

SKM150GB12VG



SEMITRANS® 3

SKM150GB12VG

Features

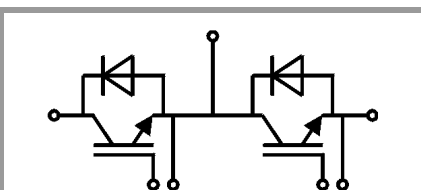
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Isolated copper baseplate using DBC technology (Direct Copper Bonding)
- UL recognized, file no. E63532
- Increased power cycling capability
- With integrated gate resistor
- Low switching losses at high di/dt

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders

Remarks

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



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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	222	A
		$T_c = 80^\circ\text{C}$	169	A
I_{Cnom}			150	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		450	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 720\text{ V}$	$T_j = 125^\circ\text{C}$	10	μs
	$V_{GE} \leq 20\text{ V}$			
	$V_{CES} \leq 1200\text{ V}$			
T_j			-40 ... 175	$^\circ\text{C}$
Inverse diode				
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	187	A
		$T_c = 80^\circ\text{C}$	140	A
I_{Fnom}			150	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		450	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$		774	A
T_j			-40 ... 175	$^\circ\text{C}$
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$		500	A
T_{stg}			-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 150\text{ A}$	$T_j = 25^\circ\text{C}$		1.85	2.30	V
		$T_j = 150^\circ\text{C}$		2.25	2.55	V
V_{CE0}		$T_j = 25^\circ\text{C}$		0.94	1.04	V
		$T_j = 150^\circ\text{C}$		0.88	0.98	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$		6.07	8.4	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$		9.13	10.47	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6\text{ mA}$		5.5	6	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$		0.1	0.3	mA
		$T_j = 150^\circ\text{C}$				mA
	$V_{CE} = 1200\text{ V}$					
C_{ies}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$		9		nF
C_{oes}		$f = 1\text{ MHz}$		0.89		nF
C_{res}		$f = 1\text{ MHz}$		0.884		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$			1650		nC
R_{Gint}				5.0		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		320		ns
t_r	$I_C = 150\text{ A}$	$T_j = 150^\circ\text{C}$		45		ns
		$V_{GE} = \pm 15\text{ V}$				
E_{on}	$R_{Gon} = 4\ \Omega$	$T_j = 150^\circ\text{C}$		10		mJ
$t_{d(off)}$	$R_{Goff} = 4\ \Omega$	$T_j = 150^\circ\text{C}$		550		ns
t_f	$di/dt_{on} = 6100\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		72		ns
		$di/dt_{off} = 1700\text{ A}/\mu\text{s}$				
E_{off}	$du/dt_{off} = 7800\text{ V}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		16.5		mJ
$R_{th(j-c)}$	per IGBT				0.2	K/W

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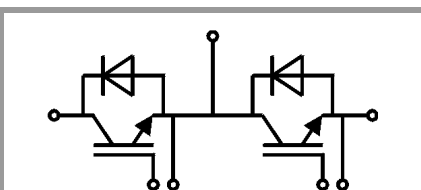
Typical Applications*

- AC inverter drives
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Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm.
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chip	$T_j = 25^\circ\text{C}$		2.17	2.49	V
		$T_j = 150^\circ\text{C}$		2.11	2.42	V
V_{F0}		$T_j = 25^\circ\text{C}$		1.3	1.5	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
r_F		$T_j = 25^\circ\text{C}$		5.8	6.6	m Ω
		$T_j = 150^\circ\text{C}$		8.1	8.8	m Ω
I_{RRM}	$I_F = 150\text{ A}$ $di/dt_{off} = 4000\text{ A}/\mu\text{s}$ $V_{GE} = \pm 15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		170		A
Q_{rr}		$T_j = 150^\circ\text{C}$		22		μC
E_{rr}		$T_j = 150^\circ\text{C}$			11	
$R_{th(j-c)}$	per diode				0.31	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	terminal-chip	$T_c = 25^\circ\text{C}$		0.25		m Ω
		$T_c = 125^\circ\text{C}$		0.5		m Ω
$R_{th(c-s)}$	per module			0.02	0.038	K/W
M_s	to heat sink M6			3	5	Nm
M_t		to terminals M6		2.5	5	Nm
						Nm
w					325	g



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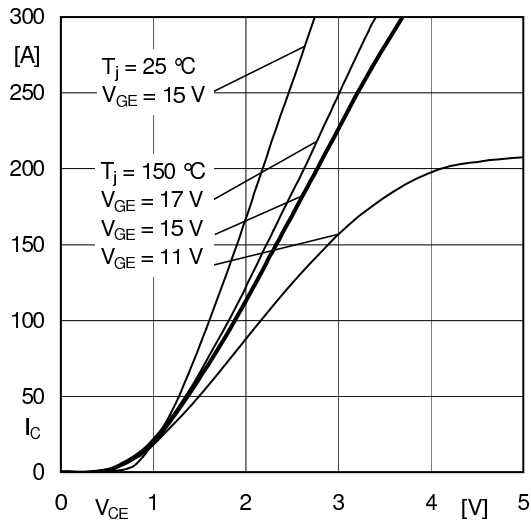


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

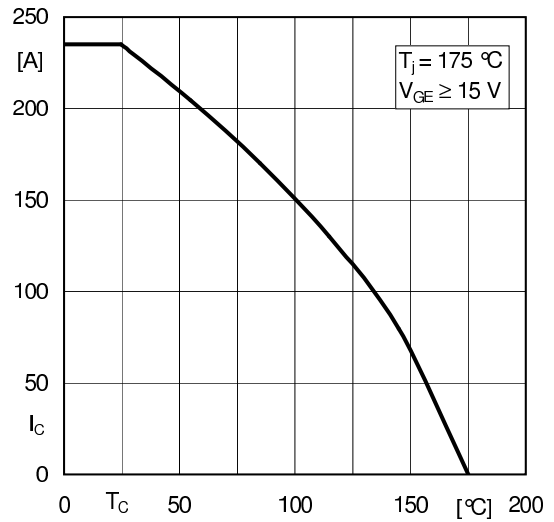


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

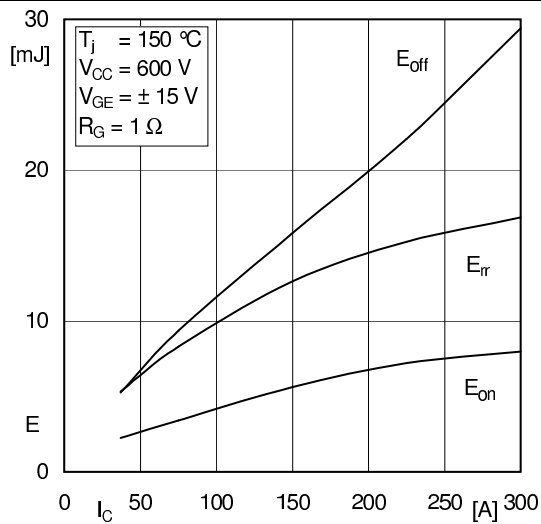


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

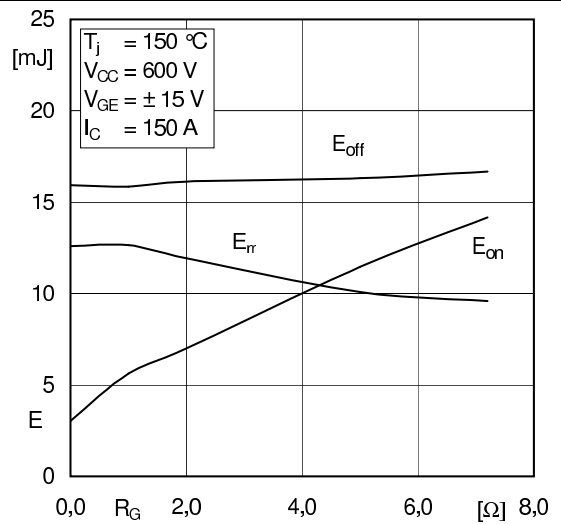


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

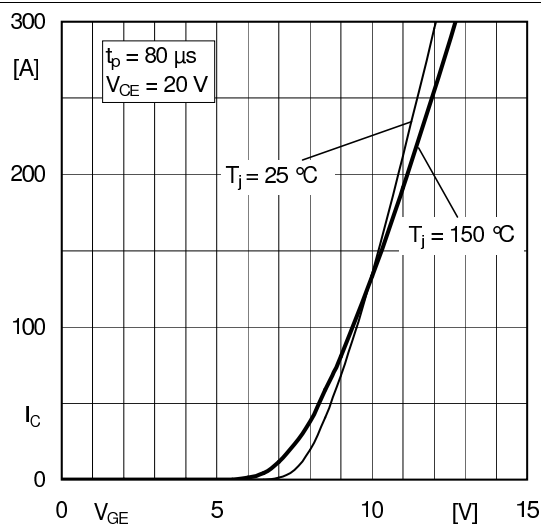


Fig. 5: Typ. transfer characteristic

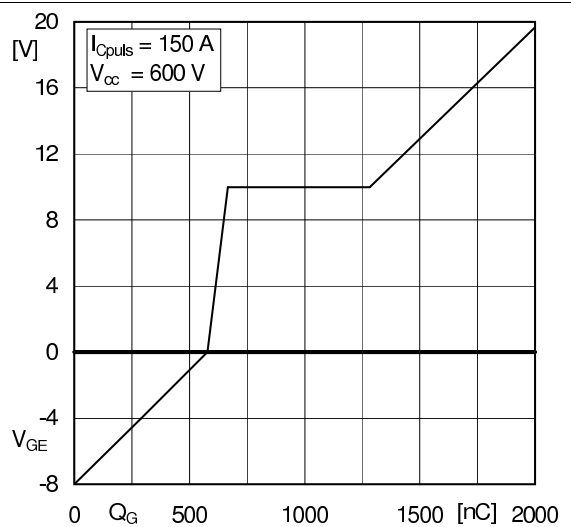


Fig. 6: Typ. gate charge characteristic

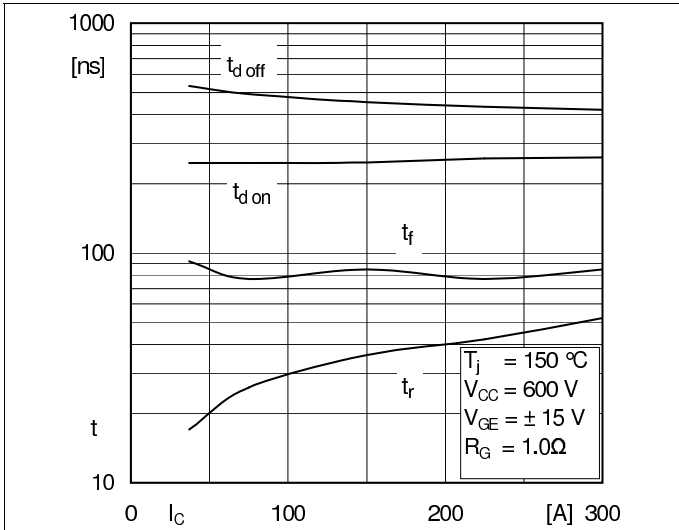


Fig. 7: Typ. switching times vs. I_C

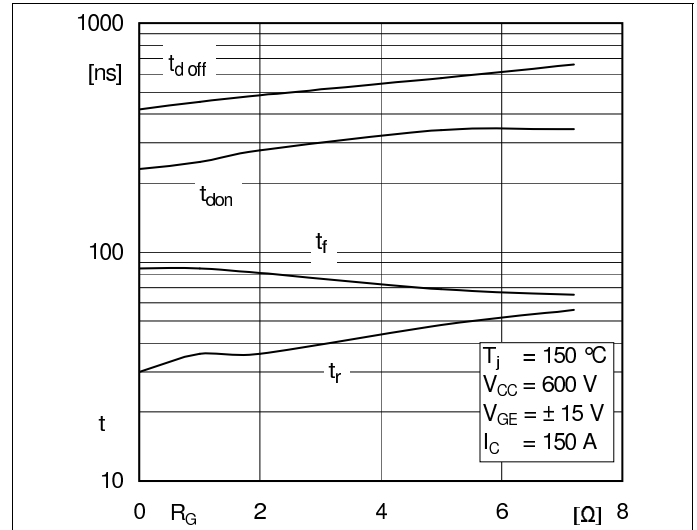


Fig. 8: Typ. switching times vs. gate resistor R_G

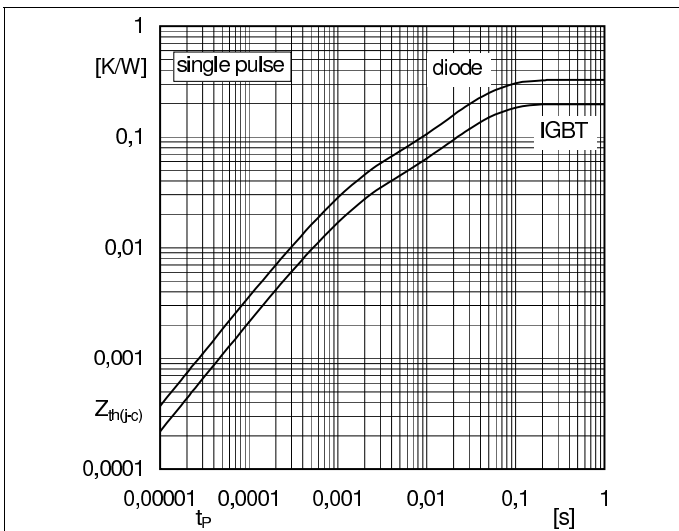


Fig. 9: Transient thermal impedance

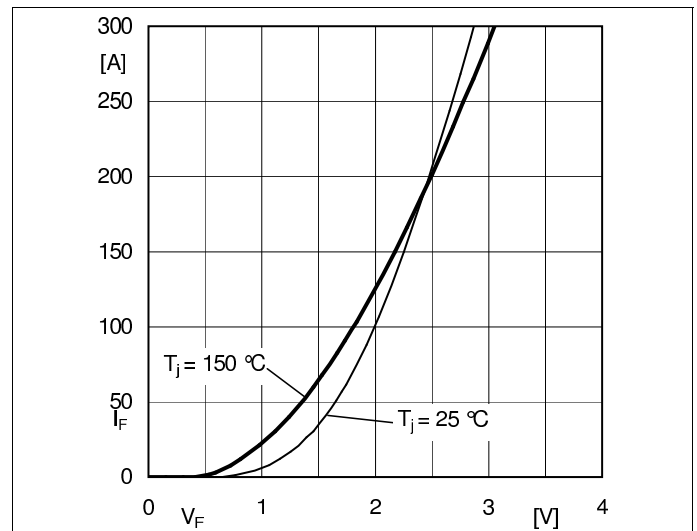


Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

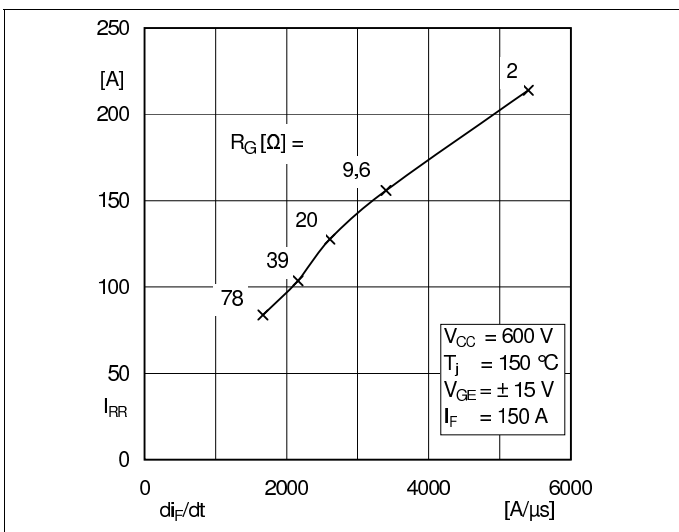


Fig. 11: CAL diode peak reverse recovery current

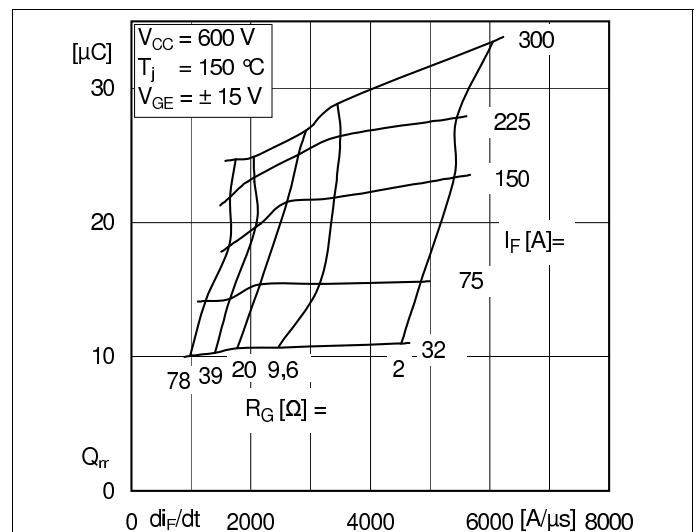


Fig. 12: Typ. CAL diode peak reverse recovery charge

