



SEMITRANS® 2

SKM50GB12V

Target Data

Features

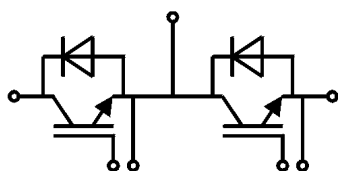
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Copper Bonding)
- Increased power cycling capability
- With integrated gate resistor
- UL recognized, file no. E63532
- Lowest switching losses at High 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 $T_j = 150^\circ\text{C}$



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 175 °C	T _c = 25 °C	77	A
		T _c = 80 °C	59	A
I _{Cnom}			50	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 720 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 125 °C	10	μs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	65	A
		T _c = 80 °C	49	A
I _{Fnom}			50	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		270	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}			200	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.84	2.29	V
		$T_j = 150^\circ\text{C}$	2.18	2.63	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	0.94	1.04	V
		$T_j = 150^\circ\text{C}$	0.88	0.98	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	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}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	3.0		nF
C_{oes}		$f = 1\text{ MHz}$	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
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 50\text{ A}$	$T_j = 150^\circ\text{C}$	276		ns
t_r	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{G on} = 13\text{ }\Omega$	$T_j = 150^\circ\text{C}$	4.9		mJ
$t_{d(off)}$	$R_{G off} = 13\text{ }\Omega$	$T_j = 150^\circ\text{C}$	403		ns
t_f		$T_j = 150^\circ\text{C}$	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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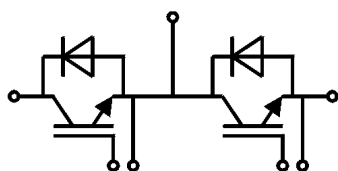
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Remarks

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Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverse diode					
$V_F = V_{EC}$	$I_F = 50\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	2.22 2.54	V
V_{F0}	chiplevel		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1.30 0.90	V
r_F	chiplevel		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	18 26	mΩ
I_{RRM}	$I_F = 50\text{ A}$		$T_j = 150^\circ\text{C}$	35	A
Q_{rr}	$di/dt_{off} = 1380\text{ A}/\mu\text{s}$ $V_{GE} = \pm 15\text{ V}$		$T_j = 150^\circ\text{C}$	8.7	μC
E_{rr}	$V_{CC} = 600\text{ V}$		$T_j = 150^\circ\text{C}$	2.8	mJ
$R_{th(j-c)}$	per diode			0.84	K/W
Module					
L_{CE}				30	nH
$R_{CC'+EE'}$	measured per switch	$T_c = 25^\circ\text{C}$ $T_c = 125^\circ\text{C}$		0.65 1.09	mΩ
$R_{th(c-s)}$	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
w				160	g



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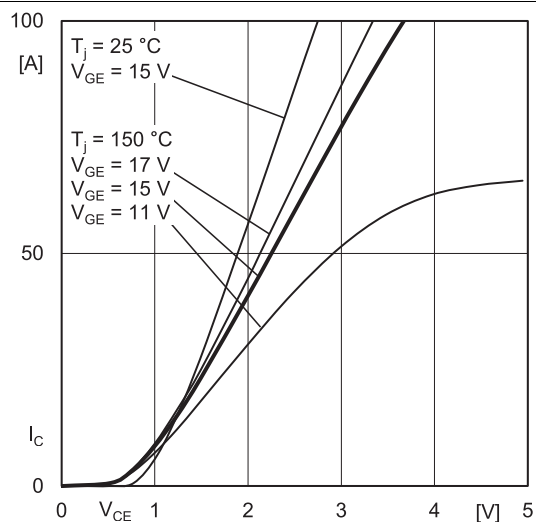


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

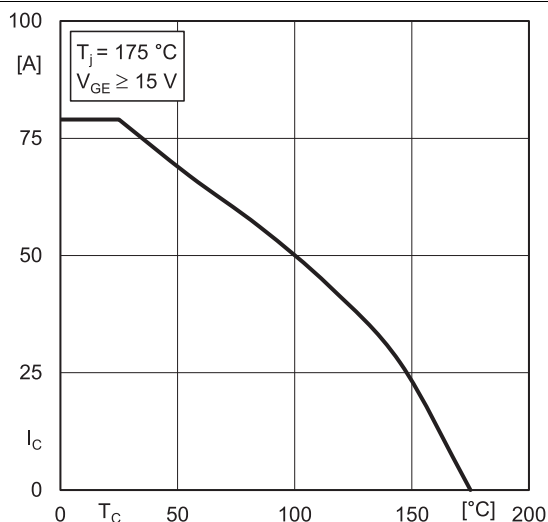


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

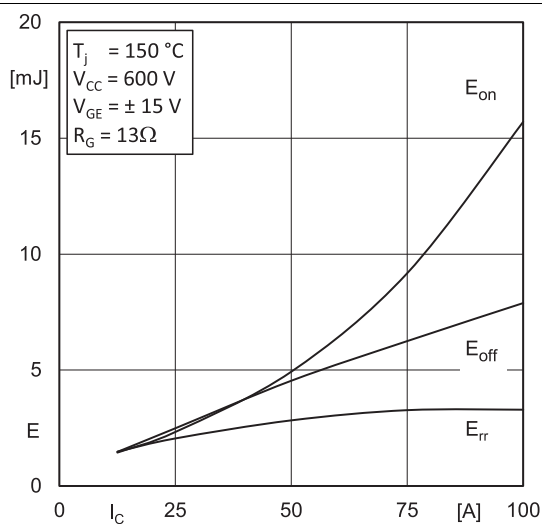


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

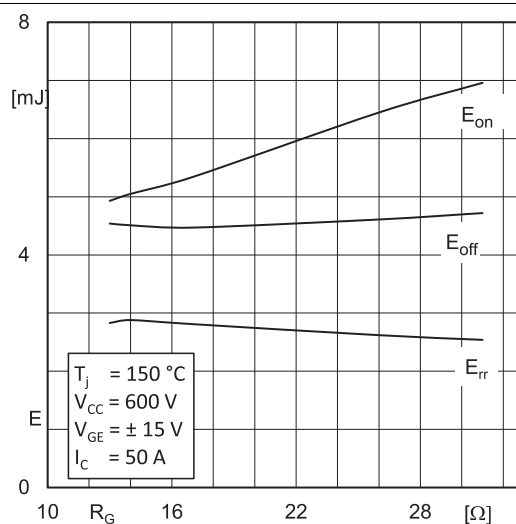


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

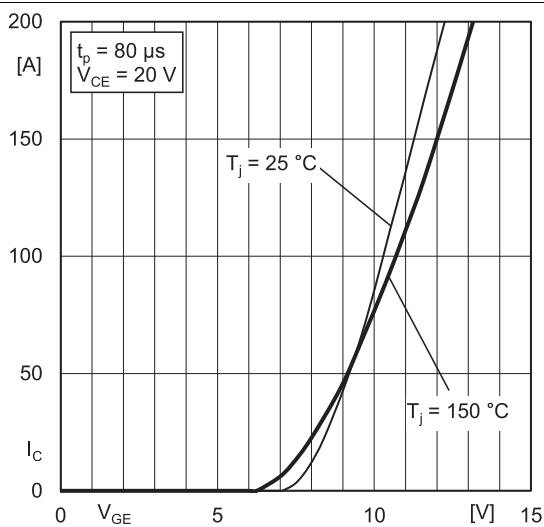


Fig. 5: Typ. transfer characteristic

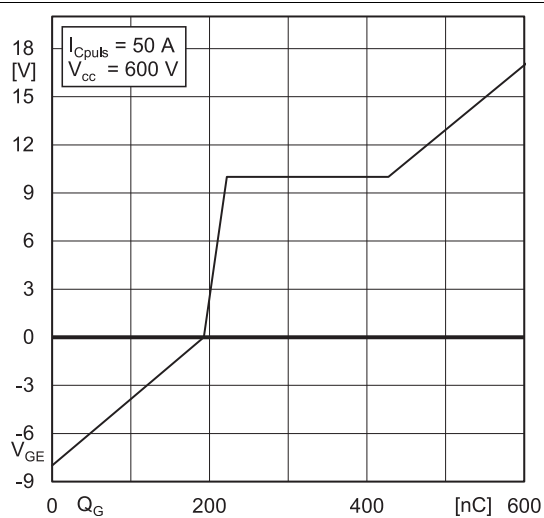
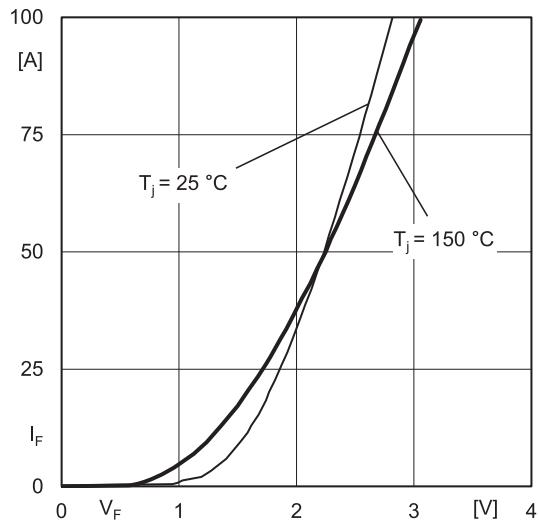
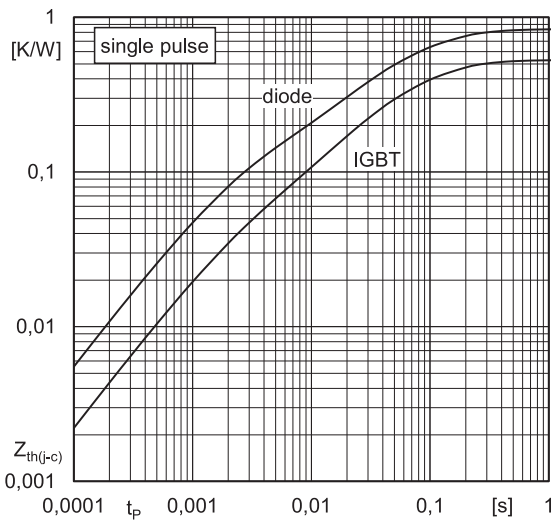
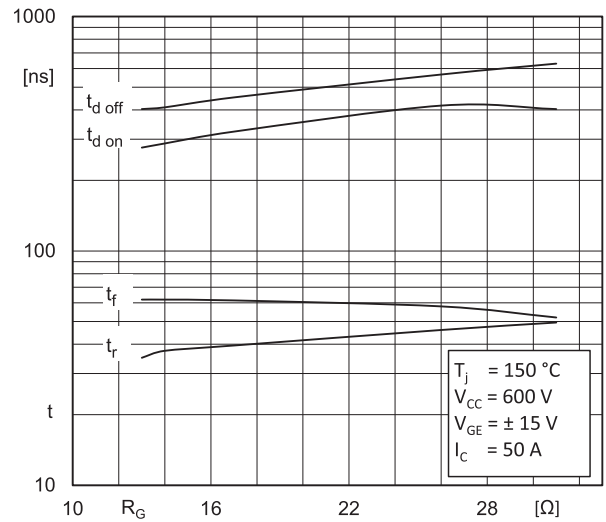
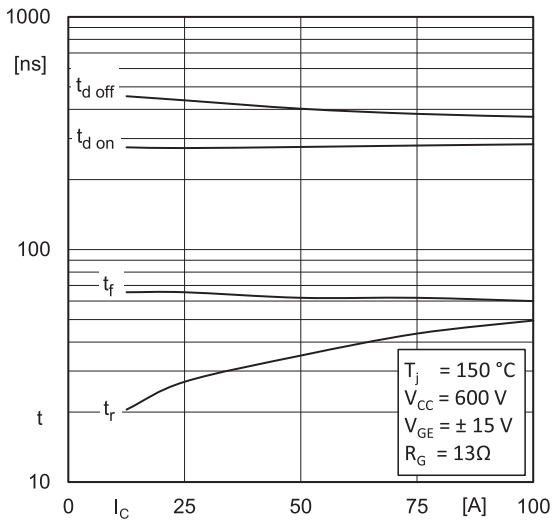
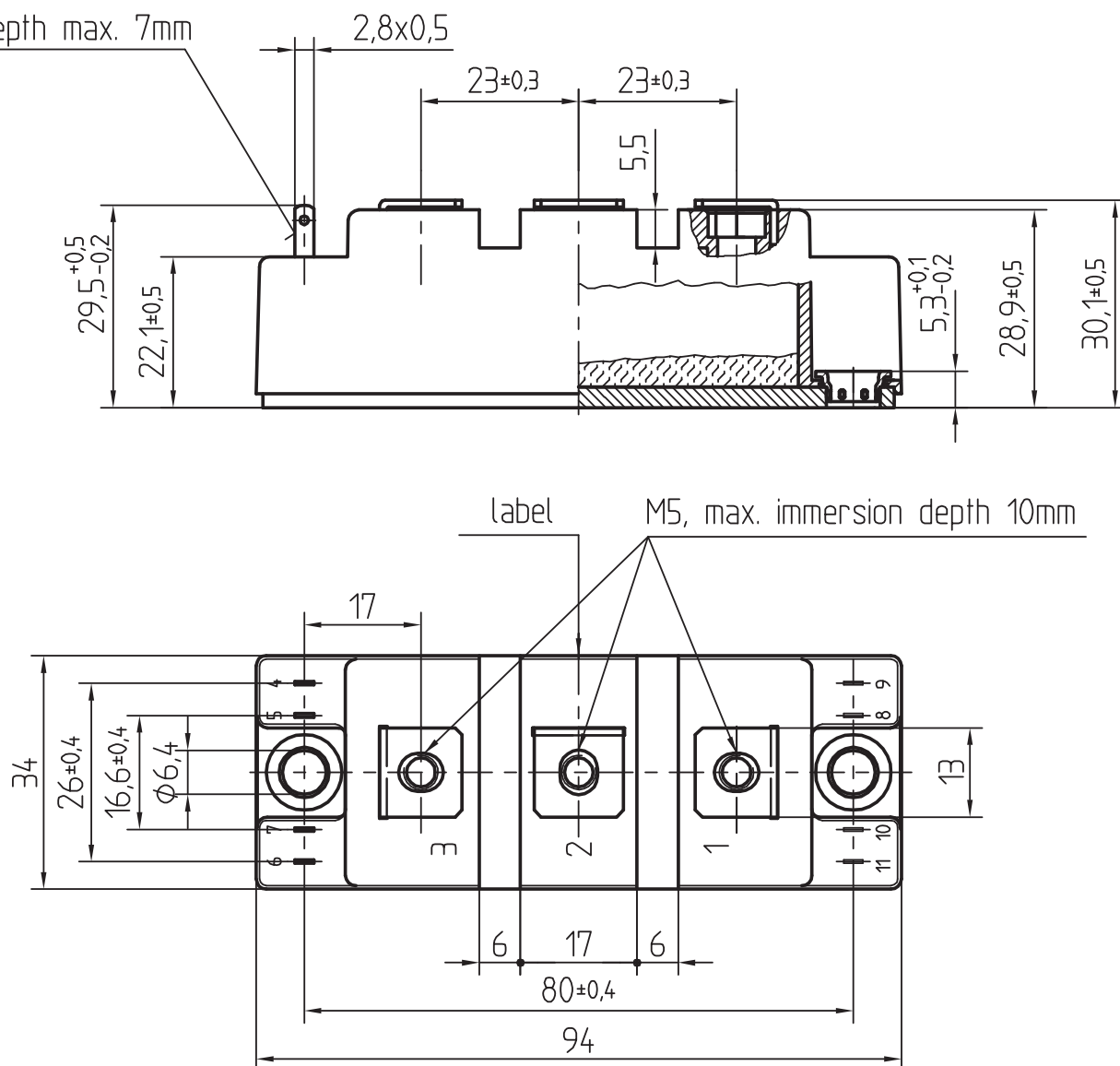


Fig. 6: Typ. gate charge characteristic



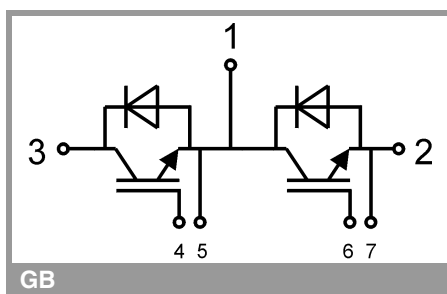
Dimensions in mm

Plug in depth max. 7mm



General tolerance $\pm 0,5$ mm

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

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