

## SKM75GB12T4



## Fast IGBT4 Modules

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## 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\*

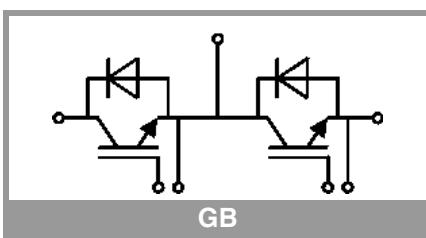
- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

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

Absolute Maximum Ratings		Values	Unit
Symbol	Conditions		
<b>IGBT</b>			
$V_{CES}$	$T_j = 25^\circ\text{C}$	1200	V
$I_c$	$T_j = 175^\circ\text{C}$	115	A
		88	A
$I_{Cnom}$		75	A
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$	225	A
$V_{GES}$		-20 ... 20	V
$t_{psc}$	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	10	$\mu\text{s}$
$T_j$		-40 ... 175	$^\circ\text{C}$
<b>Inverse diode</b>			
$I_F$	$T_j = 175^\circ\text{C}$	97	A
		73	A
$I_{Fnom}$		75	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	150	A
$I_{FSM}$	$t_p = 10\text{ ms, sin }180^\circ, T_j = 25^\circ\text{C}$	430	A
$T_j$		-40 ... 175	$^\circ\text{C}$
<b>Module</b>			
$I_{t(RMS)}$		200	A
$T_{stg}$		-40 ... 125	$^\circ\text{C}$
$V_{isol}$	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V

Characteristics		min.	typ.	max.	Unit
Symbol	Conditions				
<b>IGBT</b>					
$V_{CE(sat)}$	$I_c = 75\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.28	2.45	V
$V_{CE0}$	chiplevel	$T_j = 25^\circ\text{C}$	0.80	0.90	V
		$T_j = 150^\circ\text{C}$	0.70	0.80	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	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		$\text{mA}$
		$T_j = 150^\circ\text{C}$	-		$\text{mA}$
$C_{ies}$		$f = 1\text{ MHz}$	4.4		nF
$C_{oes}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	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		$\Omega$
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	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		$\text{mJ}$
$t_{d(off)}$	$R_{G\text{ on}} = 1\text{ }\Omega$	$T_j = 150^\circ\text{C}$	370		ns
$t_f$	$R_{G\text{ off}} = 1\text{ }\Omega$ $di/dt_{on} = 1600\text{ A}/\mu\text{s}$ $di/dt_{off} = 950\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	66		ns
$E_{off}$		$T_j = 150^\circ\text{C}$	6.9		$\text{mJ}$
$R_{th(j-c)}$	per IGBT		0.38		K/W





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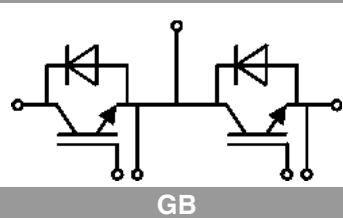
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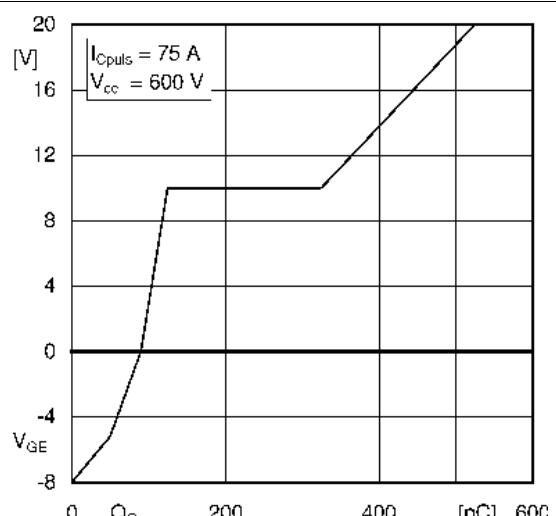
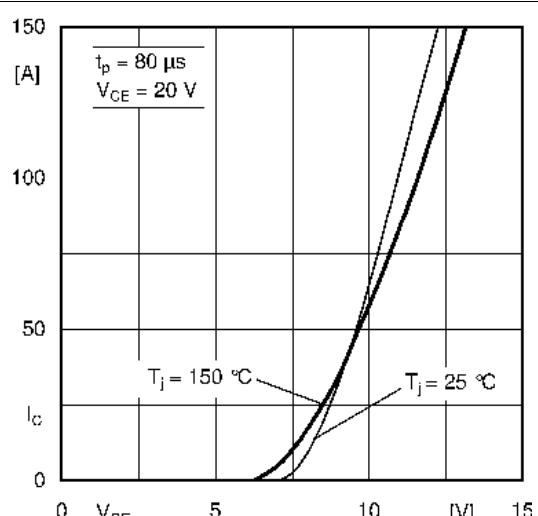
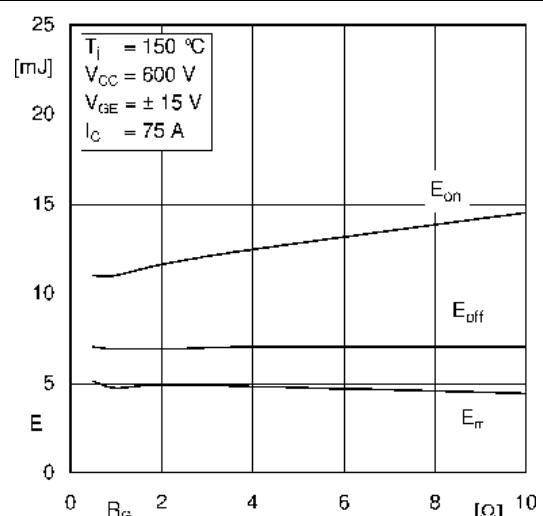
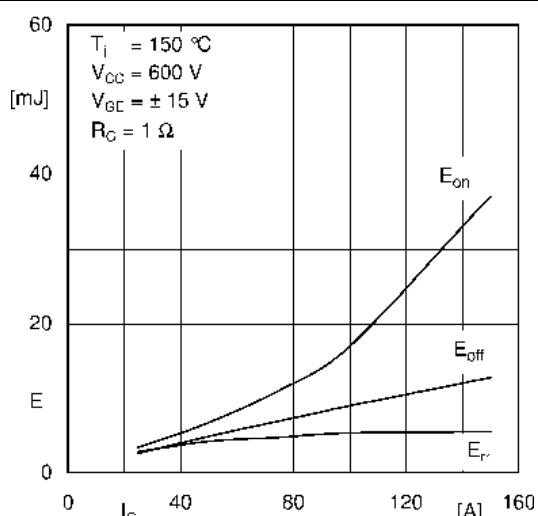
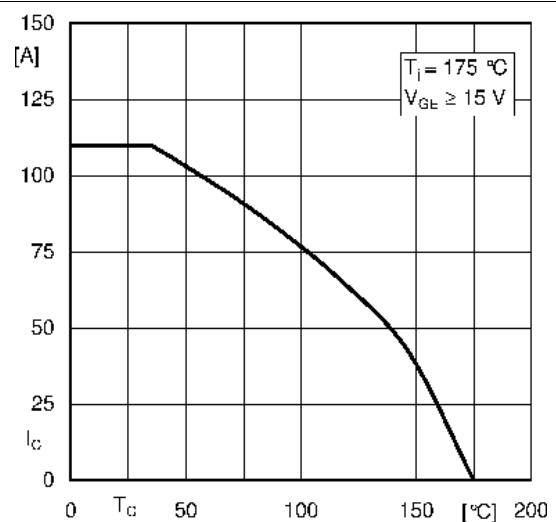
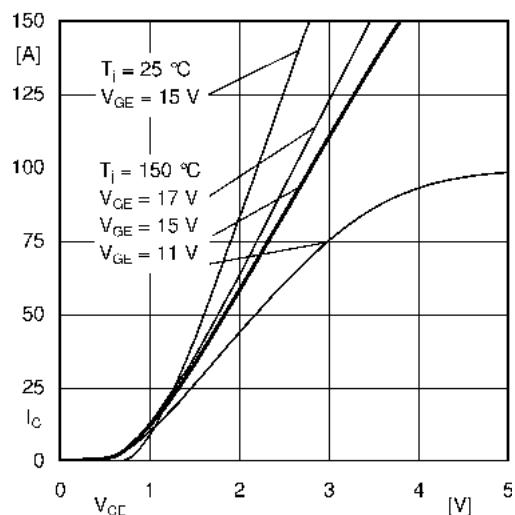
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Characteristics		Symbol	Conditions	min.	typ.	max.	Unit						
Inverse diode													
<b>Symbol</b>													
$V_F = V_{EC}$	$I_F = 75 \text{ A}$		$T_j = 25^\circ\text{C}$		2.17	2.49	V						
	$V_{GE} = 0 \text{ V}$ chiplevel		$T_j = 150^\circ\text{C}$			2.11	2.42						
$V_{FO}$	chiplevel		$T_j = 25^\circ\text{C}$		1.30	1.50	V						
			$T_j = 150^\circ\text{C}$			0.90	1.10						
$r_F$	chiplevel		$T_j = 25^\circ\text{C}$		12	13	$\text{m}\Omega$						
			$T_j = 150^\circ\text{C}$			16	18						
$I_{RRM}$	$I_F = 75 \text{ A}$		$T_j = 150^\circ\text{C}$		37		A						
	$dI/dt_{off} = 990 \text{ A}/\mu\text{s}$		$T_j = 150^\circ\text{C}$			12.6							
$Q_{rr}$	$V_{GE} = \pm 15 \text{ V}$						$\mu\text{C}$						
	$V_{CC} = 600 \text{ V}$												
$E_{rr}$			$T_j = 150^\circ\text{C}$		4.7		$\text{mJ}$						
$R_{th(j-c)}$	per diode					0.58	K/W						
<b>Module</b>													
$L_{CE}$					30		nH						
$R_{CC+EE'}$	measured per switch		$T_c = 25^\circ\text{C}$		0.65		$\text{m}\Omega$						
			$T_c = 125^\circ\text{C}$		1.09		$\text{m}\Omega$						
$R_{th(c-s)}$	calculated without thermal coupling ( $\lambda_{\text{grease}}=0.81 \text{ W}/(\text{m}^\circ\text{K})$ )				0.04	0.05	K/W						
$M_s$	to heat sink M6				3	5	Nm						
$M_t$	to terminals M5				2.5	5	Nm						
$w$							Nm						
						160	g						





# SKM75GB12T4

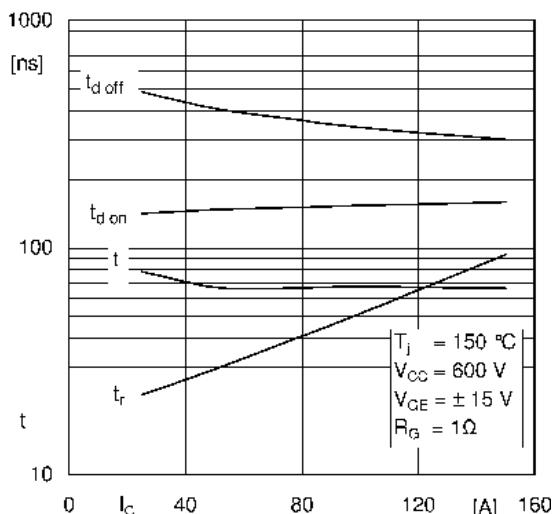


Fig. 7: Typ. switching times vs.  $I_C$

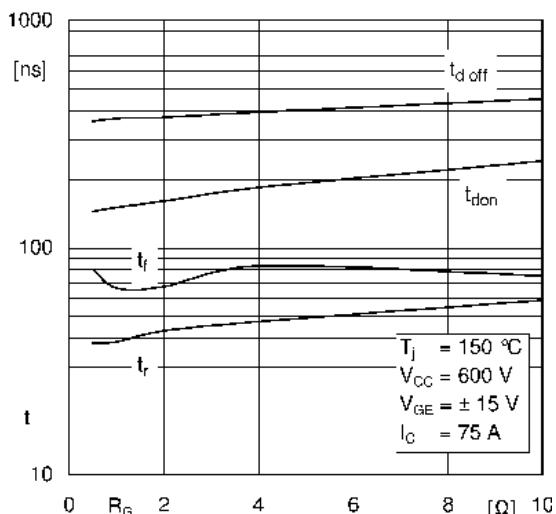


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

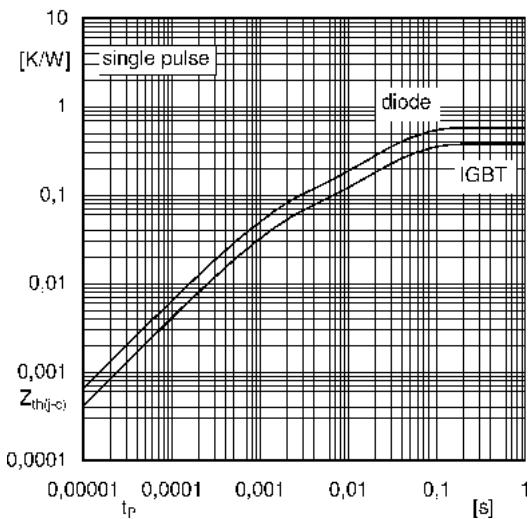


Fig. 9: Transient thermal impedance

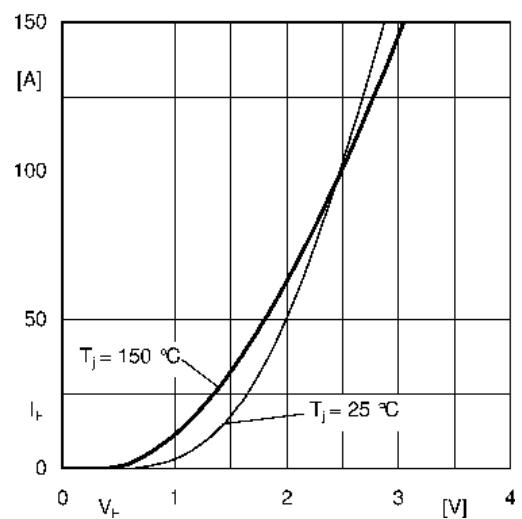


Fig. 10: Typ. CAL diode forward charact., incl.  $R_{CC' + EE'}$

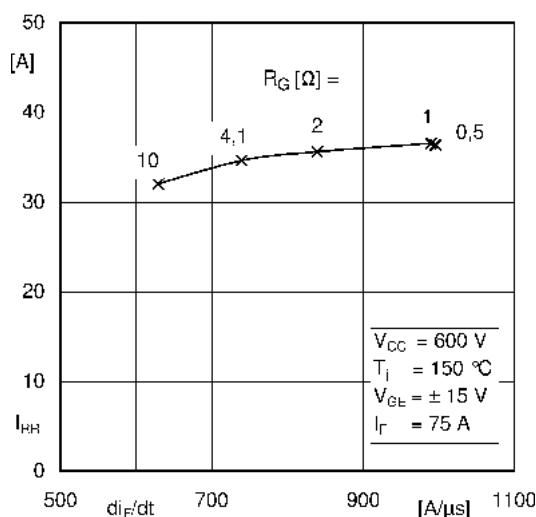


Fig. 11: CAL diode peak reverse recovery current

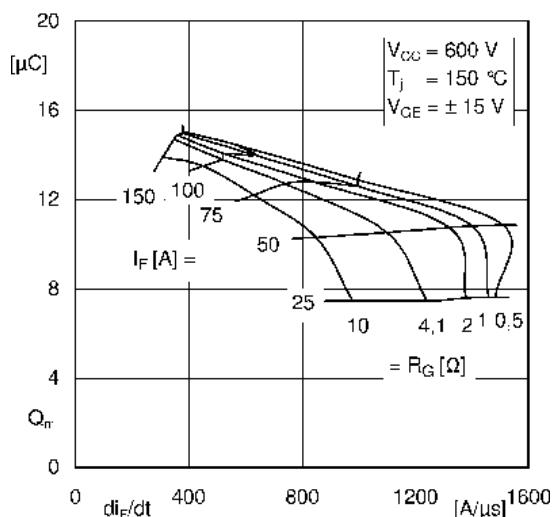
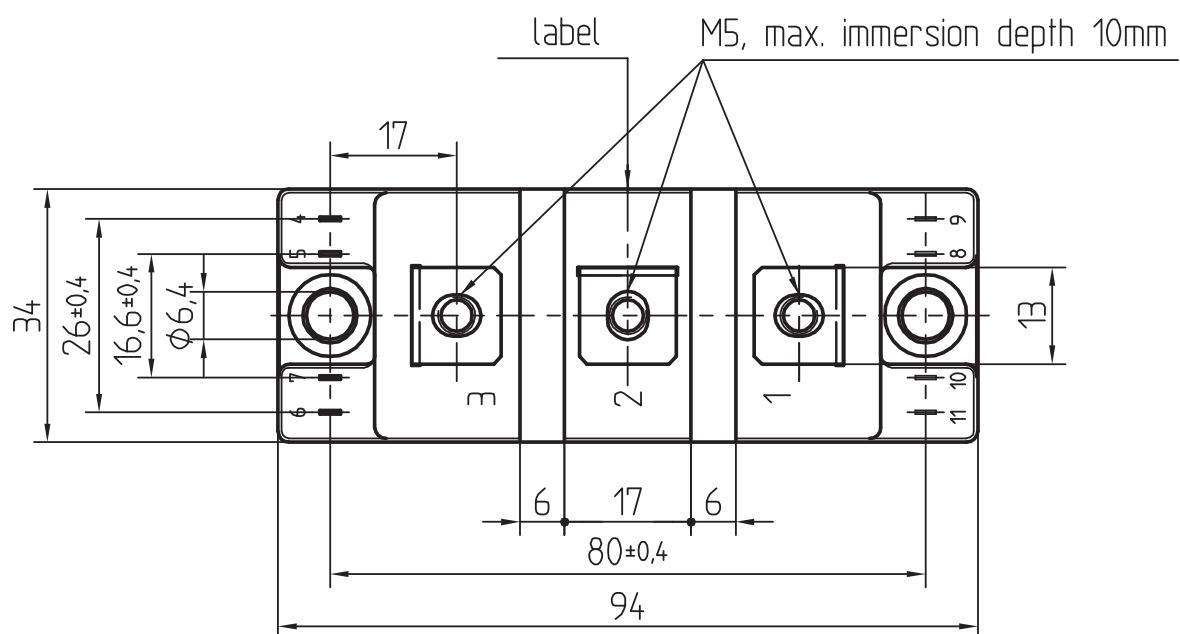
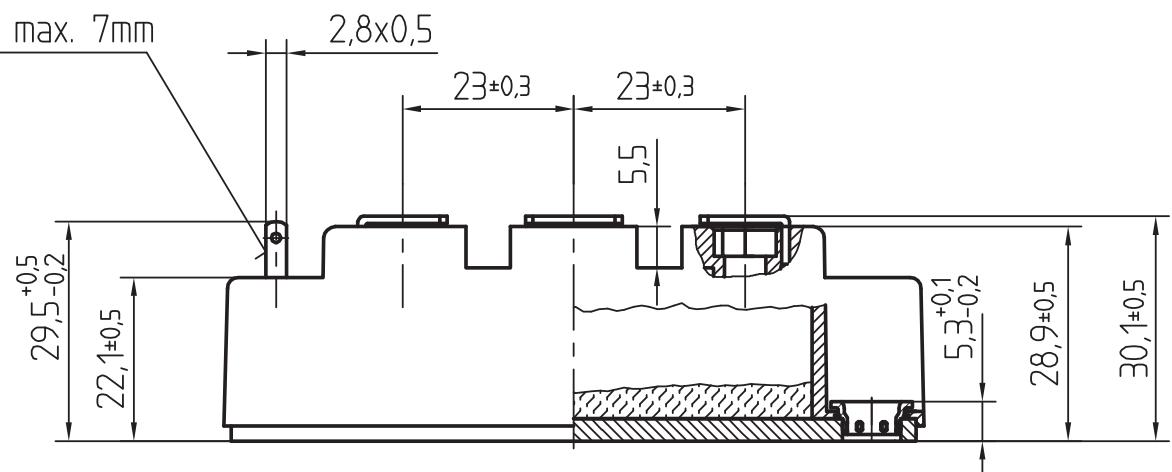


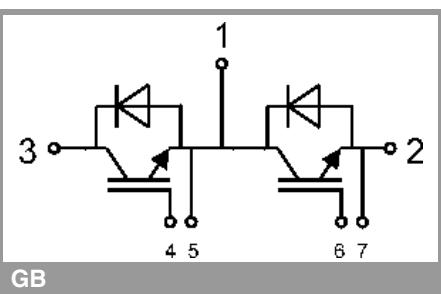
Fig. 12: Typ. CAL diode peak reverse recovery charge

Dimensions in mm

Plug in depth max. 7mm

General tolerance  $\pm 0,5$  mm

SEMITRANS 2



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

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