

SKM50GB12V



SEMITRANS® 2

SKM50GB12V

Target Data

Features

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

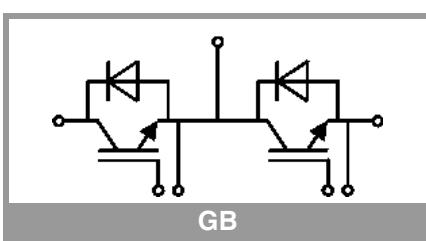
Typical Applications*

- AC inverter drives
- UPS
- Electronic welders

Remarks

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

Absolute Maximum Ratings		Values		Unit		
Symbol	Conditions					
IGBT						
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V		
I_c	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	77	A		
		$T_c = 80^\circ\text{C}$	59	A		
I_{Cnom}			50	A		
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		150	A		
V_{GES}			-20 ... 20	V		
t_{psc}	$V_{CC} = 720\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 125^\circ\text{C}$	10	μs		
T_j			-40 ... 175	$^\circ\text{C}$		
Inverse diode						
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	65	A		
		$T_c = 80^\circ\text{C}$	49	A		
I_{Fnom}			50	A		
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		150	A		
I_{FSM}	$t_p = 10\text{ ms, sin }180^\circ, T_j = 25^\circ\text{C}$		270	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.		
IGBT						
$V_{CE(sat)}$	$I_c = 50\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	1.84	2.29	V	
		$T_j = 150^\circ\text{C}$	2.18	2.63	V	
V_{CE0}	chiplevel	$T_j = 25^\circ\text{C}$	0.94	1.04	V	
		$T_j = 150^\circ\text{C}$	0.88	0.98	V	
r_{CE}	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	18	25	$\text{m}\Omega$	
		$T_j = 150^\circ\text{C}$	26	33	$\text{m}\Omega$	
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_c = 1.7\text{ mA}$		5.5	6	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$		0.3	mA	
		$T_j = 150^\circ\text{C}$	-		mA	
C_{ies}		$f = 1\text{ MHz}$	3.0		nF	
C_{oes}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	0.30		nF	
C_{res}		$f = 1\text{ MHz}$	0.30		nF	
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		550		nC	
R_{Gint}	$T_j = 25^\circ\text{C}$		4.0		Ω	
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	276		ns	
t_r	$I_c = 50\text{ A}$	$T_j = 150^\circ\text{C}$	35		ns	
E_{on}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	4.9		mJ	
$t_{d(off)}$	$R_{G\text{ on}} = 13\text{ }\Omega$	$T_j = 150^\circ\text{C}$	403		ns	
t_f	$R_{G\text{ off}} = 13\text{ }\Omega$	$T_j = 150^\circ\text{C}$	62		ns	
E_{off}		$T_j = 150^\circ\text{C}$	4.5		mJ	
$R_{th(j-c)}$	per IGBT		0.53		K/W	





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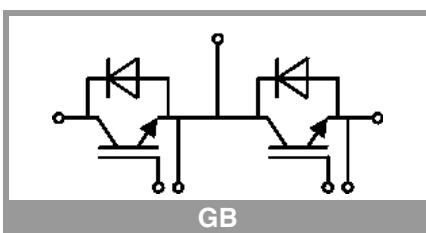
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Characteristics		Conditions	min.	typ.	max.	Unit
Symbol						
Inverse diode						
$V_F = V_{EC}$	$I_F = 50 \text{ A}$	$T_j = 25^\circ\text{C}$		2.22	2.54	V
	$V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.18	2.50	V
V_{FO}	chiplevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
r_F	chiplevel	$T_j = 25^\circ\text{C}$		18	21	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$		26	28	$\text{m}\Omega$
I_{RRM}	$I_F = 50 \text{ A}$	$T_j = 150^\circ\text{C}$		35		A
Q_{rr}	$\text{di/dt}_{\text{off}} = 1380 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		8.7		μC
E_{rr}	$V_{GE} = \pm 15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		2.8		mJ
$R_{th(j-c)}$	per diode				0.84	K/W
Module						
L_{CE}				30		nH
$R_{CC+EE'}$	measured per switch	$T_C = 25^\circ\text{C}$		0.65		$\text{m}\Omega$
$R_{th(c-s)}$		$T_C = 125^\circ\text{C}$		1.09		$\text{m}\Omega$
M_s	per module			0.04	0.05	K/W
M_t	to heat sink M6			3	5	Nm
		to terminals M5		2.5	5	Nm
w					160	g



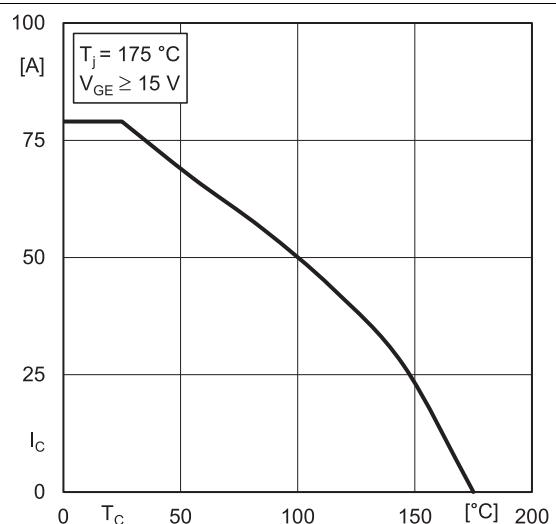
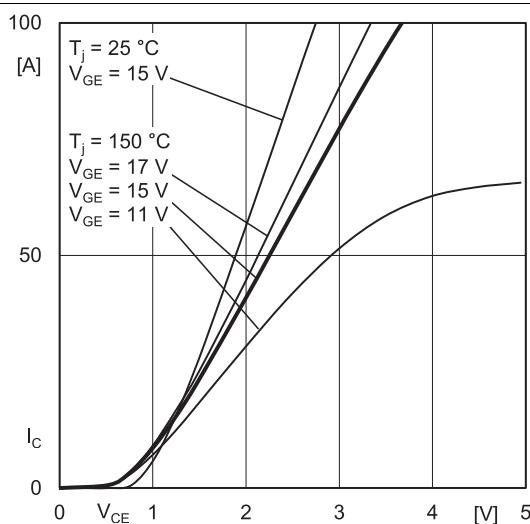
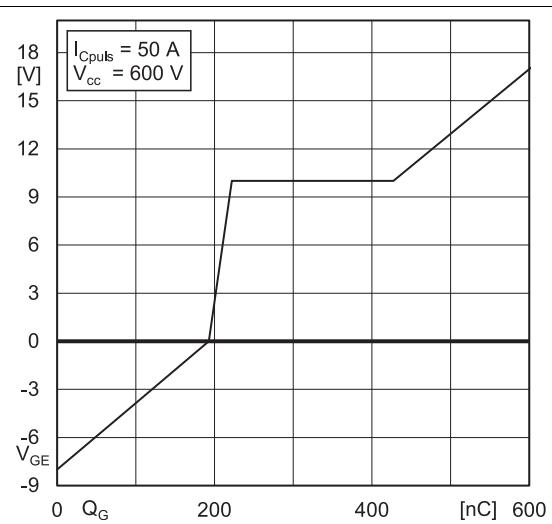
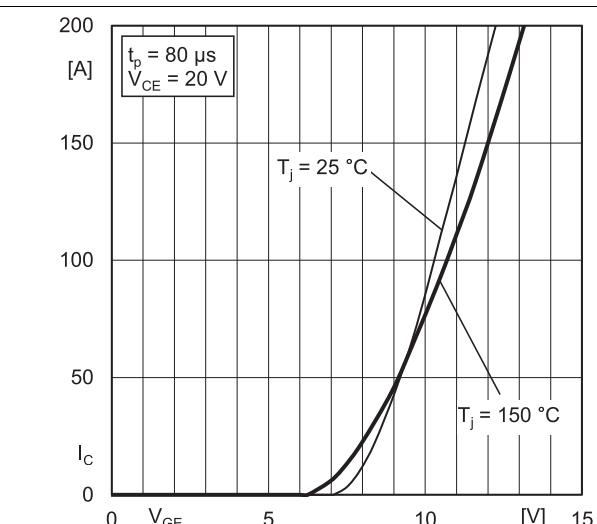
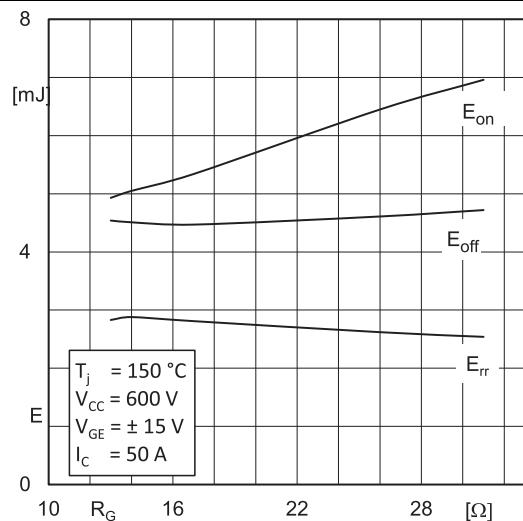
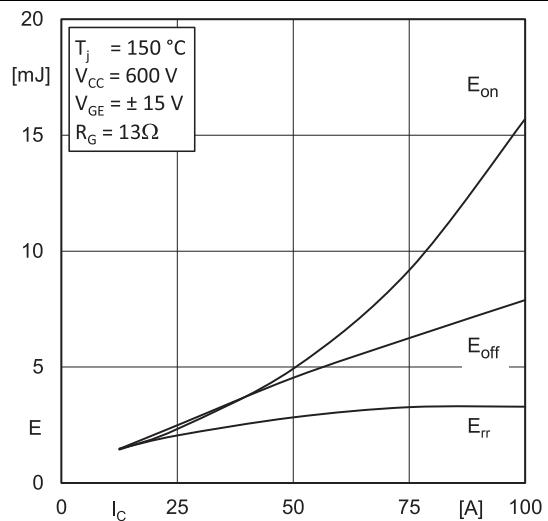


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE$

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



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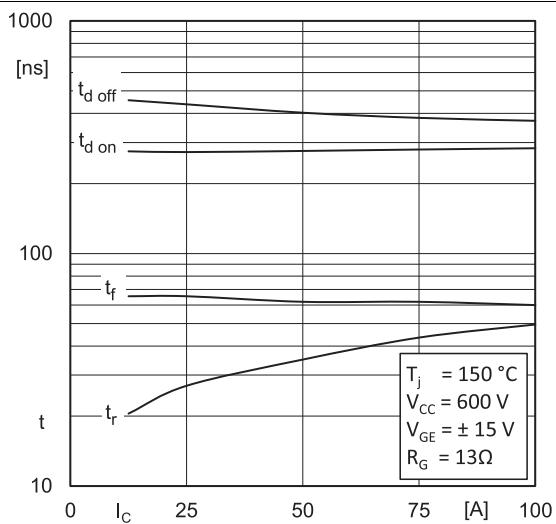


Fig. 7: Typ. switching times vs. I_C

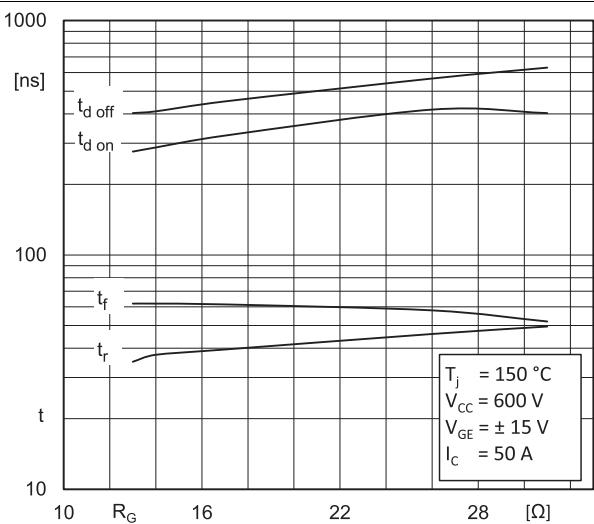


Fig. 8: Typ. switching times vs. gate resistor R_G

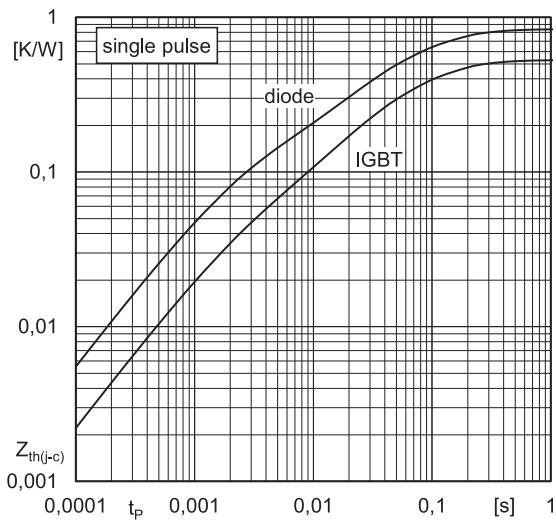


Fig. 9: Transient thermal impedance

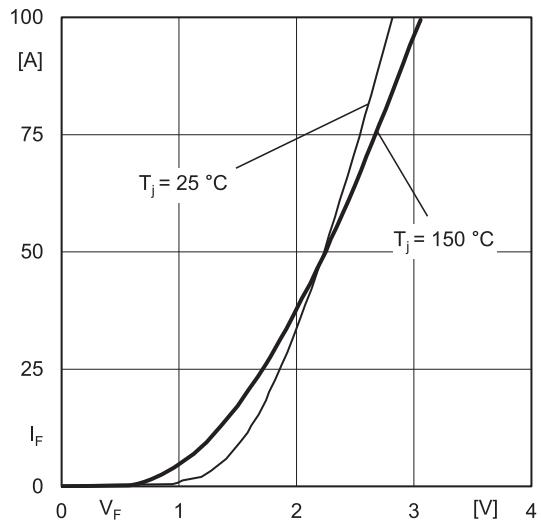
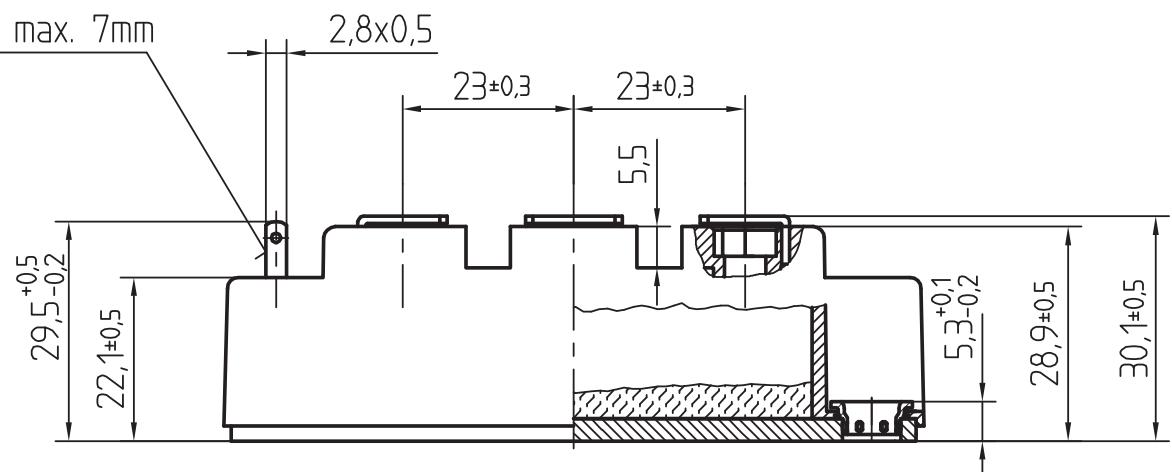


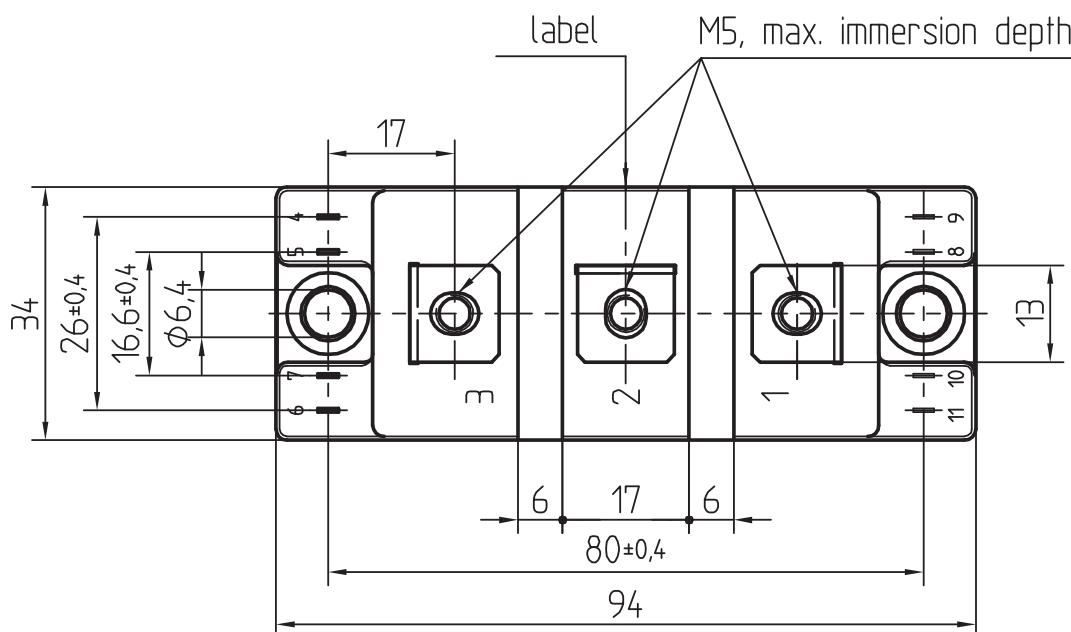
Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

Dimensions in mm

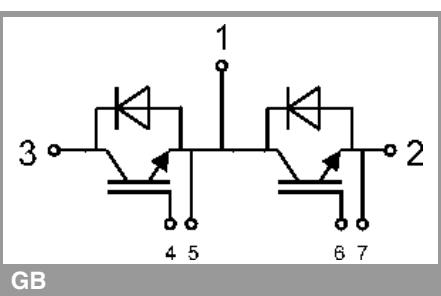
Plug in depth max. 7mm



M5, max. immersion depth 10mm

General tolerance $\pm 0,5$ mm

SEMITRANS 2



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

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