



SEMITRANS® 2

SKM50GB12V

Target Data

Features

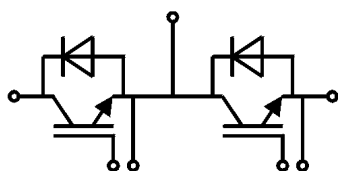
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Copper Bonding)
- Increased power cycling capability
- With integrated gate resistor
- UL recognized, file no. E63532
- Lowest switching losses at High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



GB

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 A	T _j = 25 °C		1.84	2.29	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.18	2.63	V
V _{CE0}	chipelevel	T _j = 25 °C		0.94	1.04	V
		T _j = 150 °C		0.88	0.98	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		18	25	mΩ
	chipelevel	T _j = 150 °C		26	33	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 1.7 mA		5.5	6	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			0.3	mA
	V _{CE} = 1200 V	T _j = 150 °C		-		mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		3.0		nF
C _{oes}		f = 1 MHz		0.30		nF
C _{res}		f = 1 MHz		0.30		nF
Q _G	V _{GE} = - 8 V...+ 15 V			550		nC
R _{Gint}	T _j = 25 °C			4.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		276		ns
t _r	I _C = 50 A	T _j = 150 °C		35		ns
E _{on}	V _{GE} = +15/-15 V	T _j = 150 °C		4.9		mJ
t _{d(off)}	R _{G on} = 13 Ω	T _j = 150 °C		403		ns
t _f	R _{G off} = 13 Ω	T _j = 150 °C		62		ns
E _{off}		T _j = 150 °C		4.5		mJ
R _{th(j-c)}	per IGBT				0.53	K/W



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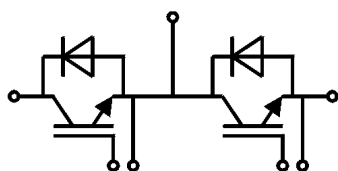
- AC inverter drives
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Remarks

- 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 $T_j = 150^\circ\text{C}$

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 50\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.22	2.54	V
		$T_j = 150^\circ\text{C}$		2.18	2.50	V
V_{F0}	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	mΩ
		$T_j = 150^\circ\text{C}$		26	28	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	$T_c = 25^\circ\text{C}$		0.65		mΩ
		$T_c = 125^\circ\text{C}$		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
						Nm
w					160	g



GB

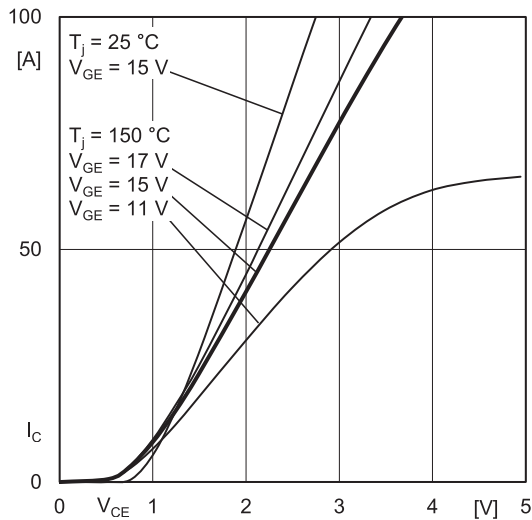


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

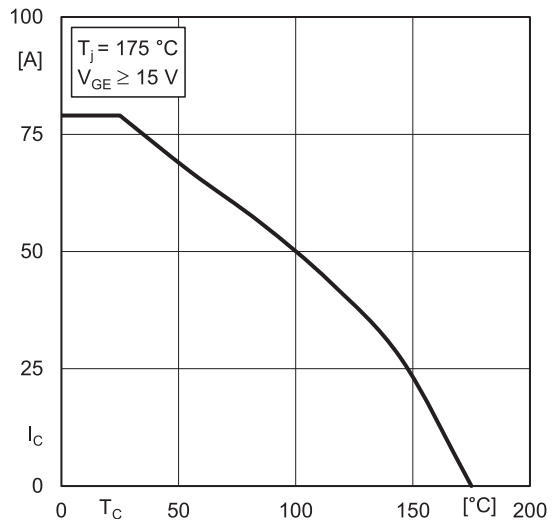


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

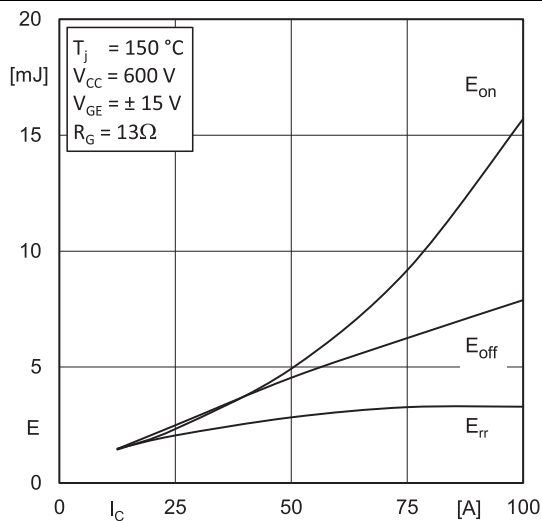


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

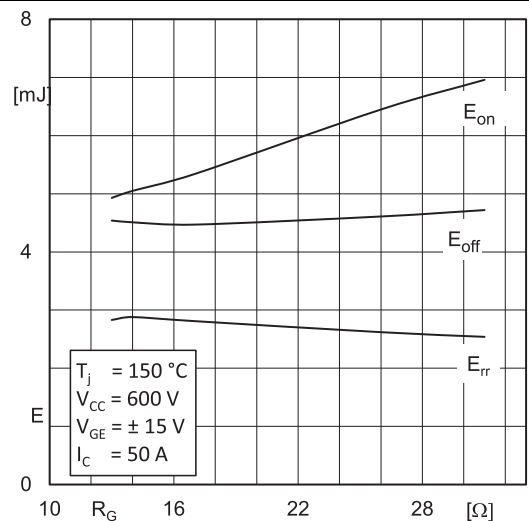


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

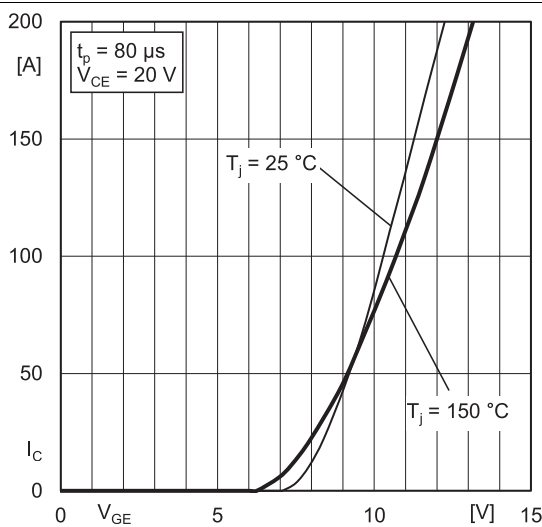


Fig. 5: Typ. transfer characteristic

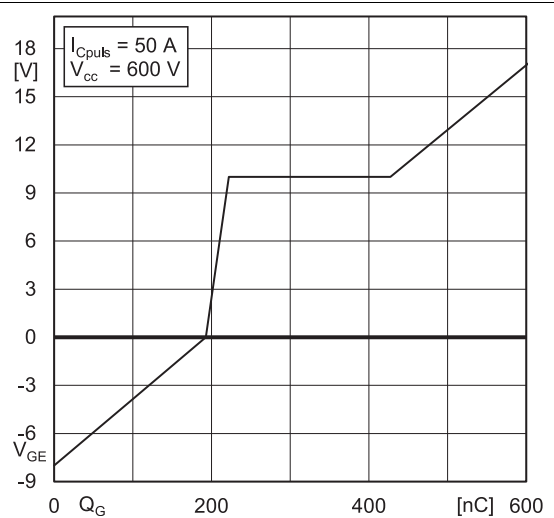


Fig. 6: Typ. gate charge characteristic

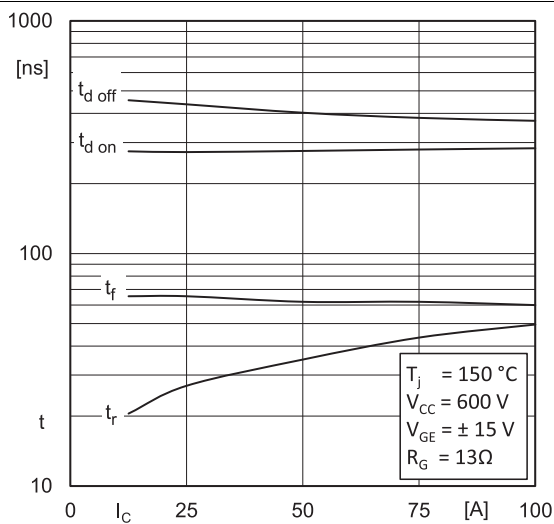


Fig. 7: Typ. switching times vs. I_C

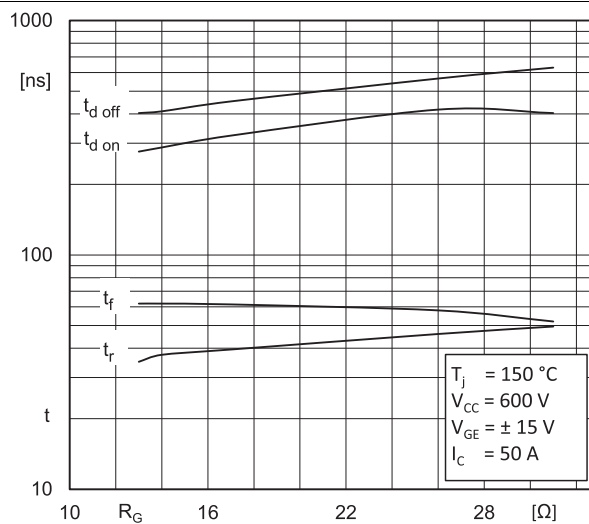


Fig. 8: Typ. switching times vs. gate resistor R_G

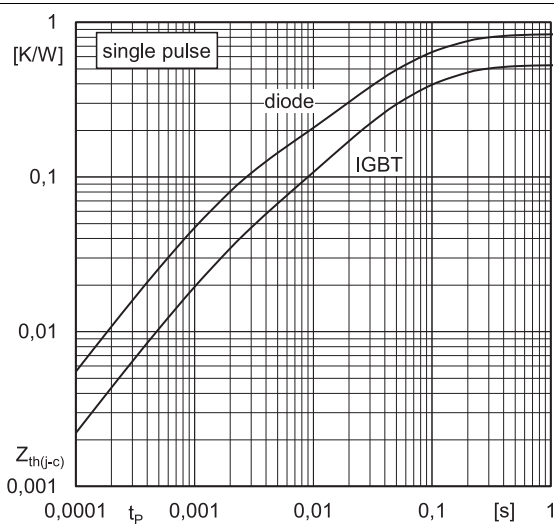


Fig. 9: Transient thermal impedance

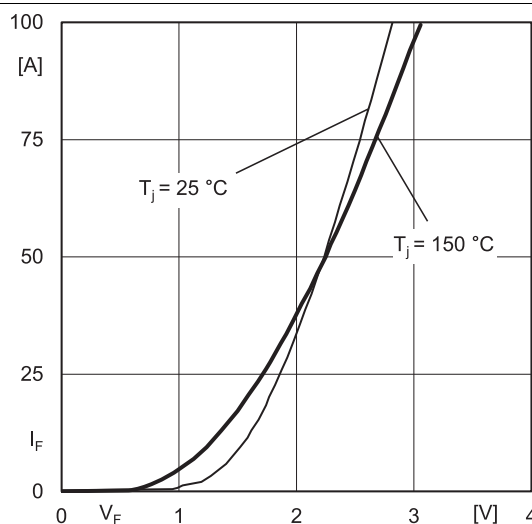
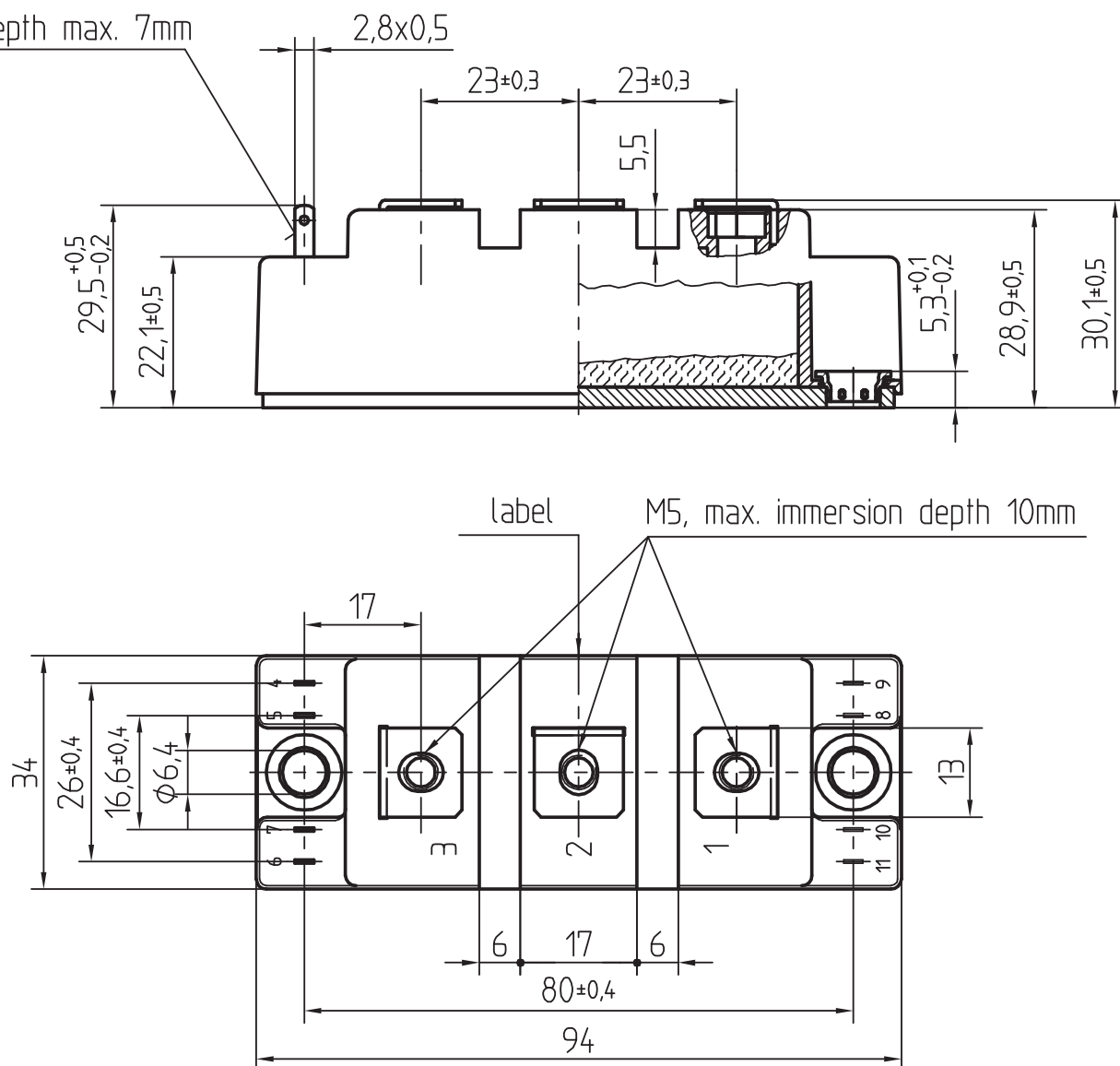


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'}+EE'$

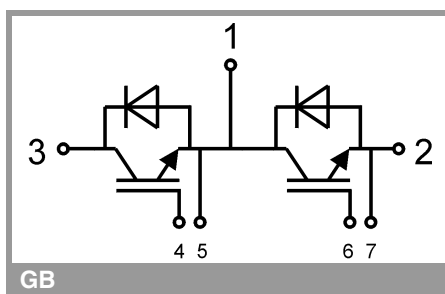
Dimensions in mm

Plug in depth max. 7mm



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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