SKM50GB12V

SEMITRANS® 2

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Target Data

Features

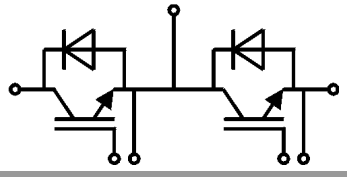
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Copper Bonding)
- Increased power cycling capability
- With integrated gate resistor
- UL recognized, file no. E63532
- Lowest switching losses at High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

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°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 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.84	2.29	V
		T_j = 150 °C		2.18	2.63	V
V_{CE0}	chiplevel	T_j = 25 °C		0.94	1.04	V
		T_j = 150 °C		0.88	0.98	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		18	25	mΩ
		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 V_{CE} = 1200 V	T_j = 25 °C			0.3	mA
		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 I_C = 50 A V_{GE} = +15/-15 V $R_{G\ on}$ = 13 Ω $R_{G\ off}$ = 13 Ω	T_j = 150 °C		276		ns
t_r		T_j = 150 °C		35		ns
E_{on}		T_j = 150 °C		4.9		mJ
$t_{d(off)}$		T_j = 150 °C		403		ns
t_f		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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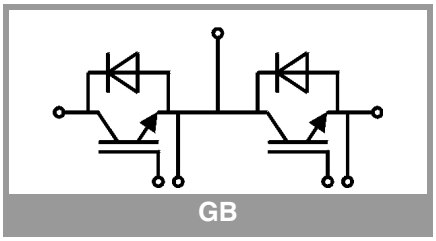

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 50 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.22	2.54	V
		T_j = 150 °C		2.18	2.50	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		18	21	mΩ
		T_j = 150 °C		26	28	mΩ
I_{RRM}	I_F = 50 A di/dt_{off} = 1380 A/µs V_{GE} = ±15 V V_{CC} = 600 V	T_j = 150 °C		35		A
Q_{rr}		T_j = 150 °C		8.7		µC
E_{rr}		T_j = 150 °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 °C		0.65		mΩ
		T_C = 125 °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

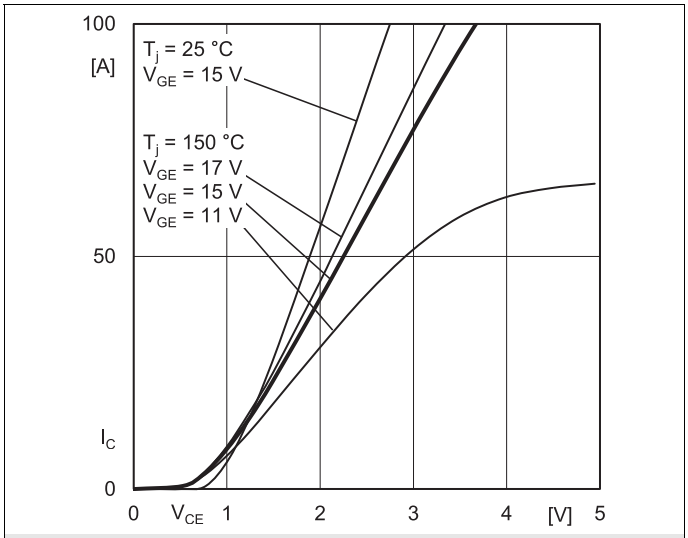


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

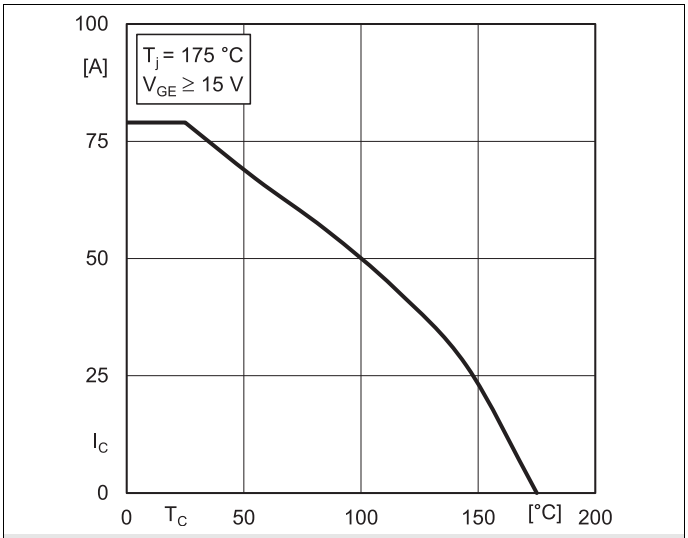


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

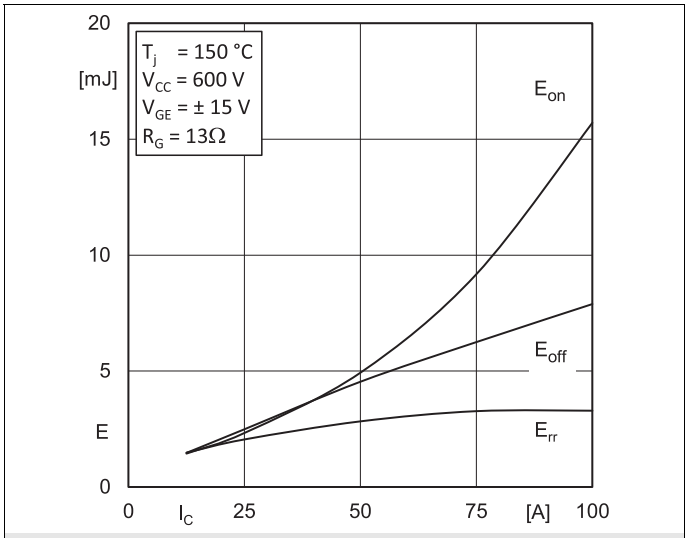


Fig. 3: Typ. turn-on /-off energy = f (I_C)

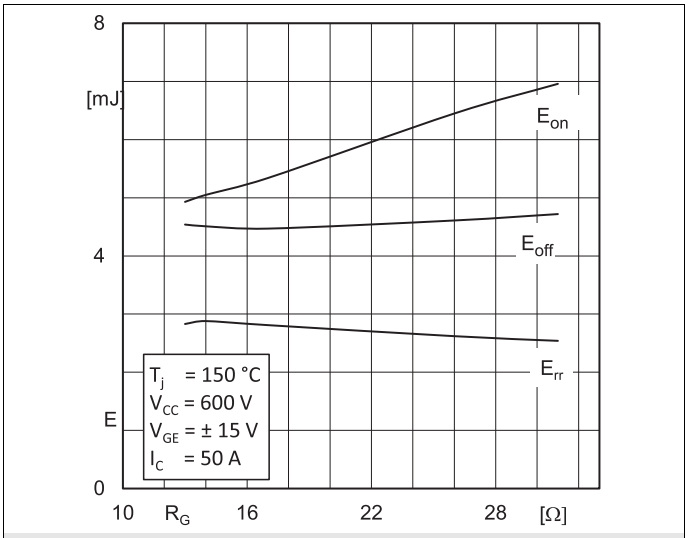


Fig. 4: Typ. turn-on /-off energy = f (R_G)

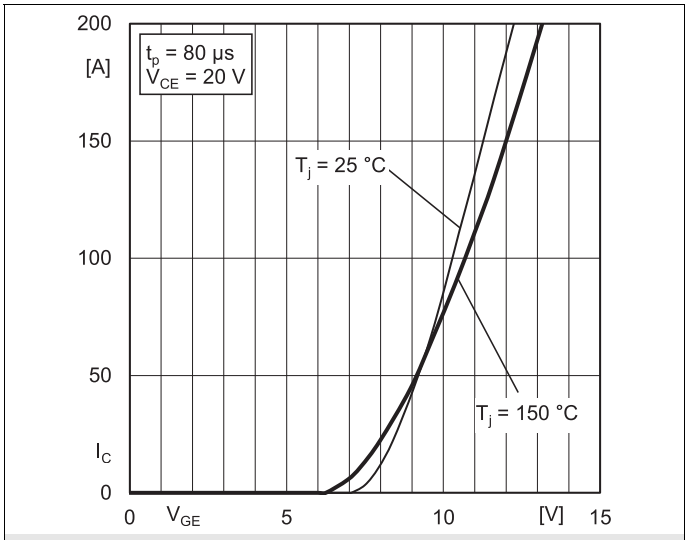


Fig. 5: Typ. transfer characteristic

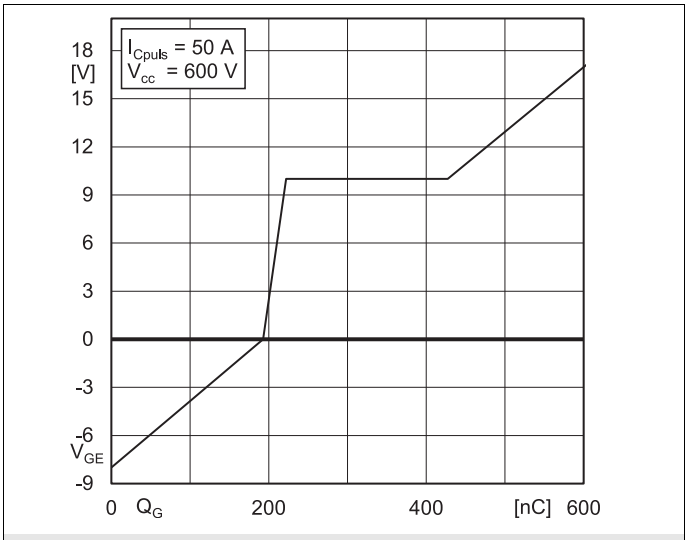


Fig. 6: Typ. gate charge characteristic

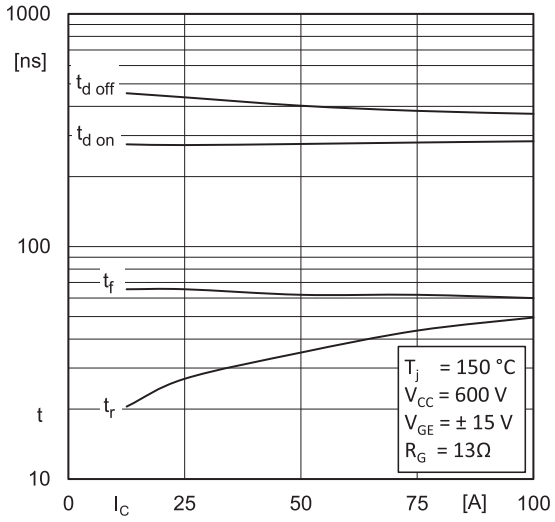


Fig. 7: Typ. switching times vs. I_C

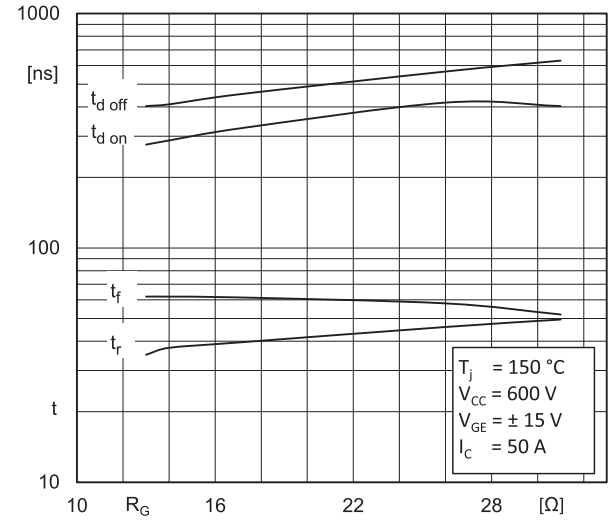


Fig. 8: Typ. switching times vs. gate resistor R_G

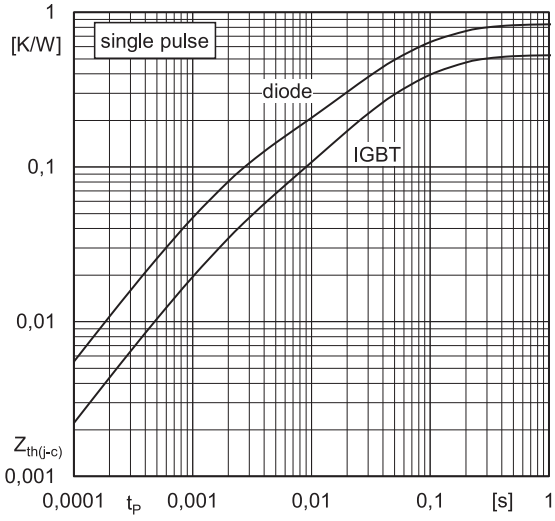


Fig. 9: Transient thermal impedance

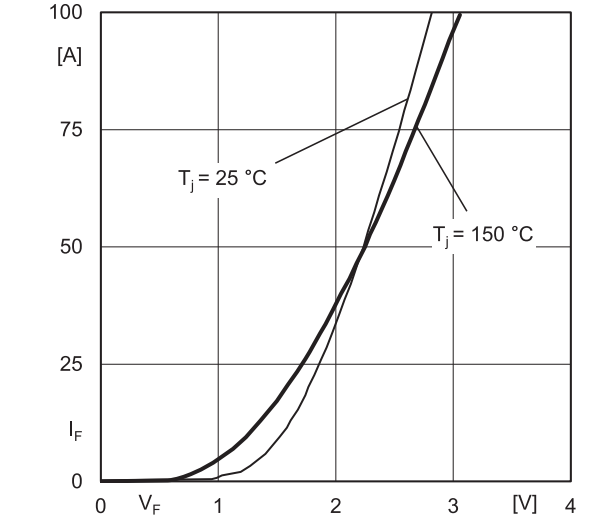
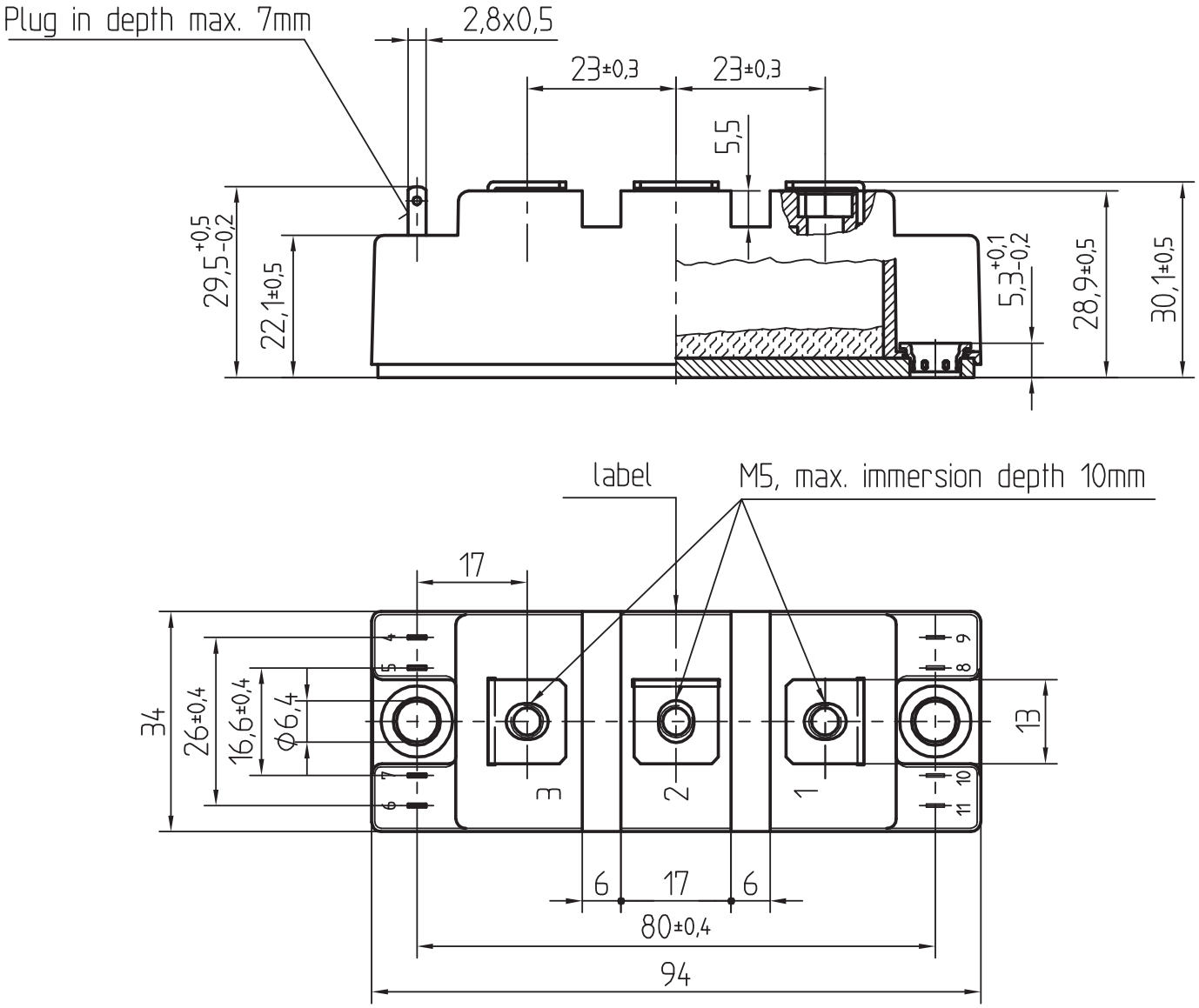


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

Dimensions in mm



General tolerance +/- 0,5 mm

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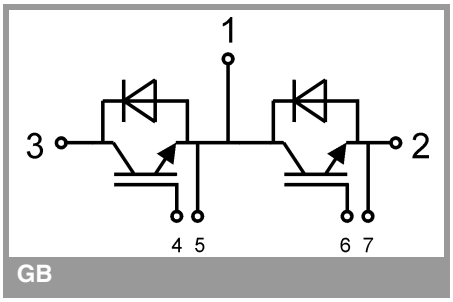

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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