

SKM150GB17E4



SEMITRANS® 2

IGBT4 Modules

SKM150GB17E4

Features

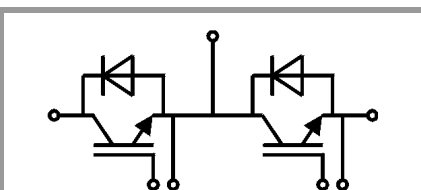
- IGBT4 = 4. generation medium fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. Generation CAL-Diode
- Insulated copper baseplate using DBC Technology (Direct Copper Bonding)
- With integrated Gate resistor
- For switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications*

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

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}	$T_j = 25^\circ\text{C}$	1700	V	
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	261	A
		$T_c = 80^\circ\text{C}$	198	A
I_{Cnom}		150	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	450	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 1000\text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 1700\text{ V}$			
T_j		-40 ... 175	$^\circ\text{C}$	
Inverse diode				
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	169	A
		$T_c = 80^\circ\text{C}$	125	A
I_{Fnom}		150	A	
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	300	A	
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$	950	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Module				
$I_{t(RMS)}$		200	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					
$V_{CE(sat)}$	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.90	2.20	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	1.1	1.2	V
		$T_j = 150^\circ\text{C}$	1	1.1	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	5.33	6.67	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	8.33	9.00	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1700\text{ V}$	$T_j = 25^\circ\text{C}$		2	mA
		$T_j = 150^\circ\text{C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$		12		nF
C_{oes}	$V_{GE} = 0\text{ V}$		0.50		nF
C_{res}			0.38		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		1200		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		5		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$ $I_C = 150\text{ A}$	$T_j = 150^\circ\text{C}$	234		ns
t_r	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	41		ns
E_{on}	$R_{Gon} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	67		mJ
$t_{d(off)}$	$R_{Goff} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	671		ns
t_f	$di/dt_{on} = 3500\text{ A}/\mu\text{s}$ $di/dt_{off} = 890\text{ A}/\mu\text{s}$ $du/dt = 5440\text{ V}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	144		ns
		$T_j = 150^\circ\text{C}$			
E_{off}		$T_j = 150^\circ\text{C}$	59		mJ
$R_{th(j-c)}$	per IGBT			0.162	K/W

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- Recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results valid for $T_j = 150^\circ\text{C}$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$		1.98	2.37	V
		$T_j = 150^\circ\text{C}$		2.11	2.52	V
V_{F0}	chipllevel	$T_j = 25^\circ\text{C}$		1.32	1.56	V
		$T_j = 150^\circ\text{C}$		1.08	1.22	V
r_F	chipllevel	$T_j = 25^\circ\text{C}$		4.4	5.4	m Ω
		$T_j = 150^\circ\text{C}$		6.9	8.7	m Ω
I_{RRM}	$I_F = 150\text{ A}$	$T_j = 150^\circ\text{C}$		77		A
Q_{rr}	$di/dt_{off} = 2410\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		46		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$ $V_{CC} = 1200\text{ V}$	$T_j = 150^\circ\text{C}$		32		mJ
$R_{th(j-c)}$	per diode				0.345	K/W
Module						
L_{CE}				30		nH
$R_{CC'+EE'}$	terminal-chip	$T_c = 25^\circ\text{C}$		0.65		m Ω
		$T_c = 125^\circ\text{C}$		1.09		m Ω
$R_{th(c-s)}$	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



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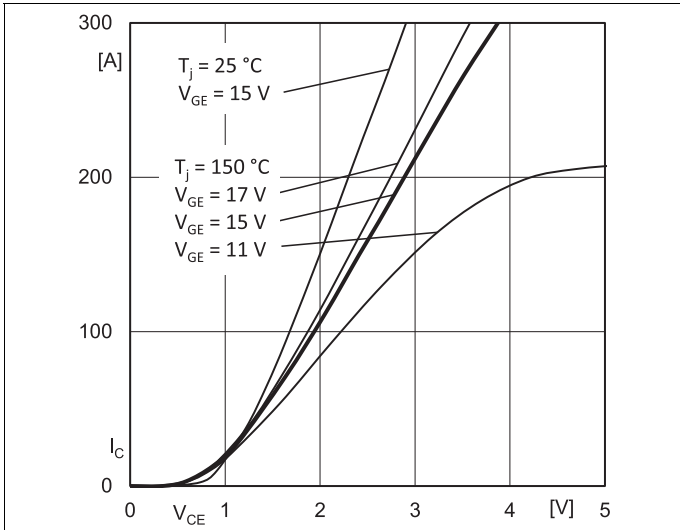


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

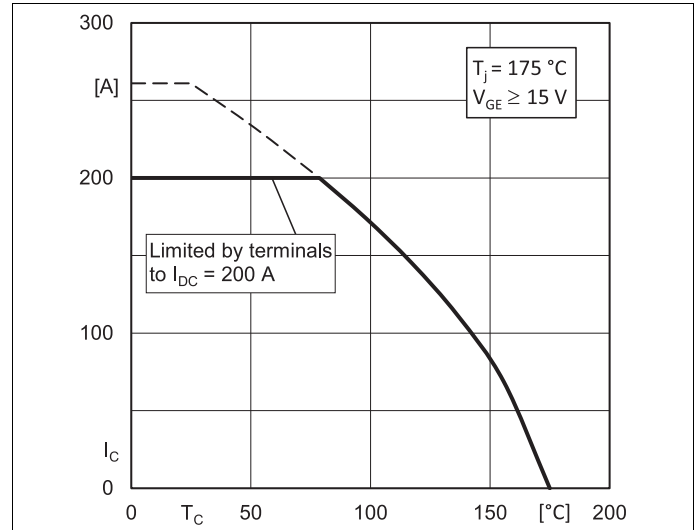


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

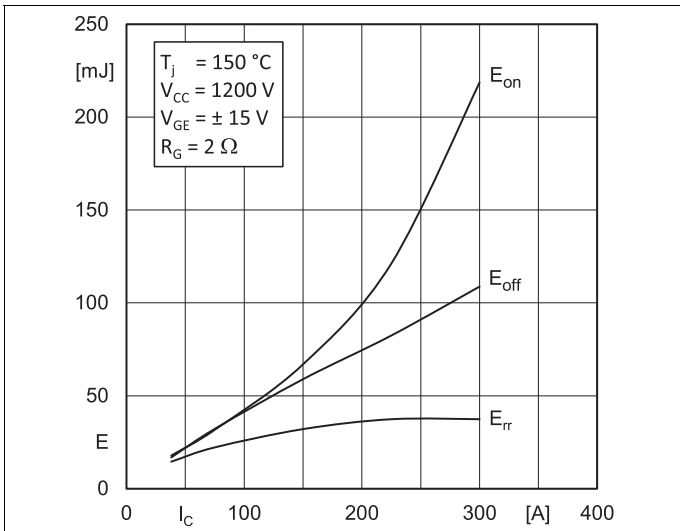


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

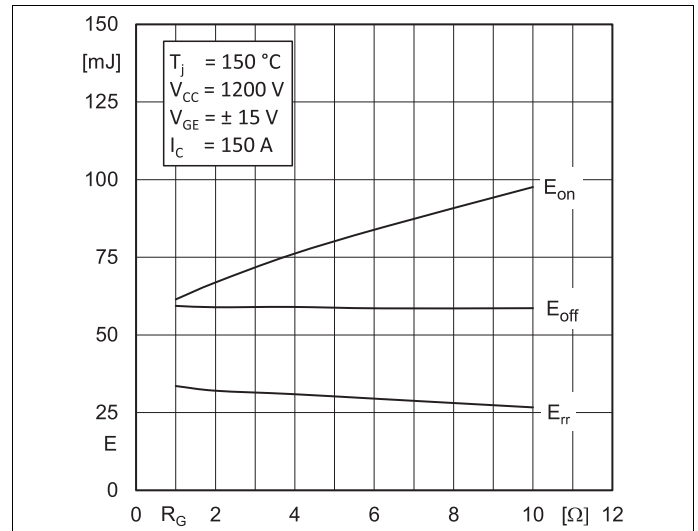


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

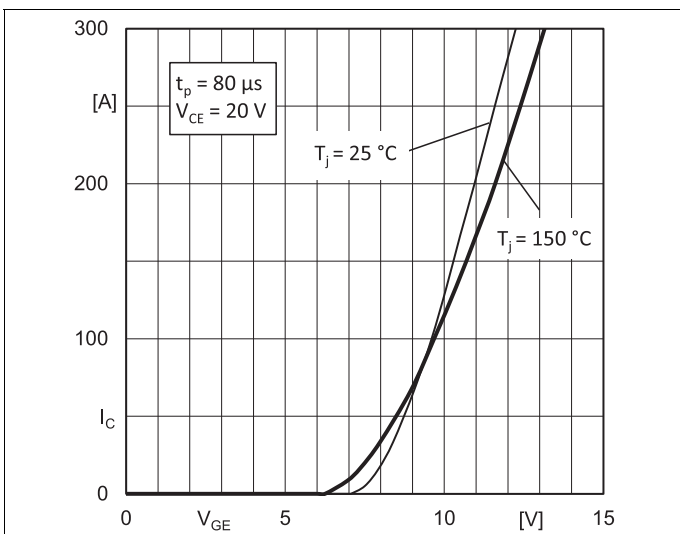


Fig. 5: Typ. transfer characteristic

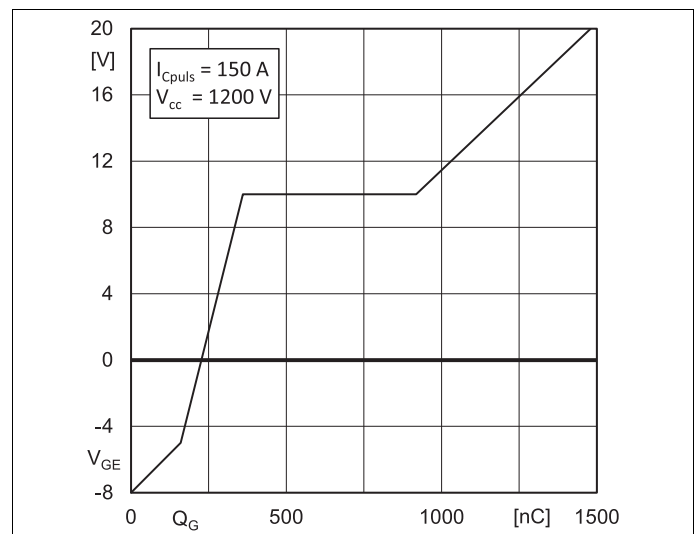


Fig. 6: Typ. gate charge characteristic

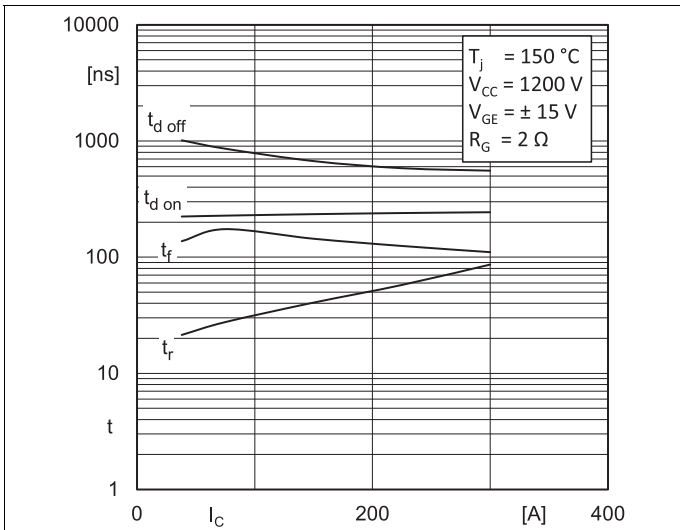


Fig. 7: Typ. switching times vs. I_C

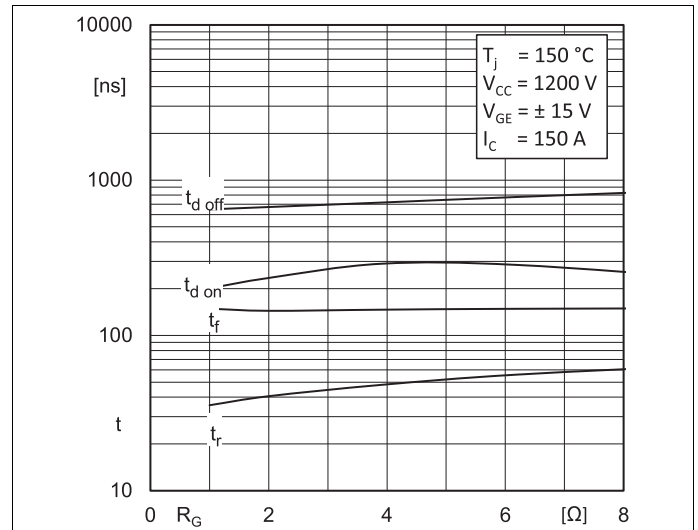


Fig. 8: Typ. switching times vs. gate resistor R_G

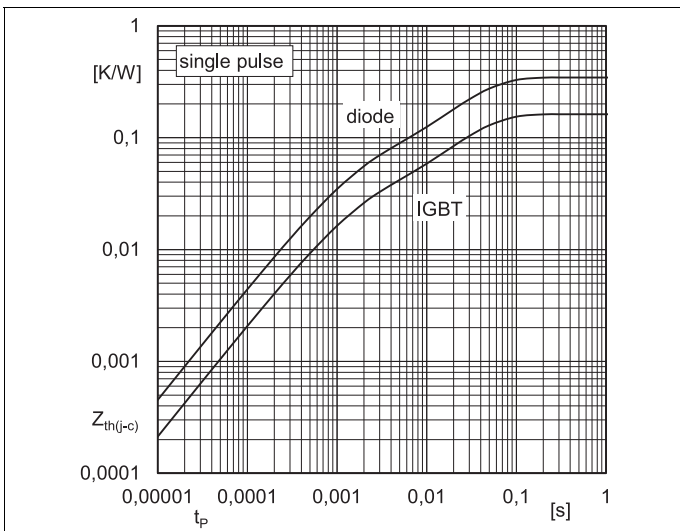


Fig. 9: Transient thermal impedance

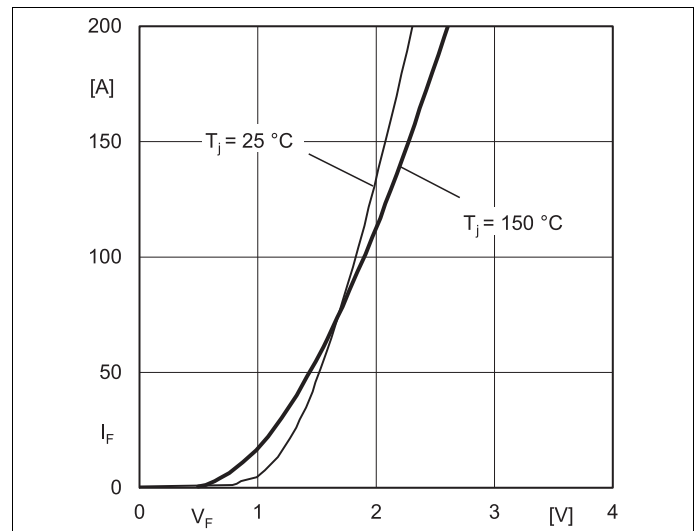


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC+EE'}$

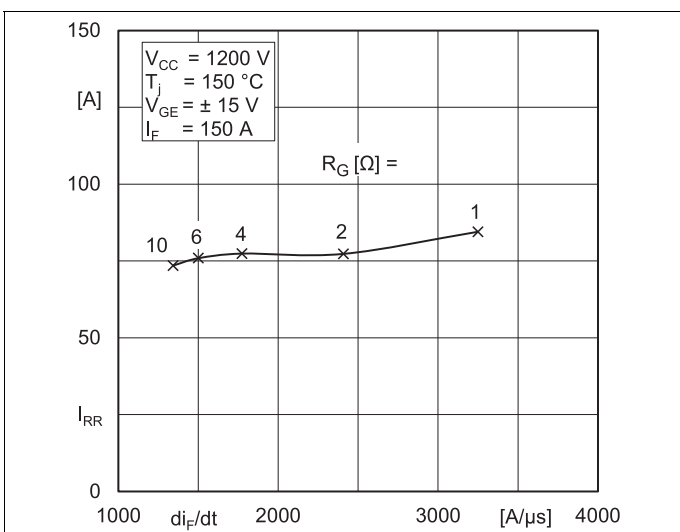


Fig. 11: CAL diode peak reverse recovery current

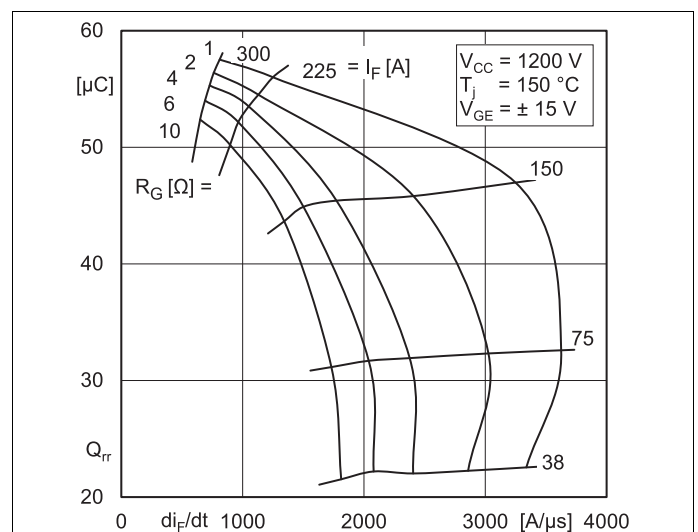


Fig. 12: Typ. CAL diode peak reverse recovery charge

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