



SEMITRANS® 2

Fast IGBT4 Modules

SKM75GB12T4

Features

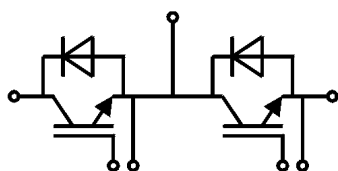
- IGBT4 = 4. generation fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 20kHz
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

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	115	A
		T _c = 80 °C	88	A
I _{Cnom}			75	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		225	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	97	A
		T _c = 80 °C	73	A
I _{Fnom}			75	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		430	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					
$V_{CE(sat)}$	$I_C = 75\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.28	2.45	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	0.80	0.90	V
		$T_j = 150^\circ\text{C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	14	16	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	21	22	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 3\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$		1	mA
		$T_j = 150^\circ\text{C}$	-		mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	4.4		nF
C_{oes}		$f = 1\text{ MHz}$	0.29		nF
C_{res}		$f = 1\text{ MHz}$	0.24		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		425		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		10		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	150		ns
t_r	$I_C = 75\text{ A}$	$T_j = 150^\circ\text{C}$	39		ns
E_{on}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	11		mJ
$t_{d(off)}$	$R_{G on} = 1\text{ }\Omega$	$T_j = 150^\circ\text{C}$	370		ns
t_f	$R_{G off} = 1\text{ }\Omega$	$T_j = 150^\circ\text{C}$	66		ns
E_{off}	$di/dt_{on} = 1600\text{ A}/\mu\text{s}$ $di/dt_{off} = 950\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	6.9		mJ
$R_{th(j-c)}$	per IGBT			0.38	K/W



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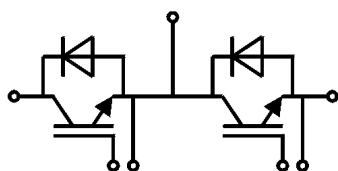
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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 75\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.17	2.49	V
		$T_j = 150^\circ\text{C}$		2.11	2.42	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		12	13	mΩ
		$T_j = 150^\circ\text{C}$		16	18	mΩ
I_{RRM}	$I_F = 75\text{ A}$	$T_j = 150^\circ\text{C}$		37		A
Q_{rr}	$di/dt_{off} = 990\text{ A}/\mu\text{s}$ $V_{GE} = \pm 15\text{ V}$	$T_j = 150^\circ\text{C}$		12.6		μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		4.7		mJ
$R_{th(j-c)}$	per diode				0.58	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
$R_{th(c-s)}$	calculated without thermal coupling ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$)			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



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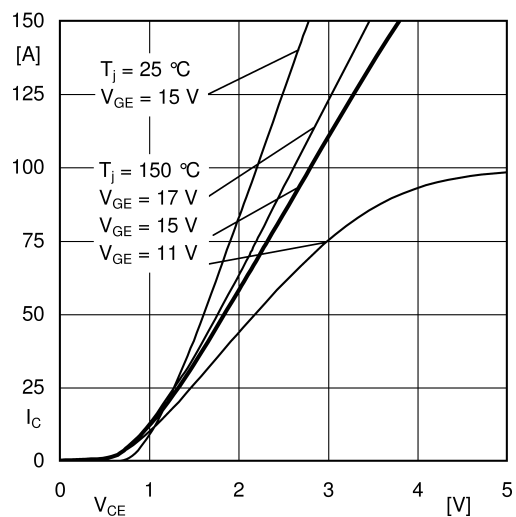


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

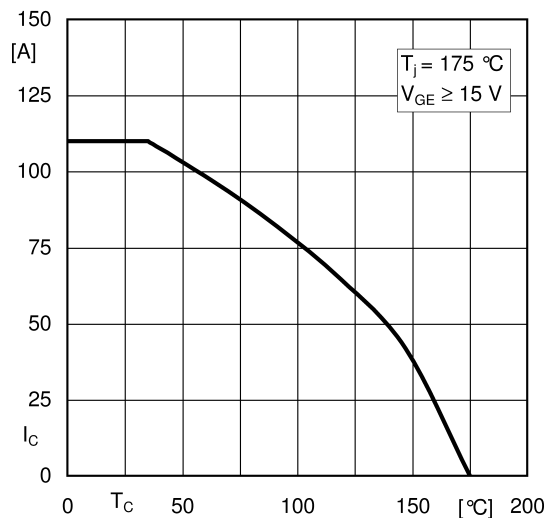


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

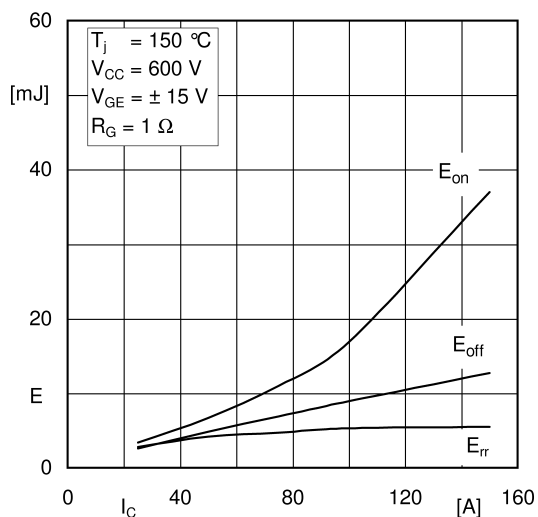


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

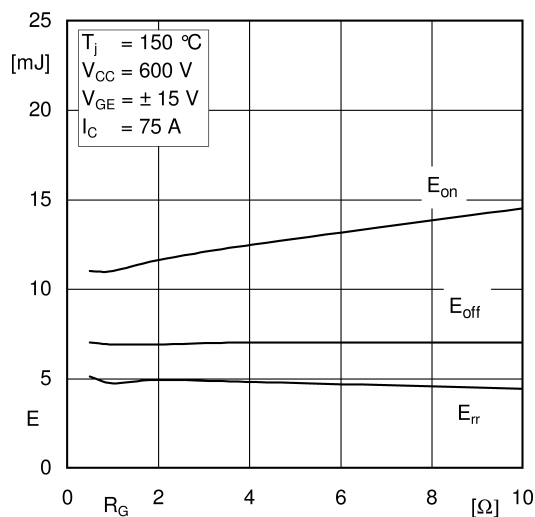


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

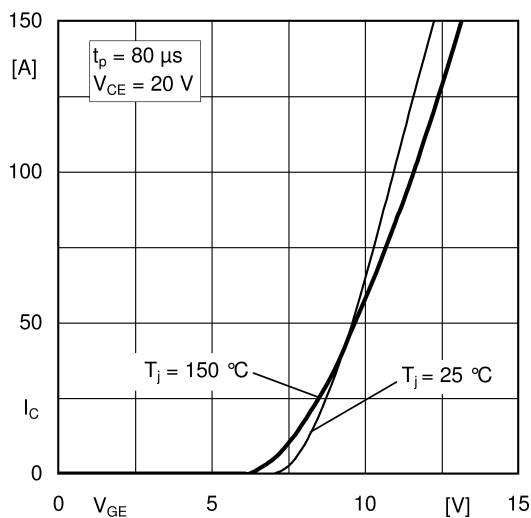


Fig. 5: Typ. transfer characteristic

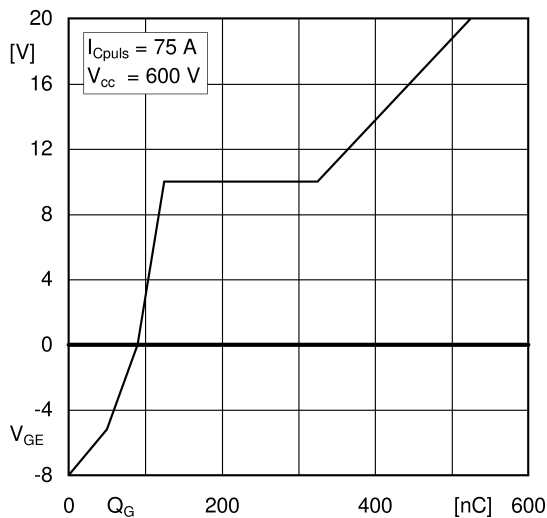


Fig. 6: Typ. gate charge characteristic

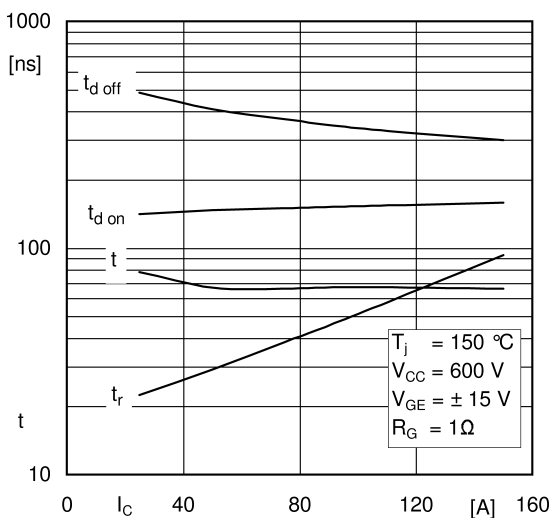


Fig. 7: Typ. switching times vs. I_C

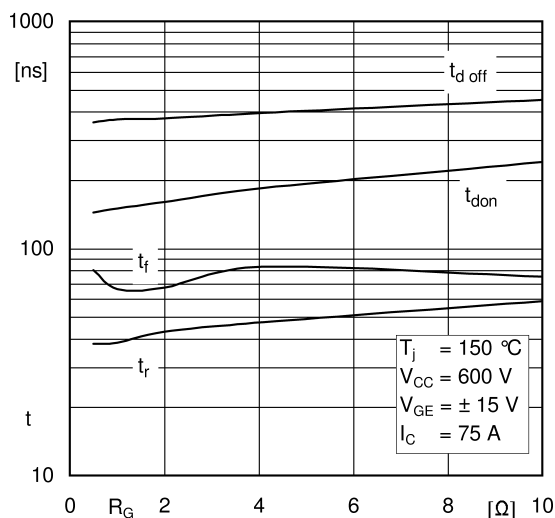


Fig. 8: Typ. switching times vs. gate resistor R_G

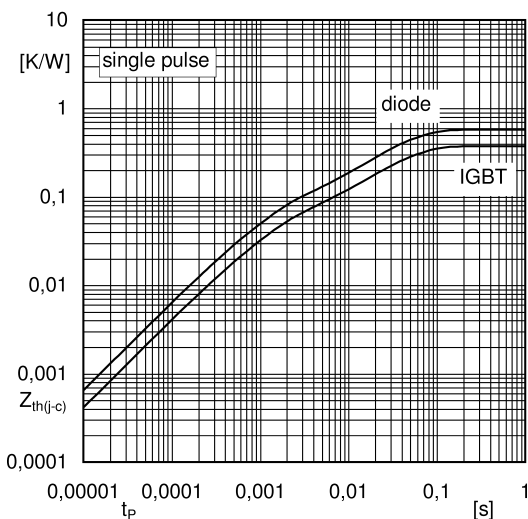


Fig. 9: Transient thermal impedance

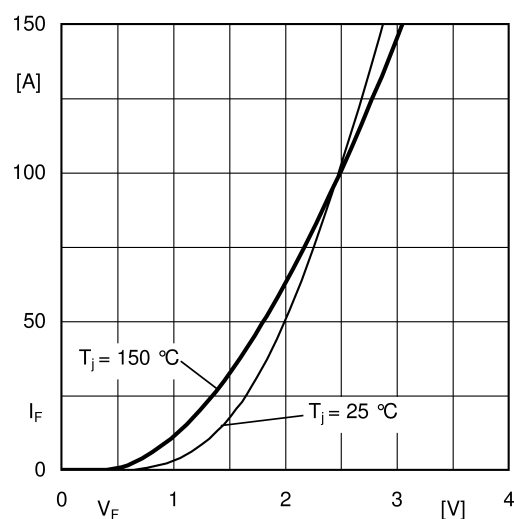


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

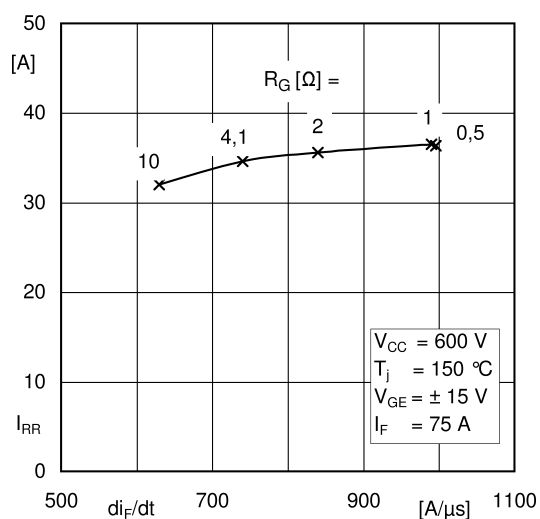


Fig. 11: CAL diode peak reverse recovery current

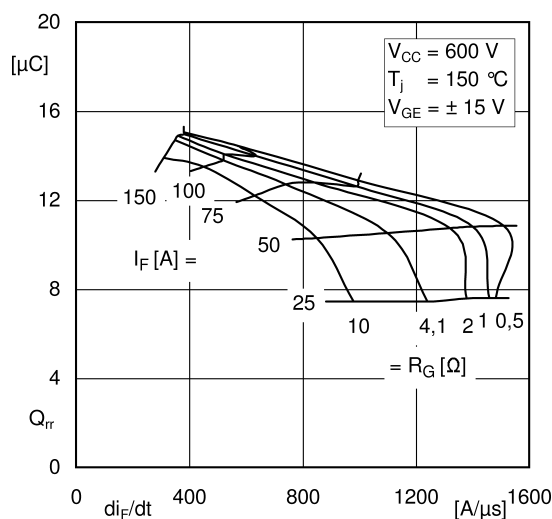
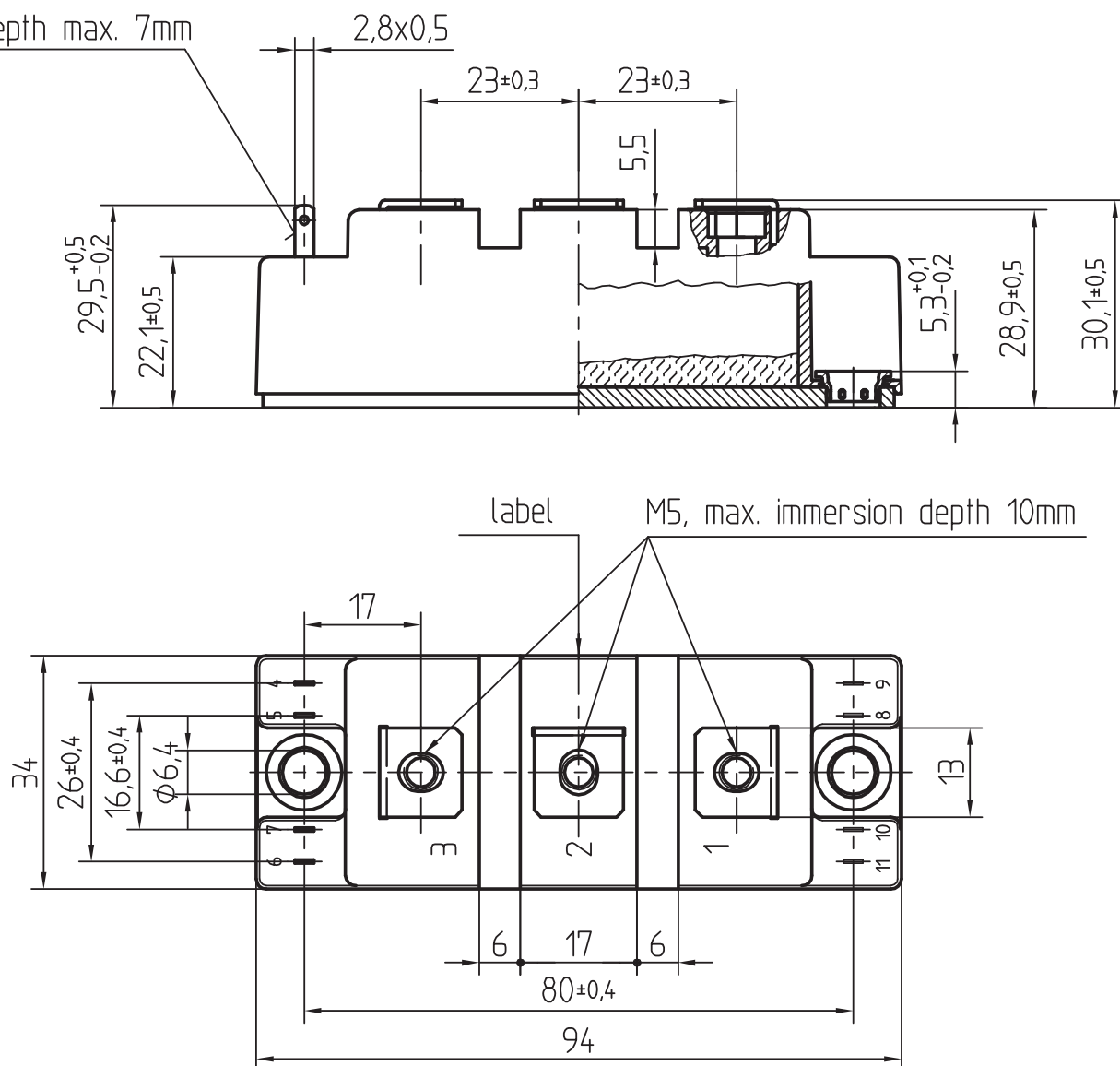


Fig. 12: Typ. CAL diode peak reverse recovery charge

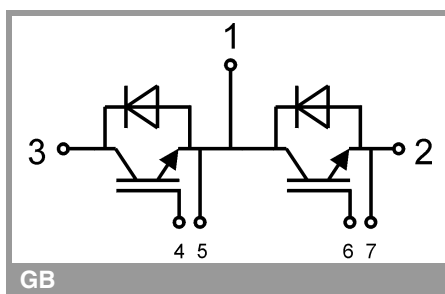
Dimensions in mm

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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