SKM600GB12E4D1



SEMITRANS 3

IGBT4 Modules

SKM600GB12E4D1

Features*

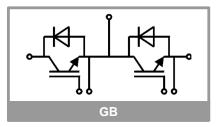
- IGBT4 = 4th generation medium fast trench IGBT (Infineon)
- CAL4HD = 4th generation high density (HD) CAL-diode optimized for low static losses
- Insulated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications

- AC inverter drives
- UPS
- · Electronic welders
- Wind power
- Public transport

Remarks

- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40... +150°C, product rel. results valid for T_j = 150°C
- Max. operating DC link voltage limited to 800V



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	860	Α
		T _c = 80 °C	702	Α
I _{Cnom}			600	Α
I _{CRM}			1800	Α
V _{GES}			-20 20	V
t _{psc}	$V_{CC} = 800 \text{ V}$ $V_{GE} \le 15 \text{ V}$ $V_{CES} \le 1200 \text{ V}$	T _j = 150 °C	10	μѕ
Tj			-40 175	°C
Inverse d	iode			
V_{RRM}	T _j = 25 °C		1200	V
I _F	Continuous DC forward current		600	А
I _{FRM}			1200	Α
I _{FSM}	10 ms, sin 180°, T _j = 25 °C		2736	Α
Tj			-40 1 7 5	°C
Module				
I _{t(RMS)}		·	500	А
T_{stg}	module without TIM		-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 = 600 A V _{GE} = 15 V chiplevel	T _j = 25 °C		1.80	2.05	V	
		T _j = 150 °C		2.05	2.42	V	
V _{CE0}	chiplevel	T _j = 25 °C		0.80	0.90	V	
		T _j = 150 °C		0.75	0.80	V	
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		1.67	1.92	mΩ	
		T _j = 150 °C		2.2	2.7	mΩ	
V _{GE(th)}	$V_{GE} = V_{CE}$, $I_C = 24$ mA		5	5.8	6.5	V	
I _{CES}	$V_{GE} = 0 \text{ V}, V_{CE} = 12$			5	mA		
C _{ies}		f = 1 MHz		37.2		nF	
C _{oes}	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	f = 1 MHz		2.32		nF	
Cres		f = 1 MHz		2.04		nF	
Q_{G}	V _{GE} = - 8V + 15 V			3400		nC	
R _{Gint}	T _j = 25 °C			1.3		Ω	
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		175		ns	
t _r	I_{C} = 600 A V_{GE} =+15/-15V R_{Gon} = 1.8 Ω	T _j = 150 °C		75		ns	
Eon		T _j = 150 °C		55		mJ	
t _{d(off)}	$R_{Goff} = 1.2 \Omega$	T _j = 150 °C		530		ns	
t _f	di/dt _{on} = 8050 A/µs	T _j = 150 °C		120		ns	
E _{off}	$\begin{array}{l} \mbox{di/dt}_{\mbox{\scriptsize off}} = 4100 \mbox{ A/} \mu \mbox{s} \\ \mbox{dv/dt} = 3500 \mbox{ V/} \mu \mbox{s} \\ \mbox{L}_{\mbox{\scriptsize s}} = 25 \mbox{ nH} \end{array}$	T _j = 150 °C		80		mJ	
R _{th(j-c)}	per IGBT				0.049	K/W	
R _{th(c-s)}	per IGBT, $(\lambda_{grease} = 0.81 \text{ W/(m*K)})$			0.032		K/W	

SKM600GB12E4D1



SEMITRANS® 3

IGBT4 Modules

SKM600GB12E4D1

Features*

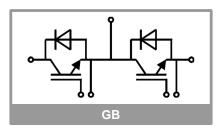
- IGBT4 = 4th generation medium fast trench IGBT (Infineon) Exciter module
- CAL4HD = 4th generation (HD)
 CAL-diode optimized for low static losses
- Insulated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic welders
- Wind power
- Public transport

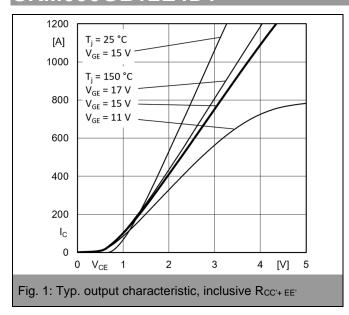
Remarks

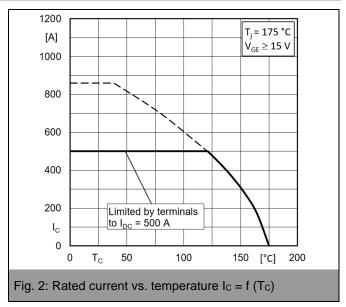
- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40... +150°C, product rel. results valid for T_j = 150°C
- Max. operating DC link voltage limited to 800V

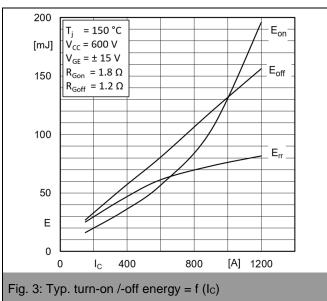


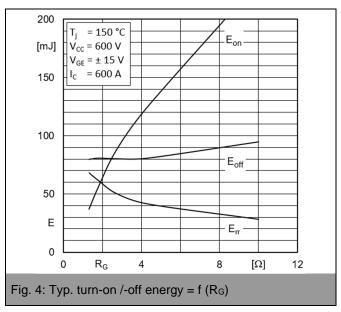
Characte	eristics					
Symbol	Conditions	min.	typ.	max.	Unit	
Inverse	diode					•
$V_F = V_{EC}$	$I_F = 600 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplevel	T _j = 25 °C		1.80	2.13	V
		T _j = 150 °C		1.83	2.17	V
V_{F0}	chiplevel	T _j = 25 °C		1.19	1.40	V
		T _j = 150 °C		0.97	1.10	V
r _F	obiolovol	T _j = 25 °C		1.02	1.21	mΩ
	chiplevel	T _j = 150 °C		1.44	1.79	mΩ
I _{RRM}	$V_{CC} = 600 \text{ V}$ $I_F = 600 \text{ A}$ $V_{GF} = -15 \text{ V}$	T _j = 150 °C		680		Α
Q _{rr}		T _j = 150 °C		130		μC
Err	$di/dt_{off} = 9200 \text{ A/}\mu$	IS T _j = 150 °C		60		mJ
R _{th(j-c)}	per diode				0.095	K/W
R _{th(c-s)}	per diode, (λ _{grease}	= 0.81 W/(m*K))		0.039		K/W
Module						
L _{CE}				15		nΗ
D	measured per	T _j = 25 °C		0.55		mΩ
R _{CC'+EE'}	switch	T _j = 150 °C		0.85		mΩ
R _{th(c-s)1}	calculated without thermal coupling (\(\lambda_{grease} = 0.81 \) W/(m*K))			0.0088		K/W
R _{th(c-s)2}	including thermal coupling, Ts underneath module (λgrease=0.81 W/(m*K))			0.014		K/W
Ms	to heat sink M6		3		5	Nm
M _t	1	to terminal M6	2.5		5	Nm
				-		Nm
W					325	g

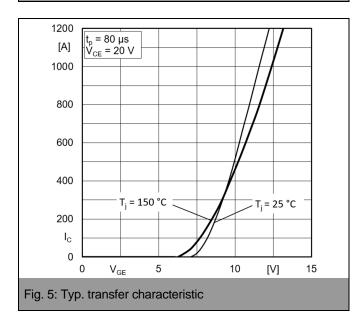
SKM600GB12E4D1

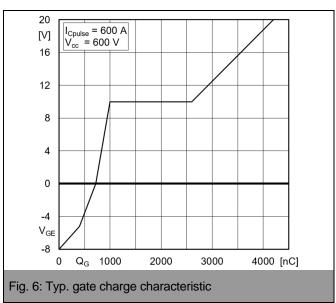












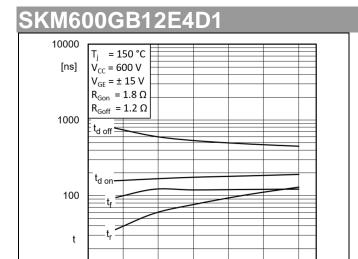


Fig. 7: Typ. switching times vs. Ic

400

800

[A] 1200

10

0

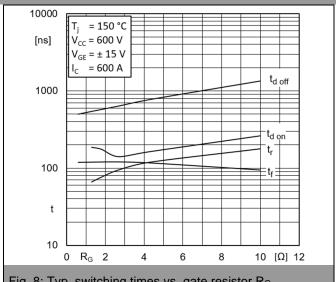


Fig. 8: Typ. switching times vs. gate resistor R_G

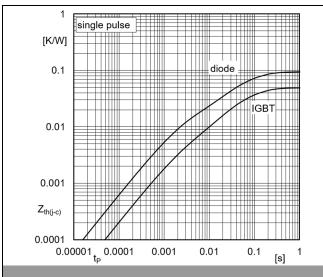


Fig. 9: Transient thermal impedance

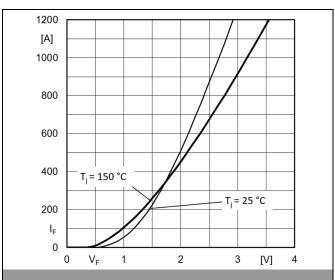


Fig. 10: Typ. CAL diode forward charact., incl. Rcc'+ EE'

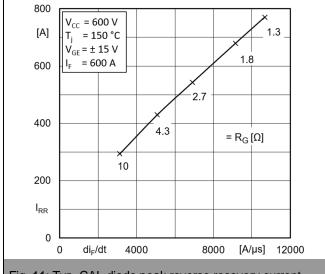


Fig. 11: Typ. CAL diode peak reverse recovery current

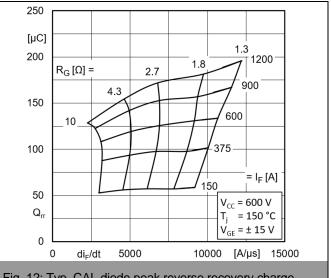
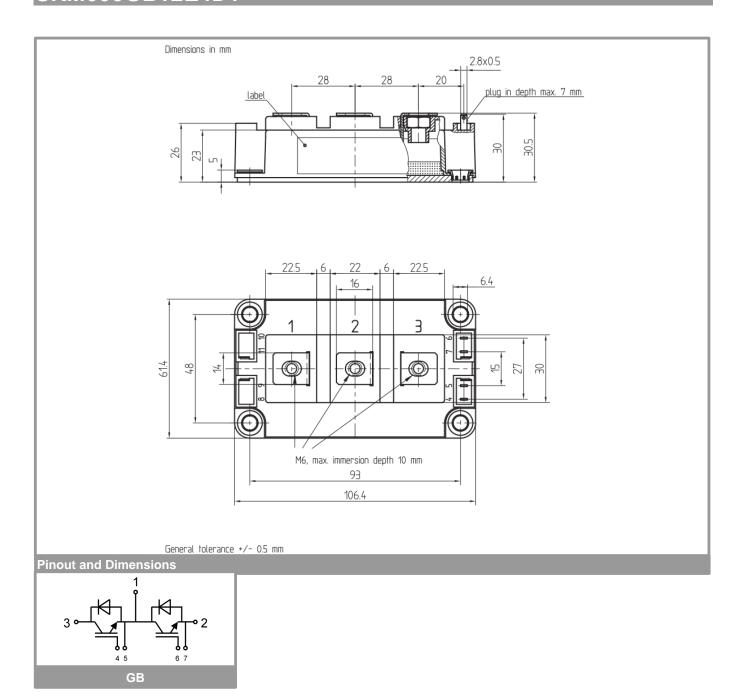


Fig. 12: Typ. CAL diode peak reverse recovery charge



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

*IMPORTANT INFORMATION AND WARNINGS

The specifications of SEMIKRON products may not be considered as guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of SEMIKRON products describe only the usual characteristics of products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Application adjustments may be necessary. The user of SEMIKRON products is responsible for the safety of their applications embedding SEMIKRON products and must take adequate safety measures to prevent the applications from causing a physical injury, fire or other problem if any of SEMIKRON products become faulty. The user is responsible to make sure that the application design is compliant with all applicable laws, regulations, norms and standards. Except as otherwise explicitly approved by SEMIKRON in a written document signed by authorized representatives of SEMIKRON, SEMIKRON products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of noninfringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets or other intellectual property rights, nor the rights of others. SEMIKRON makes no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements our products may contain dangerous substances. For information on the types in question please contact the nearest SEMIKRON sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. SEMIKRON reserves the right to make changes.