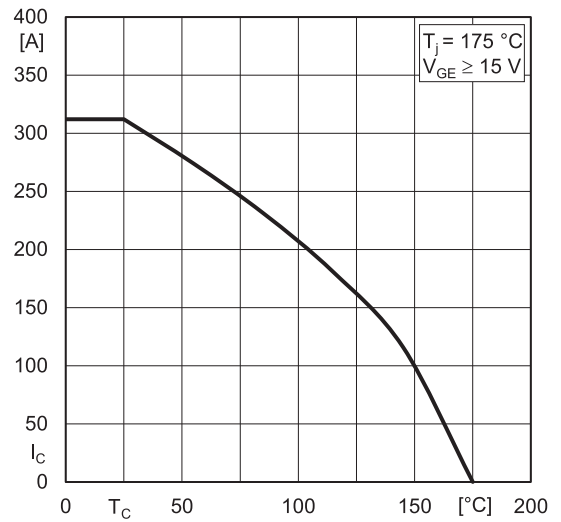


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

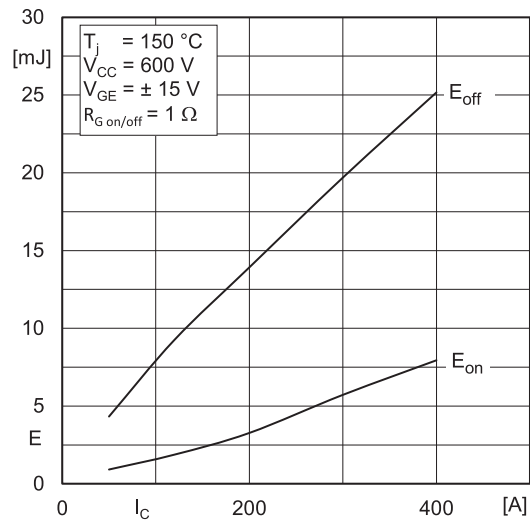


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

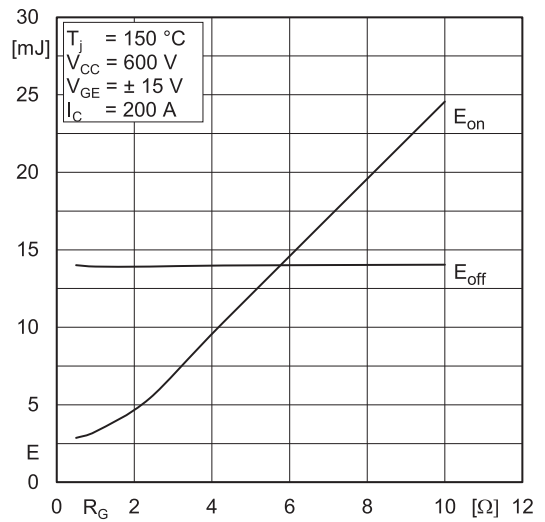


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

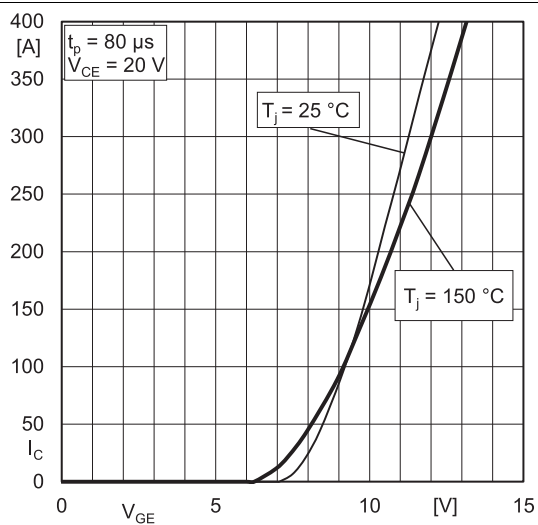


Fig. 5: Typ. transfer characteristic

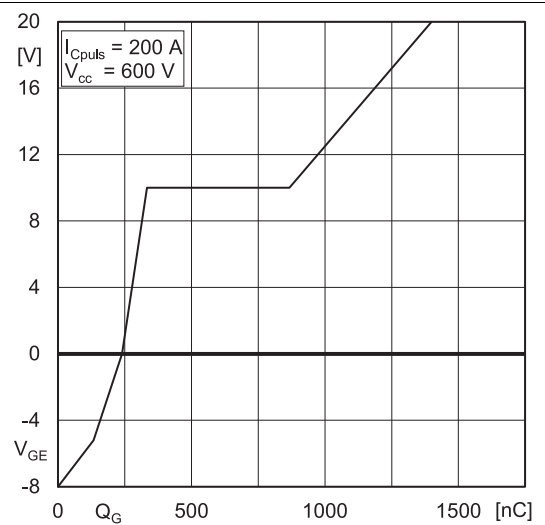


Fig. 6: Typ. gate charge characteristic

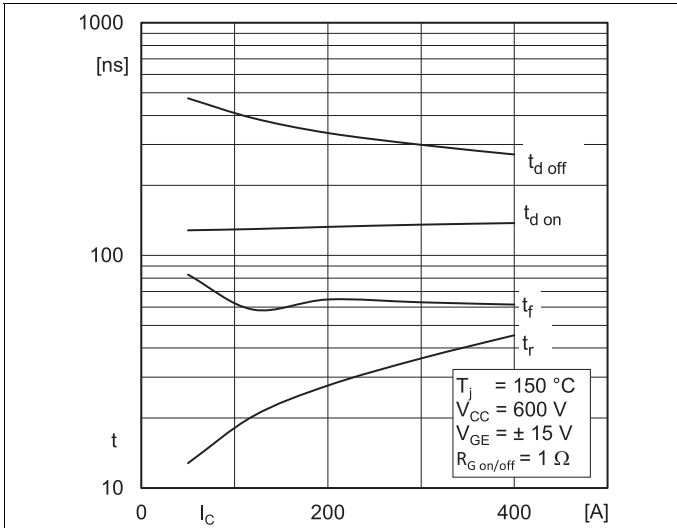


Fig. 7: Typ. switching times vs. I_C

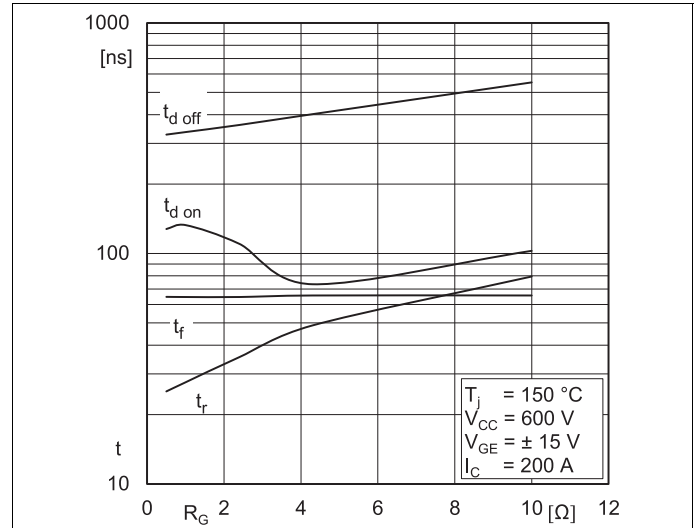


Fig. 8: Typ. switching times vs. gate resistor R_G

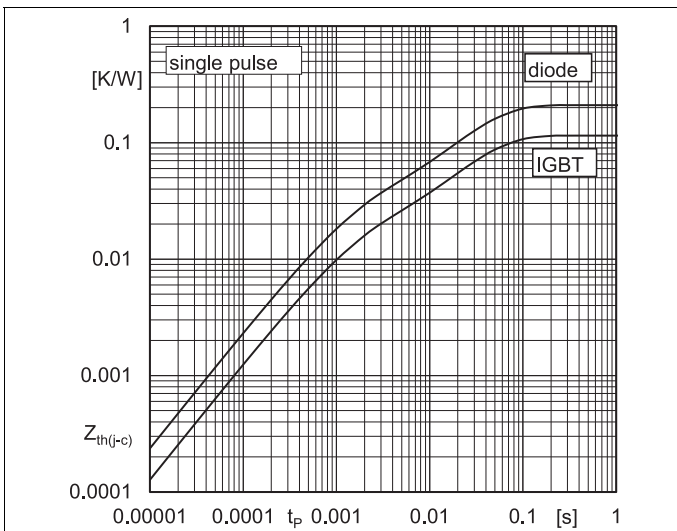


Fig. 9: Transient thermal impedance

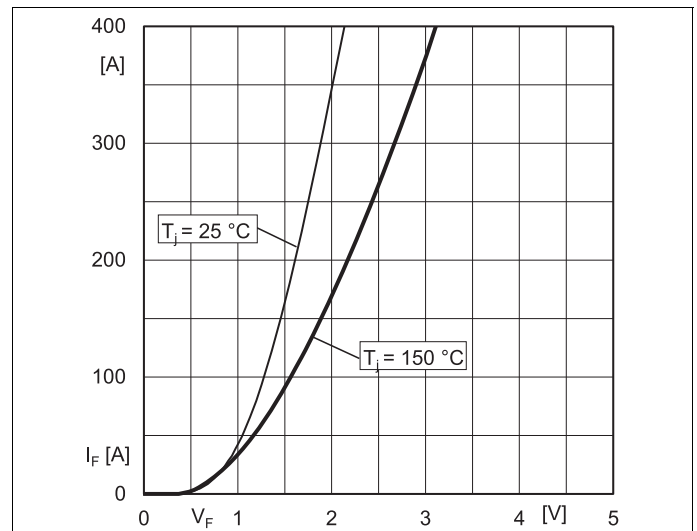


Fig. 10: Typ. Diode forward charact., incl. R_{CC+EE}

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

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